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AMERICAN UNIVERSITY OF BEIRUT

LEBANESE ANGLOPHONE POST-WAR NOVEL AND
CRITICAL CODING:
THE NOVEL ANALYSIS PROGRAM

by
TRACEY MAROUN EL HAJJ

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AN ABSTRACT OF THE THESIS OF

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Social Network Analysis (SNA) is a field of digital inquiry that provides literary studies with exploratory networks. In spite of the availability of general network visualization tools, the complexity of novelistic text necessitates a more targeted and discipline specific tool. For the purpose of literary analysis, the Novel Analysis Program (NAP) was created. Put to test with a specific corpus of two Lebanese Anglophone post-war novels, the interaction between SNA and literary theory, as well as deep reading and interpretation were rendered possible.

The Novel Analysis Program (NAP) collects the data by asking users for input, and stores them in a corresponding Neo4j database. The data is born interconnected, yet still stands alone. The automation of data collection is at the level of the connections and relationships between nodes. Once the data are stored and finalized, the user can query the database. What differentiates NAP from data collection and storage in tradition structured form in spread sheets are two main issues: automatically connected nodes and common nodes.

Using NAP and readily available tools has opened analytical horizons and supported existing hypothesis. This thesis will argue that literature, critical coding, and social network analysis can work together and enhance each other.

Putting together these disciplines allows pushing the research in the three of them, presenting one with visuals that raise different questions, tackle abstract concepts, and answer unreciprocated problems. The inherent structures of the novels are addressed and explored, from an event directed perspective (*Koolaids*) and a feminist point of view (*Somewhere, Home*).

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To the beautiful soul of Jeddo Emile.

INTRODUCTION

Place is a key element studied in the literature on post war Anglophone Lebanese novels. In her book *Lebanese Post-War Anglophone Novel: Home Matters in the Diaspora*, Syrine Hout argues that some Lebanese writers like Rabih Alameddine imply in their works that home is a place disconnected from family or people, whereas others like Nada Awar Jarrar reveal that home is connected to the people and family who root one to a certain space. This distinction here calls upon two distinct notions of place and space, human and post-human, the former aligning with Jarrar's position, and the latter with Alameddine's. Jarrar's *Somewhere, Home*, which narrates the story of Maysa and other notable characters such as Alia, takes us through time and space. Maysa's ancestors are called upon to awake in her the 'Home' sense that she is longing for; the readers are also taken to Africa to visit men of different generations, and learn more about their ways of thinking and their existence through time.

Digital humanities have presented the world of research with computational tools that allow one to approach humanistic subjects from new and exciting angles. In *Graphs, Maps, and Trees*, a book that in 2005 did not explicitly use the term "digital humanities," Franco Moretti argues for the use of "abstract models" in quantitative as well as qualitative research. To highlight the importance of qualitative evidence, in his article on Social Network Analysis, "Network Theory, and Plot Analysis," he sketches networks to address the relationships between the characters in Shakespeare's *Hamlet* as a system. Moretti used rather primitive static visualizations (especially in *Graphs, Maps, Trees*).

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This thesis argues that novels are complex systems and that social network analysis is one way of modeling those systems. Network visualization provides a way of imaging and exploring the complexity of the novelistic world. It does so by the creation of images, and yet, it is not a visual language that literary critics instinctively grasp. Network visualizations model a number of complex relations, and I will be using a number of them in the chapters that follow. Explaining such complex visuals, as they are embedded in the prose of literary analysis is a daunting task, since they are ideally meant to be explored interactively. In the appendices of this thesis can be found the data and the code used for any researcher who might wish to repeat these literary experiments.

Another issue raised by the application of digital tools to literature, includes the limits of machine based analysis. Computers deal with information in a repetitive and non-heuristic way, able to carry out more matching or counting that a human can in a lifetime, but lacking the subtleties of the human mind. Digital projects, or digital analysis of traditional subjects in the humanities are often called "failed models," for the limitations that reveal themselves along the way are quite numerous. This does not mean that we should give them up entirely. Twentieth-century statistician George E.P. Box is attributed a saying which sums this up quite well: "All models are wrong, but some are useful." Applications of social network analysis to literature are still embryonic, but promising. Similar studies have been carried out in the domains of social studies, media, and so on, where scholars argue over the meaning of words and edges in solid systems. According to Bruno Latour, as put in his "Social Theory and the Study of the Computerized Work Sites:"

Characters in the story may change, and it is because they change so much, shifting quickly out to other times, spaces and actants that they deploy many possible worlds, worlds which were not even envisioned a few minutes ago. Characters in the script dispatches roles, appointments, performances in a space and time trajectory which is also going to produce novelty but not of the same kind as that of the story (3).

That is, the evolution of characters in a given scenario can be traced throughout their conditional diversities, so as to identify their possible belonging to a dynamic system. In addition, Moretti states at the end of his article "Network Theory, and Plot Analysis," that what limits one work is the same obstacle that opens way to another. Agarwal et al.'s "Automatic Extraction of Social Networks from Literary Text" is an example of a semi-automated extraction of data from literature.

Quantitatively speaking, we can make lists of the women mentioned by the novels, classify them appropriately, giving them values or numerical weight, and we can track them down and find spatial coordinates to associate with them. Yet, this has to be done in parallel with, and in support of, qualitative evidence. A number of questions arise along the way: how are the relationships to be identified? What are the connections between characters? Are the networks to be weighed? Even when we have made our choices about vocabularies for classification, much work remains to be done. Digital quantitative modeling aiming at data representations is a long arduous process. Such data is extracted manually and the process of collecting information for a computer model creates tensions between the quantitative and the qualitative. This tension raises numerous questions, but

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instantly opens the door to a deeper analysis, and to a more critical work that leans more towards Moretti's multidimensional approach, including not only character but also setting.

In addition to the elements of gender and space, Syrine Hout points to memory as an important feature of Lebanese Anglophone novel. Jarrar's *Somewhere, Home* is a novel widely characterized by its memory element, wherein the narrator deliberately goes back in time, so as to study and learn more about herself. Not only does this novel cover the element of memory, but also that of gender, since she focuses on her female ancestors as she tells her husband in a chapter of part one: she explains that she wants to revisit the females of her past for her to acknowledge all the ways in which they have affected her. In this thesis I propose visualizing some of the complex multidimensionality of two Lebanese post war novels. As Moretti explains in "Network Theory, Plot Analysis," visualization allows the plot to be gathered in one place. In other words, what is separated in the novel becomes connected in the graph. This novel being narrated by several narrators, deeply layered in time, and delicately deconstructed in plot, could well use such an option. This thesis looks into how a network might connect plots, narrators, and time layers, revealing deeper interesting connections throughout a text. Also, gender beinga key issue in Jarrar's work, a social network could shed light on a web of gendered relations that are not obvious on the surface. The edges (types of relations), as explains Moretti, link the nodes (people, places, and time) and allow significant interactions to be recognized as such.

Another important option that characterizes network theory is what Moretti calls "experiment[al]" (4). Networks are composed of a series of relations and as a digital case of form, they are designed as visual objects. A network is not however a static hand drawn

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object, it can be manipulated, and does allow the creator (or even the receiving audience) to experiment with the results adapting different perspectives. In application to *Hamlet*, Moretti does so to highlight centrality of characters who do not seem to be as center while reading. In *Somewhere, Home*, one can experiment with the feature of memory, through the element of time. Hence, time layers can be taken off the network, so as to reveal important present characters; another experimental move is to stabilize characters from a specific time layer, and see how the network moves around them. One can also apply experiments to both gender and memory at the same time, which should allow us to see deeper relations of plot and story. Therefore, experimenting with a complex network, which is not an option without digital tools, allows one to step beyond primary results, shedding new light on the structures and formations of novels. This way of looking at the postmodern literary text is provocative in as much as it suggests that there may be underlying patterns in narrative that have escaped traditional critics of the postmodern which address fragmentation and discontinuity. Talking about "Place and the Paradox of Modernity," Timothy Oakes argues that:

> Place, […], may be conceived as the terrain upon which this struggle took place and was made meaningful, a terrain of fragmentation and instability, demanding yet simultaneously denying repair. In the tradition of critical realism, especially, the landscapes of modernity were represented by the myriad struggles between individual subjectivities and the forces of abstraction and objectification (520).

However, in this thesis, and as suggested above, it will be argued that the network models will go against the fragmented and instable literary models, to reflect on both abstraction and objectification.

Digital tools and methods present scholars with a wide range of possibilities that have not been available for traditional literary study. They stage a productive interaction between qualitative and quantitative evidence that allow a dynamic analysis of plot, characters, literary elements, and genre-specific features, and this with a large amount of data from across the whole novel, or corpus of novels. In the world of post-war Lebanese novel, computationally constructed maps and networks can help us highlight the importance and effects of major issues such as memory, space, and gender.

The maps, the networks, and the graphs are as previously argued, valued visual representations of literary works. This issue raises questions about the viability of the relationship between words and images, and the acceptability of arguing the word with an image. This topic is not one that is completely unvisited, but has been raised by many scholars such as Adorno, Benjamin, Mitchell, and others.

Creating a social network from a novel is a delicate process that results in a translation from word to image, as structured data. The words' element does not exclude itself from the final visual result, but rather allows the characters of the novel in question to be present on the image. Agency and power, thus, are those of the characters and their interconnectedness, instead of those of the creator's: they are simply servants to the novel itself, and the software generating the networks. The images and words are in power over the creator, however, the audience has the right to read and interpret the data as it sees fit,

for this is now its project to decipher (as long as it remains faithful to the novel and the networks).

"Images, like histories and technologies, are our creations, yet also commonly thought to be 'out of control' – or at least out of 'someone's' control, the question of agency and power being central to the way images work" (Mitchell 6). This sentence puts together images, history, technology, authorship, power, and creativity. What remains explicitly exterior to it, yet implicitly as dominant as any other element, is the element of words. Images translate histories, give elegance to technologies, illustrate our creations, tame our beasts (at some times), and exist with power and agency; words are accomplices in this too. Just as agency and power are central to the work of images, they are central to the work of words. If one puts both images and words to work, together, in a united sense, agency and power would make the work in question out of the control of its authors, and would be reported to the audience, just as histories and technologies, to be absorbed and invested, outside of their own real and authority.

The process to be discussed is one that transforms the same piece of art, into another form, relying on the art of translation, using digital tools. According to Adorno:

> [t]he different arts may aim at the same subject, but they become different because of the manner in which they mean it. Their substantial content lies in the relation between the what and the how. They become art by virtue of this substantial content. But this needs the how, their particular language; if it went in search of something larger, beyond the particular form of art itself, it would be destroyed (Adorno 377).

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The "manner" in this project is what differentiates the images from the novel source, and what thus allows different interpretations. The 'language' here is the image, the lines, as well as the use of words (to name and identify the characters), so as to remain within the essential form of art given within the novel. There should not be destruction of the art work, but a deconstruction. Network visualization hence is a dynamic system that emerges from the translational deconstruction of the word into an image. Nothing is to be lost in the process, but rather transformations happen resulting with evolving outcomes and elaborations.

In my thesis I am interested in novelistic space as a whole system. The point of this exercise is to trace the connections hidden between the lines: when one is close reading a novel, one follows the plot, gets hooked to a few characters, looks for dilemmas, hunts for political analysis, gender analysis, or even character relations. Yet, when one scene of the novel brings together many characters in what seems to be a minor reference, the reader may skip it, or could be inclined towards an intended ignorance. This is one of the advantages of social network analysis, for when encoding (representing the text in a network) we pay close attention to interactional details, which reveals issues that could not be revealed otherwise. Having such a novelistic model would be very difficult indeed to draw, and redraw, manually on paper. A computer assisted network allows for the dynamic discovery of it.

The resulting networks can be thought of as images; visualization in digital humanities is one of its important advantages, where the power of the image is put to work, vis-a-vis the humanistic works studied. As Presner et al. suggest, "Over the past decade, the

methods, media, and materiality of humanities research have undergone dramatic change, with massive new possibilities emerging for authorship, creative design, meaning-making, data curation, interaction, and dissemination of scholarship" (20). The authors continue to tell how digital humanities create large and complex data to be analyzed, but also link humanities to algorithmic modes of analysis (20). This discipline thus furthers the design of visual illustrations of humanities, through computational tools and methods, hence opening an entire horizon of exploration.

"The quantities approach to literature can take several different forms - from computational stylistics to thematic databases, book history, and more" (Moretti 4); this approach is a form of critical reading that directs the research from the theoretical to concrete. Images of calculated analysis and reading allocate meaningful literature to representative data. As Moretti suggests, such a process makes one ask questions (via quantitative data collection) and leads the way towards intended solutions and answers (via the form of study) (26). To relate this to literature, "[t]he novel is, so to speak, the substance of the form, and deserves a full general theory, subgenres are more like accidents, and their study, however interesting, remains local in character, without real theoretical consequences" (30). In other words, the narrative provides the juice of the research giving space for theoretical analysis and integration.

Traditionally, the most common kind of literary translation of the visual has been theatre or movie adaptations. However, Franco Moretti suggests a difference between visualized digital analysis and film adaptations, arguing that:

[w]hen we watch a play, we are always in the present: what is on stage, is; and then it disappears. Here, nothing ever disappears. What is done cannot be undone. Once the Ghost shows up at Elsinore things change forever, whether he is on scene or not, because he is never not there in the network. The past becomes past, yes, but it never disappears from our perception of the plot (4).

Networks are able to ignore sequence. What is to be highlighted here is the importance of the constant presence of the characters, and one's ability to go back and forth between past and present or even to collapse time. During a play or a movie, one is bound to abide by the sequence produced by the artist; the audience cannot separate itself from the development of the characters, nor go back and forth. The scenes are set with specific characters who can hardly be perceived outside of the specific time and space they show up in. However, this fixed representation is more flexible because the characters are present, even if the scene has passed: the creator of the networked image as well as the receiver, are in control of the characters' presence. Furthermore, the multi-dimensionality of the Lebanese post-war novel emerges from the network through connections between time and gender, memory, time and character, gender oriented relationships, and other connected elements.

In addition, Moretti explains that "what is done is never undone; the plot as a system of regions; the hierarchy of centrality that exists among characters; finally – and it's the most important thing of all, but also the most difficult – one can *intervene* on a model; make experiments" (5). The three chapters of this thesis are such experiments. The importance of experimentation is emphasized, for the images can be manipulated in order

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to highlight salient interactions, of which the relevance could not have been underlined via close reading. This will be discussed and illustrated below, while close reading the resulting images. Not to forget, in his same essay "Network Theory, Plot Analysis," Franco Moretti says it clearly, so that the process of visualization is one that could not be simply worked without, especially at this point in the development of academia and research:

> 'Seen' is the keyword here. What I took from network theory were fewer concepts than visualization: the possibility of extracting characters and interactions from a dramatic structure, and turning them into a set of signs that I could see at a glance, in a two dimensional space (11).

However, it is possible to detect one of the limitations of Moretti's speed and dimensions. This limitation is indeed the fact that they are hand-drawn. In Moretti's case, the networks are not computer generated. It becomes obvious that when digging for concepts, it is possible to stumble upon some images that would simply reveal themselves as the material with potential. These images have the power of putting forth a representation that portrays its concepts more explicitly than the concept itself. What is suggested, and as will be discussed in later chapters, is that the representations add back an iterative quality and highlight the multi-dimensionality of linking data.

In their lexicon section for the collectively written book *Hyper Cities: Thick Mapping in the Digital Humanities*, Todd Presner and his co-authors discuss mapping in a way that precisely applies to visualizations and networks. Indeed he explains:

> Mapping is not a one-time thing, and maps are not stable objects that reference, reflect, or correspond to an external reality. Mapping is a verb and bespeaks an on-

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going process of picturing, narrating, re-symbolizing, contesting, re-picturing, re-
narrating, re-symbolizing, erasing, and re-inscribing a set of relations. On its most
fundamental level, a map is a graphical representation of a set of relations. Maps are
visual arguments and stories; they make claims and harbor ideals, hopes, desires,
biases, prejudices, and violence. They are always relational, in dialogue or in
contact with someone or something (15).

Moreover, maps are just one form of visuals. Visualization is itself an on-going
process of analysis and interpretation, which starts at one point, but can expand for as long
as scholars have something to add. It is not a fixed and determined finding, but one that
changes with the changes of the facts and the givens. Visuals are representations of
concepts, ideas or narrative, which were previously stored as words, but are translated into
an image (a graph, a map, a tree or a network). They are series of relations shown in a
pictorial diagrammatic form. As the authors argue, "thick maps are never finished and
meanings are never definitive […]. [They] betray their conditions of possibility, their
authorship and contingency, without naturalizing or imposing a singular world view" (19).
Although visualization is attractive, we should be more interested in it as a way of thinking
through a given problem, then fetishizing as "beautiful." On this note, Elijah Meeks
casually blogs that he has:

grown quite familiar with the argument that network visualization, especially the
kind of large-scale network visualization that can be popped out almost like an
assembly-line product, is pretty but uninstructive. Like anyone who plays with
visual representation of data, [he has] retreated into the typical hands-off arguments

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that, "it's instructive in its scale" or "yes, but it gives a sense of the complexity of the network" or "it's to begin interpretation, not to display knowledge (Digital Humanities Specialist, 2011).

Meeks thus focuses on how the aesthetics of a given network are of no value if one is not seeking the informative aspect behind it. The importance of a network is not merely how it looks but the questions it derives and the answers it potentially provides.

In order to highlight the issue of spatial narrative, and so one can visually recognize the dispersion of this novel's elements, I have adopted social network analysis as an approach, drawing upon the value and weight of literary elements across the plots. This approach offers a new level of digital tools that serve for different forms of analyses. In their lexicon section for the collectively written book *Hyper Cities: Thick Mapping in the Digital Humanities*, Todd Presner and his co-authors discuss mapping in a way that precisely applies to visualizations and networks. According to Franco Moretti, in his *Graphs, Maps, Trees*, "Distant Reading" is an approach: where distance is neither negative, nor an obstacle, but a *specific form of knowledge* (1).

As Syrine Hout mentions in the introduction of her book *Post-War Anglophone Lebanese Fiction: Home Matters in Diaspora*, "A large number of Lebanese authors write and publish beyond geographical and linguistic boundaries. In so doing, they have, as Elise Salem puts it, 'broadened and complicated the notion of Lebanon'" (4). Not only do they write in a foreign language, but they also chose to break the boundaries the war imposed on the Lebanese people. Hout adds that the characters' "movements [from] and back to Lebanon" and the "narrative dynamics" stand for statements of diaspora, amnesia, and the

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"long-term effects of the Lebanese Civil War" (10-11). Distance and abstraction are

suggested here, thus bringing forth the issue of space as an element in contrast to concrete

places.

Moreover, Lamia Rustum Shehadeh speaks of the women who had to leave their

homes and work to support their families:

> Displaced mothers or homemakers struggled to bridge the gap between work in the
> home and in the marketplace, between life in the private sphere of the family and
> the public sphere of economics and politics. They had to make this move abruptly
> and without any preparation (50).

The key word here is 'displaced.' A social network with highlights on places is able

to represent the dispersion of Lebanese post-war novel characters across different spaces.

This thesis will argue against the claim of dispersion, however, suggesting that the

characters mostly come back to one space, that being of the unknown. Being displaced, I

argue, means a localization of the characters in a state of undefined spatial existence.

Traditionally, the idea of dispersion is one mapped onto geo-space. Thinking network wise,

or in terms of relationships, this thesis argues for an alternative spatiality of the post-war

Lebanese novel.

The female characters in this genre, however, translate their so-called displacement

through writing, a phenomenon illustrated in Nada Awar Jarrar's *Somewhere, Home*. As

Cooke suggests in her article "Mapping Peace" published in *Women and War in Lebanon*,

"[w]omen have the power, what [is] called the magic power, to heal societal wounds with

the atomic power of their words. Language and literature in such a formulation are not

decorative descriptors external to their subjects, they are interventions in a political

situation" (Shehade 75). She continues to group women Lebanese authors as a group of

"Beirut Decentrists." This term adds to the suggestion that the spatiality is within a

mysterious, undefined place, thus decentralizing the focus of the locational setting. In other

words, the Decentrists are pioneers of the decentralized aspect of the post-war/post-modern

Lebanese novel. The fact that the places in question are undefined creates open horizons for

the spatial element in the novels. Miriam Cooke, in her "Mapping Peace," discusses how

Lebanese women writers have influenced the field of literature, especially Lebanese post-

war literature. She argues that they have deconstructed the myth that men go and fight the

wars for women, and that these writers have revealed the horrors of the war, whereby men

tend to remain silent. Cooke explains that the "Beirut Decentrists" have been physically

scattered all over Lebanon, which was the effect of war on them, but adds that they were

also intellectually scattered: they were torn between remaining silent about the suffering of

women caused by war (and so being accomplices) or speaking and thus doing more harm

than good. One stops and asks then, how did Beirut Decentrists map peace? The answer can

start by returning to the two novels that form the corpus of this thesis, and highlight the fact

that both of them are not committed to one specific place. Just as these writers have been

physically scattered, their scattering of their novels' settings is an attempt at mapping

peace. This, I have claimed, is not a mapping that takes place cartographically. Cooke has

explained how women writers have acknowledged that quiet times have not been ones

without war. It will be argued here that there is one place to which these characters return

which is an unspecified spatial entity.

To my knowledge, this thesis is the first example of literary data being collected from Lebanese post-war novels. Some of this data are published in the appendix here and are openly available; the remaining data will be published in an open format soon after this thesis is completed. The tool designed for this thesis (and described in chapter 2) will also be made openly available. The wager here is not only to create visual representation of literature, but to open up public exploration of the literary texts to different views and collaborations.

CHAPTER I

SOCIAL NETWORK ANALYSIS COMPUTATIONAL TOOLS

Novels contain (if not consist of) different types of relationships. Be it relationships among characters or connections between elements, such connectedness needs to be acknowledged. Social Network Analysis (SNA) is an effective, way of modeling, exploring and analyzing this aspect in the novels. Social Network Analysis is a computational method that uses data that are created manually by close reading. Integrating such digital analysis within more traditional literary criticism involves a shift in methodology: the quantitative calculated algorithms behind the resulting visualizations suggest a kind of factual analysis. The critical reading starts with the collection of the information, and traverses the social network analysis tools to then grow into a critical reading and analysis of visual representations of the literary works at hand. Social Network Analysis has not been used in literary studies until recent years. It has been applied by Franco Moretti onto Shakespeare's Macbeth for one, in "Network Theory, Plot Analysis."

The tools for the SNA technique of analysis were not designed by literary critics, but have been imported from the social and hard sciences. They provide the platform for collecting the structured data, calculating the relationships, and translating it into the visual, making graphical visualizations. Some examples of SNA tools available at the time of writing this thesis are mostly Gephi and Palladio. Gephi is a general network visualization tool used in a variety of disciplines, including those which maniplte very large datasets. In this thesis, Gephi was used for one of the datasets. Another visualization platform known

as Palladio was recently designed at Stanford with the humanities data in mind. It is more appropriate for the smaller multidimensional datasets that humanists build, and yet, like all tools, has a limited capacity to represent genre-specific relationships. A custom-built tool was designed for the purpose of this thesis to handle specific description and analytical needs of exploring network relationships in the specific corpus of postmodern novels used in this thesis. It is called the Novel Analysis Program (NAP).

A. Readily Available SNA Computational Tools:

Palladio is a web-based visualization tool developed by the Humanities and Design Research Lab at Stanford University. As per the Lab's definition, Palladio is "[a] visualization platform currently under development (funded by the United States-based National Endowment for the Humanities) with an emphasis on data refining and linking combines a map view, node-Link graph view, and multiple filters."
(http://hdlab.stanford.edu/tools/). This tool allows one to generate graphs, maps, galleries, and lists from imported data. The part of this visualization tool that is used for this study was the graph function. The graphs created using Palladio allow one to decenter the focus on the human characters, and focus on aspects such as place, events, emotions, and others. Having a human character centered analysis of a novel restricts the reading to an element that could always bring up personal emotions from the reader's part. In addition, it compromises other novelistic elements to the cost of social relationships. Having such a decentered model allows one to apply relationships without the social element, thus noticing literary aspects and patterns.

For the tool to visualize relationships between elements of plot, character and setting, structured data tables that represent the relationships need to be created first. An example of what one of those tables might look like can be found below (Figure 1). This part of the analysis of the novels is still very human centeredBy this, I mean that the relationships existing in the text have not been done automatically by a computer, although such semi-automatic detection of novelistic relationships has been attempted by Agarwa et al. in "Social Network Analysis of Alice in Wonderland" with moderate success. In other words, creating a table is an aspect that allows the scholar to interpret the work at hand. The transformation of literary prose narrative into rows and columns of a spreadsheet is a form of delicate critical reading.

Figure 1: Dataset Used for Palladio

I have chosen to organize many different kinds of details from the narrative in tabular format: the event, the character related to this given event, his/her gender, the place

where the event happened, the coordinates, the granularity of the place (that is, along a scale of largest to smallest), the time during which the event happened, the time granularity, the emotion of the character perceptible in the passage (if any), the page number, and the precision of the information. Some of these aspects are used to create the networks, while others for filtering. Filtering is a process that can take place inside or outside software, but essentially allows the user to explore facets of the data. For example, if the source is selected to be the emotions and the target to be the gender, with no active filters, the below graph will be generated.
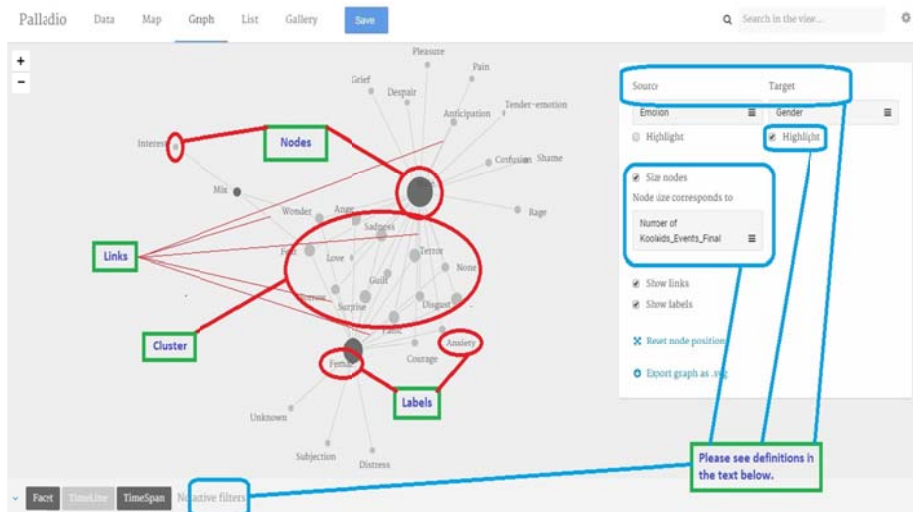
Figure 2: Palladio Network Graph

Figure 2 shows a network generated by Palladio with some colored annotation written over it for explanatory purposes. The base of Palladio is all grey scale. One sees in the network a number of dots labeled with text (corresponding here to the aspects of the dataset being visualized—gender and emotion—and a number of thin lines linking those). Also, the size of the dark grey dots varies. The way that such a network can be "read" is to notice the linkages (connections between aspects) and the size of the nodes (the strength of

those connections). It is essential to keep in mind that the position of the nodes does not

have a meaning behind it, except for the centrality. Centrality does not mean that the

position of node is at the center of a given group of nodes, but rather that it is central in its

connection to certain nodes, what might be said to be its functionality. In other words, the

nodes that are central to a connected network (as in Figure 2) in general, or to clusters

specifically, are ones that control the distribution and layout of the graph. If we are

interested in shared characteristics, the central ones capture our attention. The other

"outliers" are less influential to the overall data as it has been gathered thus far. Therefore,

the two nodes "Female" and "Male" are at the core of the generated graph, so if one is

moved, the network will not remain the same (in its position). The importance of the

network lies in the size of the nodes and their connectedness.   A network visualization of

this sort is never quite correct, nor is it "finished." It attempts to bring together elements of

a novelistic work of art, and yet the data can never fully capture all of what is happening.

Despite their graphical structure, it is perhaps useful to think of the network in the terms

that Bodenhamer et al. have described digital maps, "framed as a conversation and not a

statement… inherently unstable, continually unfolding and changing in response to new

data, new perspectives and new insights" (Bodenhamer et al. 4).

As one can see in Figure 2, the size of the node is associated with the number in the

file (Figure 1). That is, the size of the node grows with the number of occurrences in the

data. The connectedness is represented through the links between the nodes. The nodes that

are darker than others have been "highlighted," an option that can be selected within

Palladio to help the scholars better read the networks: it allows one to visually stress the

element one wants to focus on. At the bottom of Figure 2 there is a filtering option which allows one to choose specific elements to be included in the visualization. In the particular case above, while exploring the relationships between gender and emotion, one might want to restrict those to any other element of the data, say, a specific time period, or a particular location. Alternatively one can filter by gender and choose to have only female characters on the node: this is done by asking Palladio to 'facet' by 'Gender' and select female. The filter option allows more focus on given issues, and a more targeted exploration of the networks, since as the data grows, the networks become more and more crowded. Simply put, while source and target determine the nodes that are to be represented and connected, the filtering option conditions the representation. One last notion to remember: a cluster is a group of nodes close to each other via the force of an element (or more) linked to all of them.

To illustrate the previous discussion, a sample analysis of a visual example is presented below.
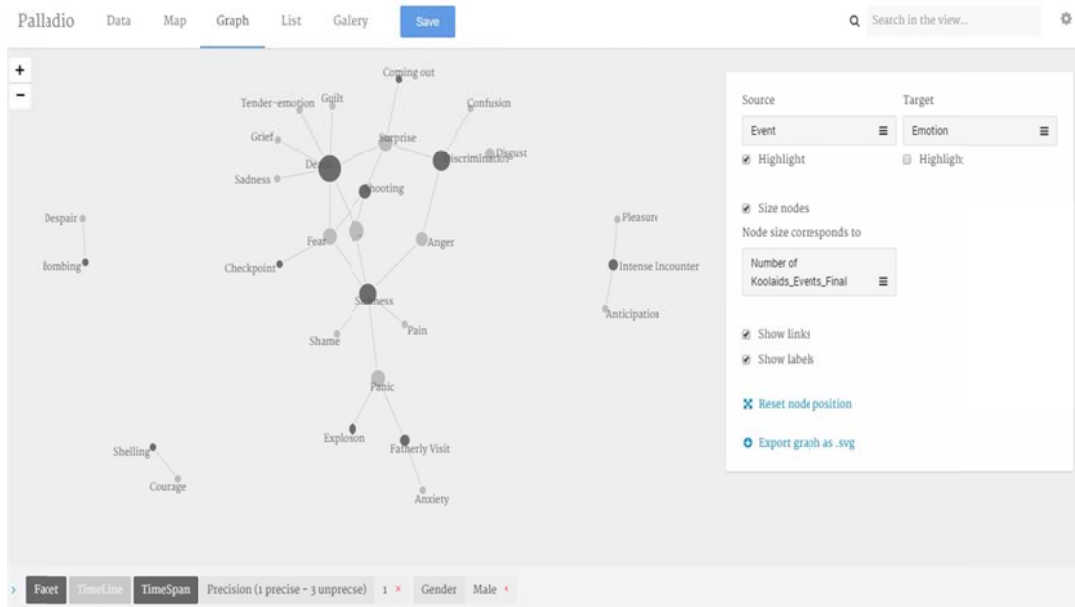
Figure 3: *Koolaids'* Emotions to Events [Male Filtered]

Figure 3 shows the relationships between events and emotions taken from the data created about Rabih Alameddine's novel *Koolaids*, filtered to include only male characters, with precise instances (that is, in the table the precision value is equal to one, which means that the encoding was characterized by a high degree of certainty). When one looks closely at the network, it is easy to discern a clearly formed polygon that links 3 events together and centers the fourth. The three linked events are death, sickness, and discrimination, while the one at the center of the polygon is a shooting. These events are linked together through the emotions that characters have experienced, which points out a pattern. When dealing with visualizations of data, the viewer is often dealing with pattern discernment. Patterns in networks might evoke relationships that the close reader of the novel may have already noticed, but the opposite can also be true. As the amount of data increase—and this is particularly true of complex, postmodern novels—patterns that have escaped close reading come to light.

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The emotions directly involved in this visual above are surprise, anger, and fear. Reading closely into this example, one thinks of the cycle created, which connects three different instances and highlights their internal relatedness. Starting with discrimination, passing through sickness, and ending with death, one can think of it as a metaphor for the social situations in which the characters of the novel might be living. What is discrimination after all, other than a kind disease that would spread across the mentality of given society, killing its sense of belonging, union, and even its freedom? Thus, this network has put forth three events that took place in a novel, creating a remarkable link between them, not only across one scene of the novel, but scaled up over the whole novel. The network points to a way that the novel connects certain concepts, defines a social context, criticizes it, and enlarges the picture for one to understand the consequences. That is, a network can provide one with the necessary visual assistance necessary to understand the functionality of the novel's structure onto the reader's interpretation. In addition, the emotions experienced throughout this cycle are three which somehow build upon each other supposedly as follows: surprise grows to become anger, which in turn, and under given circumstances could culminate to fear. Upon an instance of discrimination, one could feel surprise at the idea of it; upon realizing the seriousness of such an event, the thinking behind it, and the effects of it, it is anger at the logic that follows. Giving the scenario more thought, one would realize the graveness of such an occurrence, seeing the bigger picture, that is, the death of societal understanding and the end of an appreciative coexistence, which will drive fear of a dark future where each man/woman is on his/her own, for lack of

humanistic sense of synergy. It is also important to keep in mind that the events in question are each connected to their own emotions:

- Discrimination: confusion and disgust,

- Sickness: pain, panic, and shame,

- Death: sadness, grief, tender-emotion, and guilt.

As is pointed out, the emotions associated with each of the events is one that is, in one way or another, experienced by the reader while the event takes place (except in the case of shame in the event of sickness). When the reader is faced with an instance of discrimination, his/her attachment to the discriminated character will initiate a feeling of disgust at the discriminator, and a sense of confusion at the occurrence of such a behavior. Furthermore, the pain and panic experienced over the sickness of a character are the result of the relationship built between the reader and the character, having a connection slowly growing to become genuinely treated as an actual acquaintance. Therefore, the death of a character induces sadness, grief, and a tender-emotion, for the relationship that grew has just ended. A sense of guilt may emerge as the reader looks at the continuous lifeline of the novel and his/her perception of it as it started to develop; however, this is not always applicable. More specifically, the scenes that discuss AIDS, gay relationships, sex, and other issues that seem to be unaccepted by the Lebanese society, are mostly weighted by mixed and complex emotions. There is no one strict feeling that emerges from the characters, but a mixture of emotions that strongly imposes themselves on the readers; this is illustrated in the network above.

Thus, the network provided by Palladio after entering the data, shows a relationship between two elements that provide some critical insight to expand our reading. The visual representation of a repeated pattern suggests a reentry point into the text that the reader can develop with critical reading and analysis. It should be noted, though, that one should know what to look for, what to select as source and target and how to filter. In other words, the literary analysis process starts with the data collection and continues with the production of the networks, passing to the reading, interpretation, and analysis of the visualizations. None of these steps is far from a traditional close reading. The coding of relationships, organizing and visualizing them, allows for a more empirically supported close reading, in fact. Patterns are, after all, repetitions found in a system. The computer does not detect them, but rather organizes them for the user.

The other readily available tool I have employed in my research is Gephi. It is not a network visualization tool designed for the humanities; it is mostly used in data science and network analysis in the sciences and social sciences. This means that I have had to think carefully about how the same kind of data inputted into Palladio above can find expression in this more sophisticated network software. When encoding for Gephi, the characters are all listed as nodes, and are assigned each an id number. Gephi does not give space for other elements, which restricts the nodes to the element of character, the actors in a network. The interactions are then encoded into what is known as an "edges" table. If a nodes' table gives a list of the discrete elements of a network, an edges table marks instances of interaction between those elements. Traditionally, the two elements must be one marked as source and the other as target, whether or not there is directionality in the relation. The initiator of the

interaction is the source, and the receiver of the interaction on the other hand is the target. In network analysis, one can also use weight (a numerical value given to an instance to determine its value in comparison to others, which is in this case used to give value by the time layer) is also encoded as part of the edges table. In my study, I have used the concept of weight to emphasize the importance of time layers and memory in the novel. These two post-war Lebanese novel elements are not considered to be only verbally encoded, but numerically represented: the only elements directly represented are characters, while time virtually represents the memory aspect through the weighting discussed above. This can be used via the filtering tool. In other words, the words describing character name or time layer are not available, but are replaced by numerical values (IDs or weighing numbers). The type of the interaction is labeled as either directed or undirected. It is directed when the source and the target are in a direct interaction, as in the target interacts back with the source. If not, the interaction is undirected. That is how the data should be organized for Gephi to understand it, which leaves the reader with a complicated process missing words and relying heavily on an accurate system of tracking the numbers put to use. The two figures below are an illustration of the previous description.

Figure 4: Gephi Nodes

	A	B
1	ID	Label
2	1	Maysa A
3	2	Alia
4	3	Saeed
5	4	Leila
6	5	Adel
7	6	Unspecified
8	7	Ameen
9	8	Selma
10	9	Wadih
11	10	Yasmeena
12	11	The Doctor
13	12	Rasheed
14	13	Salam
15	14	Fouad

Figure 4: Gephi Nodes

	A	B	C	D
1	Source	Target	Type	Weight
2	1	5	Undirected	4
3	5	2	Undirected	4
4	1	5	Undirected	4
5	6	5	Undirected	3
6	5	6	Directed	3
7	6	2	Undirected	5
8	6	7	Undirected	5
9	6	12	Undirected	5
10	6	13	Undirected	5
11	6	14	Undirected	5
12	6	5	Undirected	5
13	2	29	Directed	3
14	1	4	Undirected	4
15	8	1	Directed	1

Figure 5: Gephi Edges

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As one can notice from the above tables, the nodes' table in Figure 4 gives each of the characters an identification number. In Figure 5, the numbers are used to represent the characters in the system. In the second row (1, 5, Undirected, 4), what has been described is the reciprocal relationship between Maysa and Adel with a weighing system "4" that in this case refers to the time of their encounter. The directedness is the only added detail along with time. Multidimensional aspects of narrative data such as those used in Palladio (place, gender, type of relationships, and emotions) are not included. Multidimensional data can be represented in Gephi, but it is a much more complex process. The poverty of the data in Gephi's case results in networks limited to the links between characters: no other information is represented.

The image below is an example of a Gephi generated network of the characters in Nada Jarrar's *Somewhere, Home*.
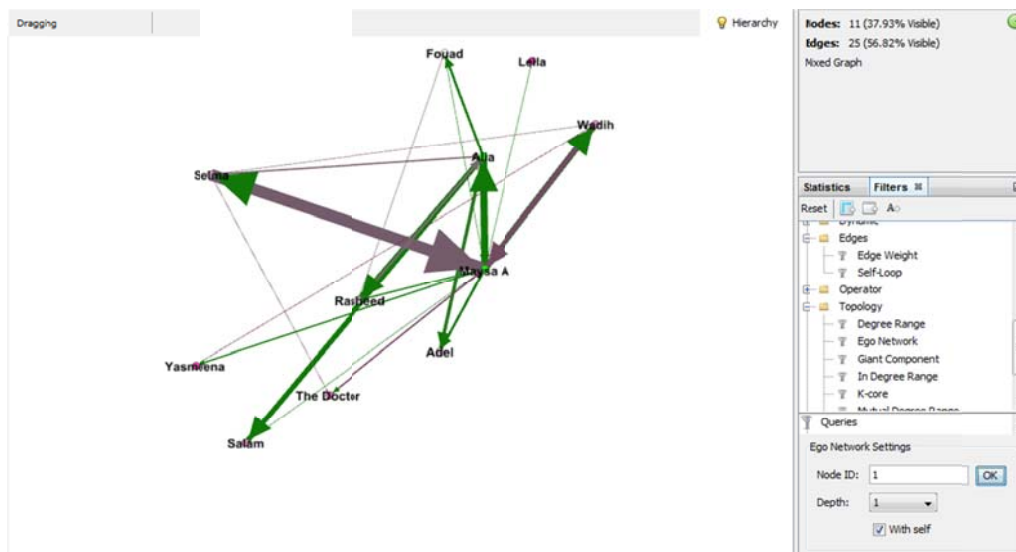
Figure 6: Gephi Network: *Somewhere, Home*

This graph shows the relationships between the characters, filtered by the ego filter of the character Maysa; that is, one is looking at the social network of the encoded section

of the novel I chose to encode, a section written from the particular point of view of one

character. Looking at the links between the characters, the thickest/strongest connection is

between Selma and Maysa, followed by the one between Maysa and Alia, right before the

line linking Maysa to Wahid. Those three relationships are the ones most dominant in the

sample data (bearing in mind that I did not code all of *Somewhere, Home*). If one analyzes

the outcome, the first thing one notices is that Maysa is mostly the target of her relationship

with both Selma and Wadih, while she is the source of hers with Alia. Aside from the fact

that Alia is a dead character and most of the instances are either a memory or a thought, the

directedness of the relationship between Maysa and Alia suggests that in order to take in

Alia's life, Maysa has to address her grandmother in various ways. The fact that Alia is the

target in this relationship, although indirectly Maysa is, highlights the double-layered

structure: on the surface, it seems that Maysa is the one taking from her grandmother (be it

thoughts, ways of life, beliefs, or other), the actual case is that she is giving into her

grandmother's remembrance, feeding the relationship and the ongoing existence of Alia, as

a way of absorbing her aura.

The two other characters dominating the main character's life are Selma and her

husband Wadih. Selma is the woman who checks on Maysa following up on her health and

her pregnancy, while she fills up Maysa's always half empty cup of knowledge of her past

and her grandparents. She has known Alia for a while, so as far as the readers know, Selma

is an extension of Maysa and Alia's relationship, or more of a means of connection.

Therefore, this relationship is a triangular one, with Alia and Maysa at the base (see Figure

7), while the relationship between Maysa, Selma and Wadih also forms a triangle, but with

Maysa as the head (as shown in Figure 8). One of the innovative aspects of social network

analysis in the case of fiction is the way that it allows us to define certain morphologies in

the interconnection of characters underlying the plot. These are, of course, abstractions, but

nonetheless, useful abstractions for discussing the way the characters interact.

Figure 7: Maysa-Alia-Selma
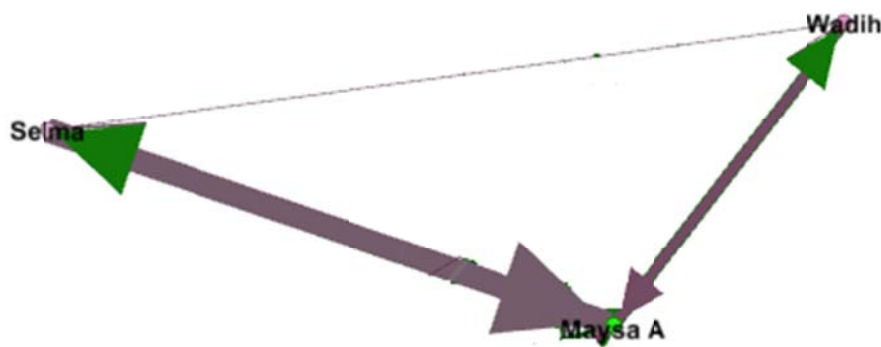
Figure 8: Maysa-Wadih-Selma Triangle

Figures 7 and 8 show a reversed pattern that should be carefully treated and

analyzed. While in her connection to Alia Maysa is subordinate, she is her husband's

superior in another zone. Alia is the center of a relationship with both Selma and Maysa, driving their conversations in the ways she (unwillingly) desires. Because of her influence on both other characters, the grandmother is the one who takes the lead, although she is not actually present. On the other hand, Maysa heads the connection between herself, Wadih, and Selma, following on the steps of Alia who sets up the example. Thus, one notices from this moment of the narrative that Maysa is a character who follows Alia's existence patterns. While the former is alive and the latter dead, it would be safe to say that she is picking up after her, continuing on her path, and suggesting evolution.

Using Gephi, I have been able to represent the relationships between characters as a network graph, allowing the interpreter to take it a step further and connect it with the novel itself. The overall focus and functionality is significantly more basic. The thickness of the links, their colors, and the patterns formed, all reveal associations between the surface of the plot and the below structure of the interactions. Even if the graph is not as developed as hoped for, the visual can still suggest further interpretations.

B. The Novel Analysis Program: A New Customized Computational Tool

One of the non-traditional steps of the research for this thesis involved learning how to code and to create a tool (Novel Analysis Program) that is better adapted to the kinds of literary data that I generated through my close readings of the novels. The Novel Analysis Program (NAP) is a tool that allows creation and organization of literary data in a graph database. I have decided to create it, since there are no available tools that are specific for SNA in literature. The NAP allows the reader to track literary elements, and is built in a way that guides the data collection without restricting it. Thus, unlike Gephi and Palladio, it

is the tool for literary data extraction, with very few restrictions imposing themselves from outside the discipline. Basically, the NAP allows for a directed set of questions about literary texts to be answered by any researcher seeking to build similar data tables as I have discussed above, but without having to resort to working in a spreadsheet. It also builds a database about the characters so that repetitive questions are avoided.

For the NAP tool to run, the Neo4j database should be running in the background, since the tool stores the data in it. This process does not require internet connection, although to query the data and visualize the networks, the link opens in a normal web browser. Once executed, the NAP user interface is rather simple, appearing as shown in below. Each screen capture that follows is accompanied by a description of what is happening within.
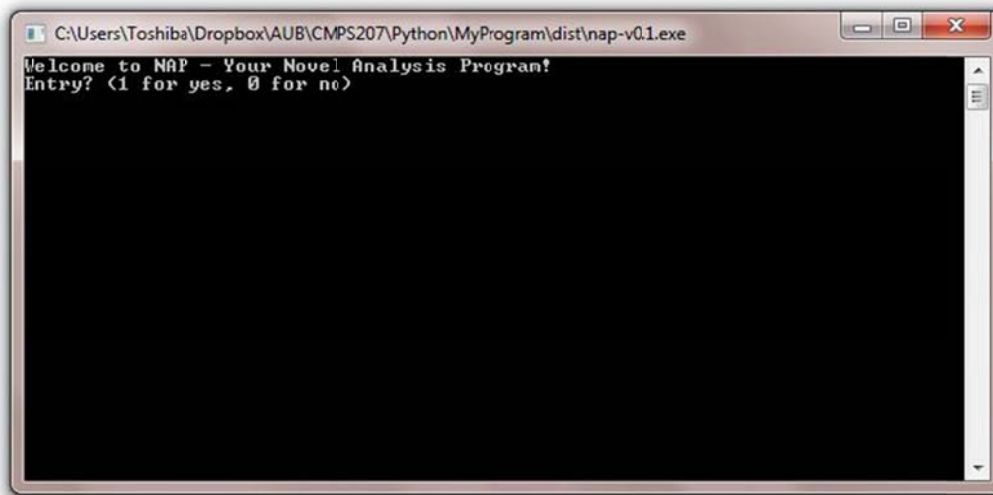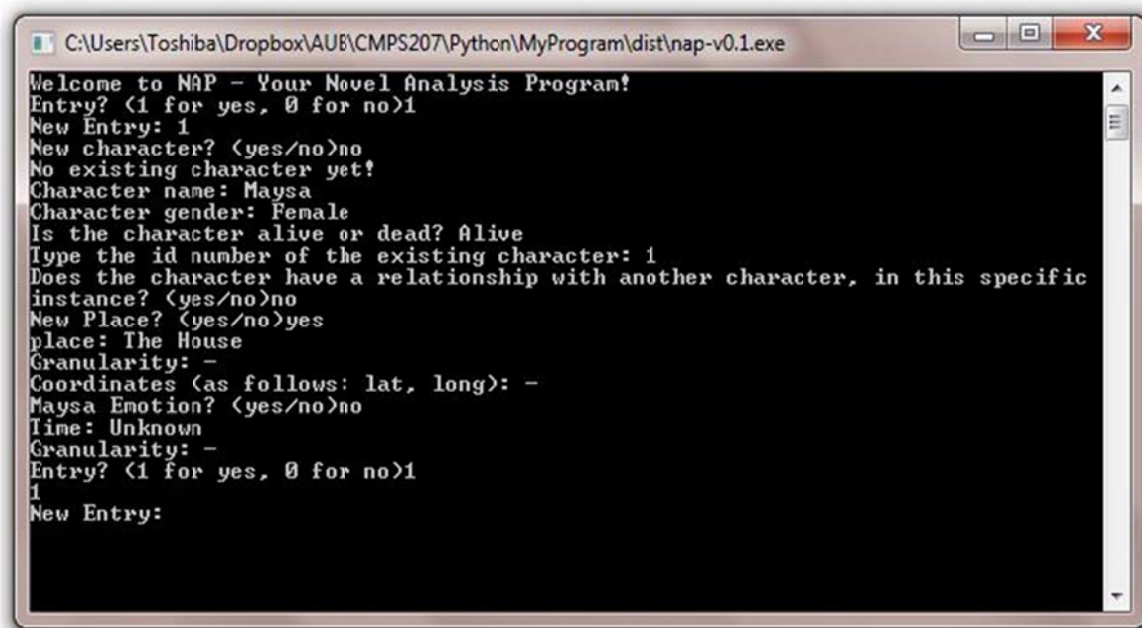
Figure 9: NAP Home

Figure 9 shows the opening window, where the user is asked to enter 1 for a new entry and 0 to quit. When the user enters 1 and continues as per the questions asked, the tool window will look like Figure 10 where the user opens a new entry. The first step is to

define a character. If no characters are created, the default is to create them first. The tool

takes the character's properties through a series of questions (each corresponding to one of

the columns of the data tables mentioned above) and then continues to ask whether this

character has a relationship with another. In Figure 11, since the character has already been

defined, the tool asks about the place, followed by the character's emotion, and then the

time. After getting the information for the specified entry, the tool asks if there is a new

entry. The results are presented in Figure 12.


```
C:\Users\Toshiba\Dropbox\AUB\CMPS207\Python\MyProgram\dist\nap-v0.1.exe
Welcome to NAP - Your Novel Analysis Program!
Entry? (1 for yes, 0 for no)1
New Entry: 1
New character? (yes/no)no
No existing character yet!
Character name: Maysa
Character gender: Female
Is the character alive or dead? Alive
Type the id number of the existing character: 1
Does the character have a relationship with another character, in this specific
instance? (yes/no)no
New Place? (yes/no)yes
place: The House
Granularity: -
Coordinates (as follows: lat, long): -
Maysa Emotion? (yes/no)no
Time: Unknown
Granularity: -
Entry? (1 for yes, 0 for no)1
1
New Entry:
```

Figure 10: New Entry

Figure 11: Characters and Relationships

As the user enters "1" for a new entry, the tool displays previously saved entries so that the user continues from there (enters "2" in this case). Figure 11 shows an instance where the character does have a relationship with another one who already exists. Thus, the user chooses the id number of the corresponding character in order to revert to the previously entered properties. After allocating the character, the type of the relationship is requested. Although the type of input is not defined, it is best for the user to use a consistent, "bounded" list of possible relationships to ensure more consistent data. The next step is to select the place from the displayed list as it already exists. Figure 12 shows an example with a new place. Again, the location input is followed by the emotion (picked form a list) and finally the time. To exit the program, the user has to answer with "0" to the "Entry?" question.

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```
C:\Users\Toshiba\Dropbox\AUB\CMPS207\Python\MyProgram\dist\nap-v0.1.exe

Entry? (1 for yes, 0 for no)1
2
1
New Entry: 3
New character? (yes/no)yes
Character name: Adel
Character gender: Male
Is the character alive or dead? Alive
Does the character have a relationship with another character, in this specific
instance? (yes/no)yes
New character? (yes/no)no
9 Adel
5 Leila
1 Maysa
Type the id number of the existing character: 1
What is the type of the relationship? Real
New Place? (yes/no)yes
place: Lebanon
Granularity: Country
Coordinates (as follows: lat, long): 33.9, 35.533333
Adel Emotion? (yes/no)no
Maysa Emotion? (yes/no)yes
['Acceptance', 'Anger', 'Anticipation', 'Anxiety', 'Aversion', 'Contempt', 'Cour
age', 'Dejection', 'Desire', 'Despair', 'Disgust', 'Distress', 'Elation', 'Expec
tancy', 'Fear', 'Guilt', 'Grief', 'Happiness', 'Hate', 'Hope', 'Interest', 'Joy'
, 'Love', 'Pain', 'Panic', 'Pleasure', 'Rage', 'Sadness', 'Shame', 'Sorrow', 'Su
bjection', 'Surprise', 'Tender-Emotion', 'Terror', 'Wonder']
Emotion (choose from list): Interest
Time: Winter
Granularity: Season
Entry? (1 for yes, 0 for no)
```

Figure 12: Existing Characters and Emotions

As discussed above, the data collection process, at the level of data input and entry,

happens by answering questions and selecting element id numbers. However, at the level of

reading and extraction information from the texts, the NAP does not take away the pleasure

of critical reading; it enhances it. In order for the user to answer the tool's questions

accurately, s/he has to be fully acquainted with the novel. The non-automatic data-

collection process is purposeful, since one is not to put aside the intellectual activity

essential for proper encoding. The decisions made by the encoding scholar are the stuff of

close reading: whether the character has a relationship with another, what the type of the

relationship are, whether the character is experiencing an emotion, what kind of emotion it

is, as well as the spatiotemporal aspect of that relationship. These elements are ones that I

argue should be consciously and purposefully extracted by the scholar. Specialists in

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informatics have attempted to do such data extraction in an automated way using elements of natural language as indicators, however, this process obviously renders a much less accurate representation of the literary scenario. It results in a selection of irrelevant places and time instances to the characters, or misinterpreted allocations of relationships or emotions. I also believe that the critical reading experience is intensified by encoding, whereby the reader is faced with decisions that will not only affect an argument, but will shape a visual outcome.

The data collected by the NAP tool is stored in the graph database, Neo4j, and can be accessed through the clickable link it produces when it is run. The database is on one's own computer and thus a user can have more than one, from which to choose when running Neo4j. The figure below illustrates the running window.
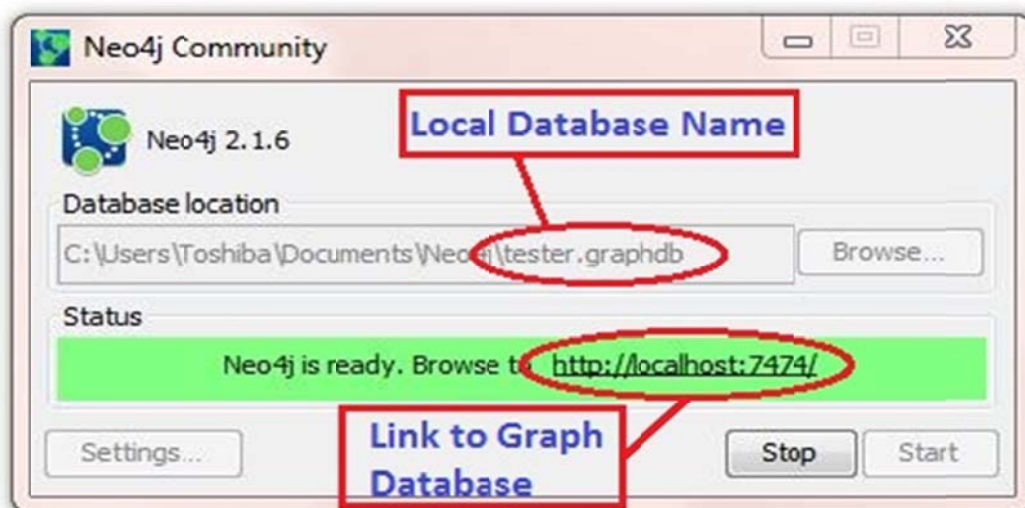
Figure 13: Neo4j Running Window

When it comes to the original representation of the data, Neo4j includes the means for visualizing networks. It generates a dynamic network, which means that the nodes are clickable and will expand upon the clicks of the user. Unlike the Palladio graph, the nodes

in the Neo4j networks are not designed to represent frequency. Please note that the

networks and graphs in this chapter are initial samples for the purpose of illustration and

explanation.
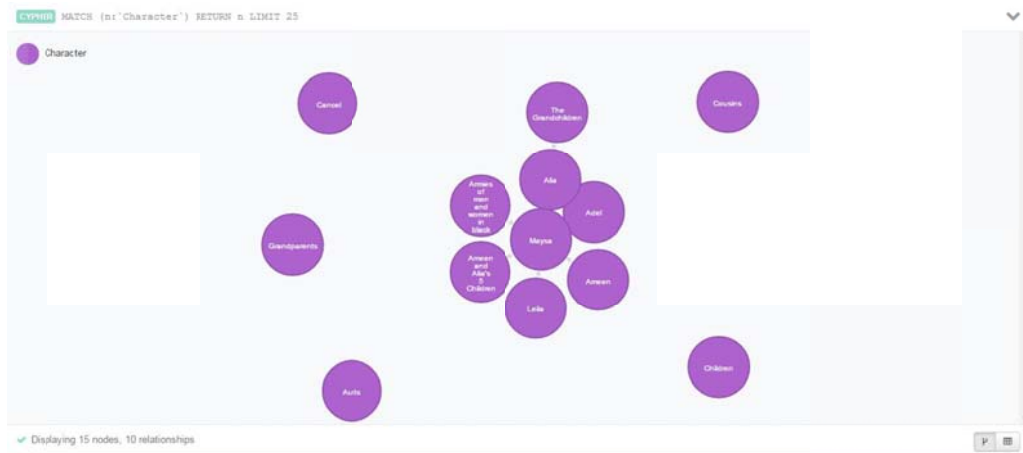
Figure 14: Characters Graph Database
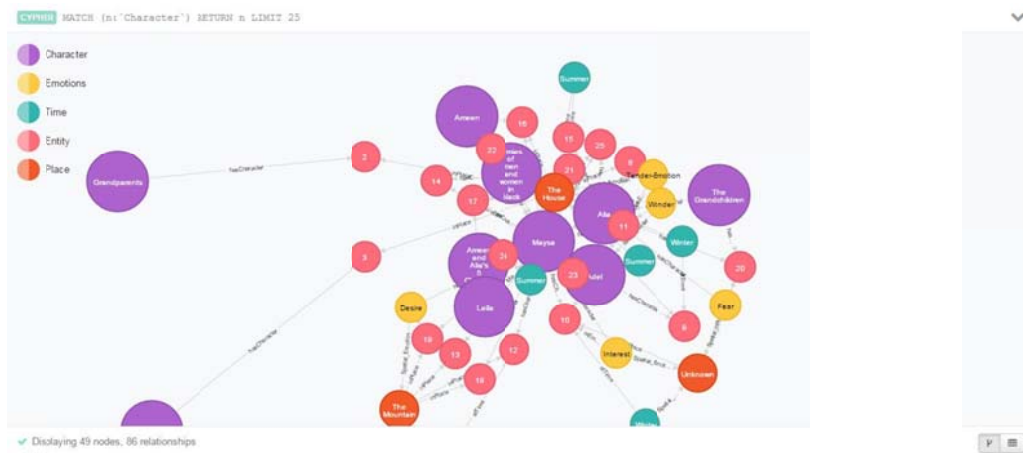
Figure 15: Characters Graph Database Expanded

Looking at the characters' graph (Figure 14), one sees purple nodes, of which 7 are

connected by relationship links. At this point in the visualization, all that is represented are

the characters present in the data. On each of the nodes is written the name of the character.

In order to expand the graph – as in Figure 15 – the user double clicks on the nodes of

interest, which will reveal all the connections and related information. Looking deeper into

the network, the relationships and their labels become clearer, as well as the important

relationships between the very dimensions of the data. The links express connections

between the various interconnections of the entities; however this process is user driven,

the choice of which nodes to expand being left up to individual choice. Nevertheless, if the

first query is characters, these are to be the core of the graph: the network's dynamics are

character conditioned. This is why every emotion, place, or time does not show in the

expanded Characters graph.

Figure 16: Emotions Graph Database Expanded

Figure 16 is a representation of emotions expanded. Emotions, in yellow, are the

ones directing the graph so as to have all the emotion nodes showing, but not all the

characters. This, for example, suggests that not all the characters have emotions, and not all

emotions are connected to other elements. In addition, the distribution of the nodes and the

clusters are conditioned by the emotions' placement; in other words, when one drags an

emotion node, all attached nodes are dragged along.

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The following two figures show a graph of the places. Figure 17 is a simple view of the places on the graph, without relationships or links. The reason behind this is that locations do not have inter-relationship like characters, even if inherently related to other elements. I have not modeled the relationship between places in my thesis, although theoretically such a model is possible. When one of the place nodes is selected, it will expand, and thus open the elements inherently connected to it such as entities, emotions, and time (as shown in Figure 18). Since characters are not directly linked to place, but rather to entity, a more elaborate network is visualized when entity nodes are selected. The place is freed from its immediate connection to the character, so as to avoid limiting the spaces to the characters, and restricting the character's existence to one place or another. The entities' happening, however, depends on the corresponding characters, therefore necessitating a direct link. That is not the case for places and characters, nor should it be. For example, Maysa is not actually linked to the house directly, but she is given the freedom to be connected to more than one place, through the indirect connection of entities.
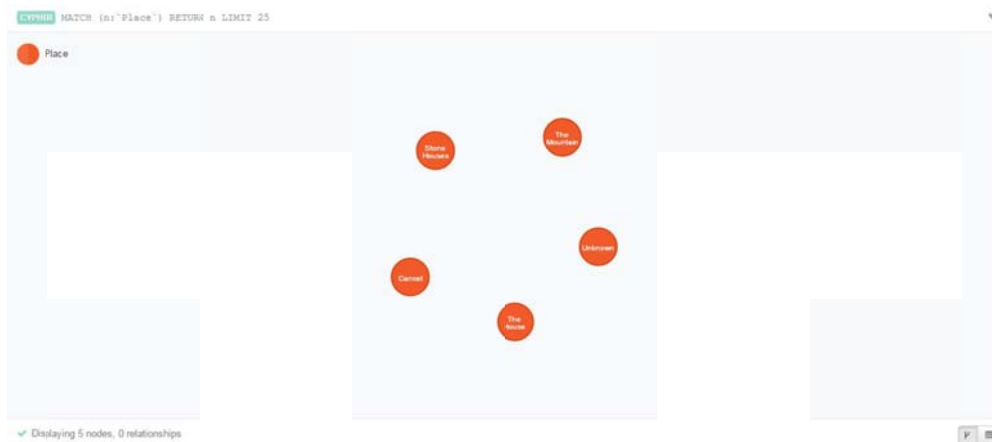
Figure 17: Places Graph Database
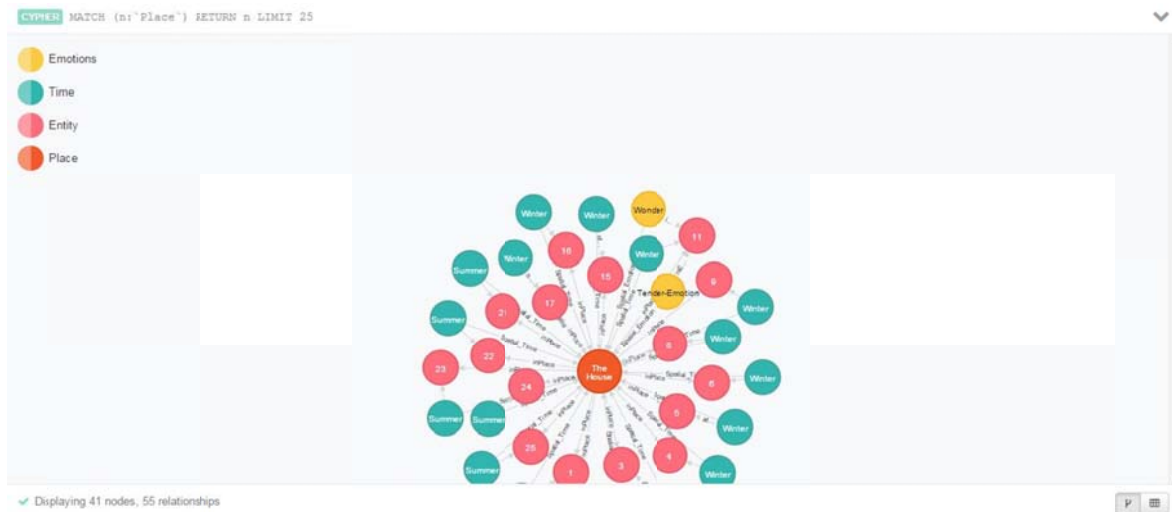
Figure 18: Places Graph Database Expanded
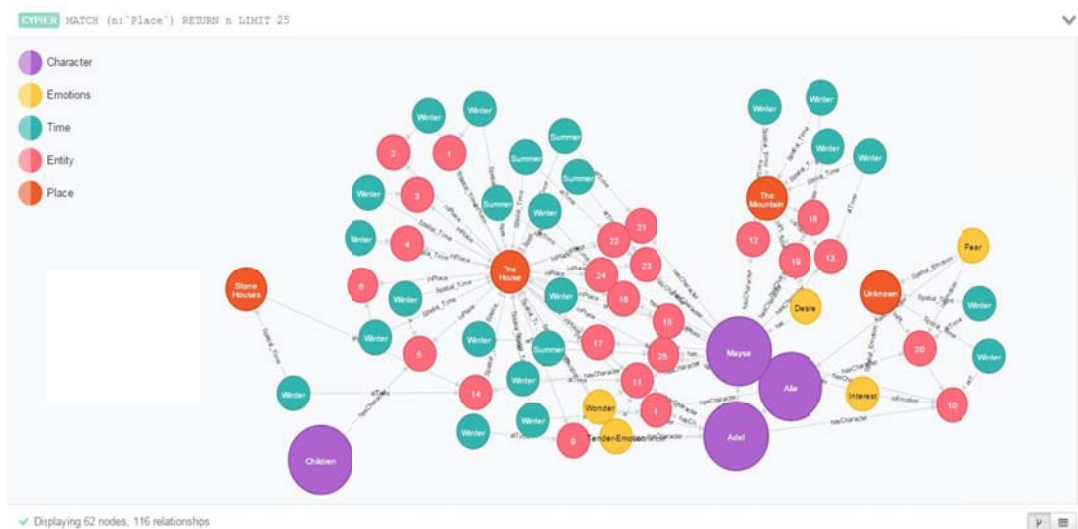
Figure 19: Place Expansion through an Emotion and an Entity

Figure 19 shows an expanded emotion (Fear) and an expanded entity (10) that in turn expands others in order to reveal the inherent connections. The expanded entity 10 reveals 2 characters (Maysa and Adel) whose relationships are also revealed, even if their entity is still folded. Therefore, the opened entity opens relevant peers. By peer here, I mean neighboring nodes that are relevant to each other.

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In order to extract the data from the graphs and benefit most from the elaborate process of data entry and structuring, the user makes a query. That is, in the command space in Neo4j the user enters a kind of search using a special syntax asking for a specific kind of data output. Even though such actions can be done through randomly clicking on nodes, a query would be more directed way of receiving a specific piece of information. Clicking randomly on nodes in a large network is a bit like looking for a needle in a haystack. What the NAP in conjunction with the power of neo4j has accomplished is what Palladio was not able to: specific queries of the data for relationships.

For example, the WHERE tag helps filtering the data, SKIP allows skipping unwanted results, and so on. Queries will be discussed in detail in chapter 3, explaining the reason behind each and its function.

It is important to know that since NAP uses Neo4j as its graph database, it allows the extraction of the data in JSON form, which can be used with other tools, as well as transformed to formats such as CSV (comma-separated value) files. This format for data is a kind of degree zero of formatting and is accepted by many platforms, including Palladio and Gephi.

In an attempt to discuss an example of how the data from NAP can be helpful to literary analysis, an image will be presented and analyzed (Figure 20).
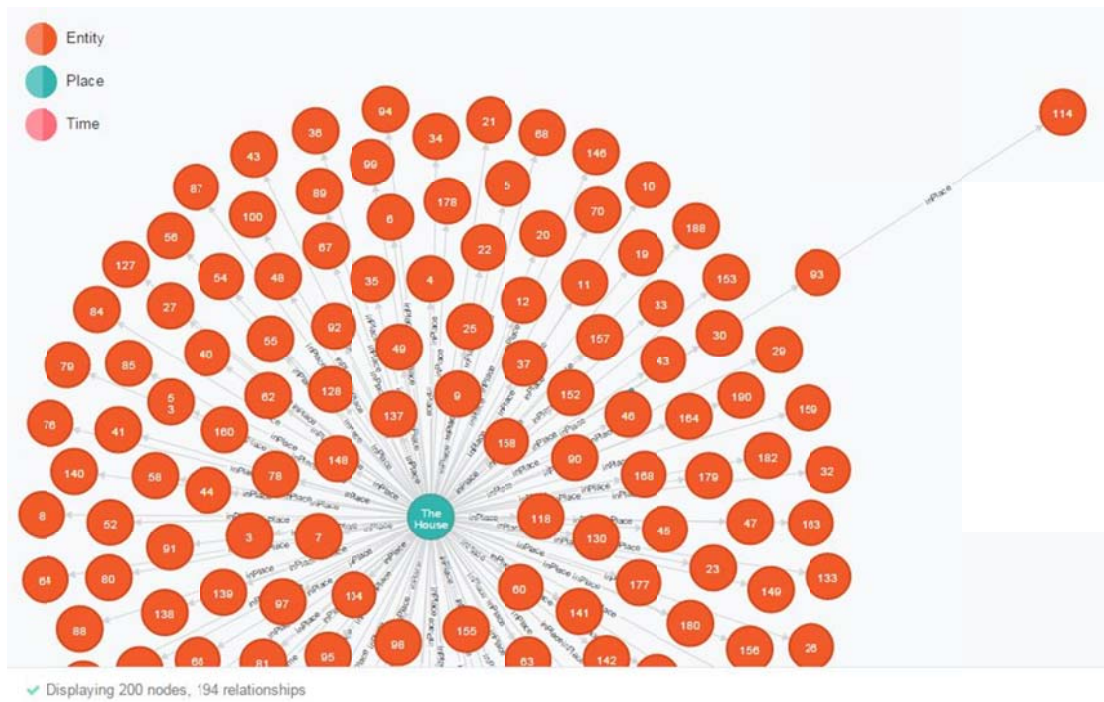
Figure 20: in-Place

As one looks at this sample extract from a NAP network (generated through Neo4j), the first thing that strikes us is the fact that the node 'house' is the only place node that appears when fetching the 'inPlace' relationships. This is because the house is the most connected to entities that it takes over the other connections. This alone strongly suggests that the house (Alia's house) is the dominant place that can shape the special environment of the part of the novel that has been encoded for this thesis. The strength of this specific node algorithmically eclipses other place nodes, leaving them entirely out of the visualized equation, thus hidden from the interpreter's consideration. This place being at the center of the others shapes the novel by its own dictations—in the network, as in the novel, it imposes a certain flow, due to its heavy weight within the structure—thus agreeing with the claim that could be raised, explaining that Alia is the character who directs the others. In

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other words, this house being Alia's, and the fact that Maysa chooses to give up her house in the city and go live there, she thus chooses Alia above most other characters. She embeds her within her own life, thus mixing both existences together in one spatial container, which is the house. That being the case, the same container, due to the strong connections of Alia and Maysa to their characters, is the one that indirectly embraces other characters, and so the relational structure of the encoded section of *Somewhere, Home*.

If we choose to expand the network expanding entity 93, a graph will show up as seen in Figure 21.
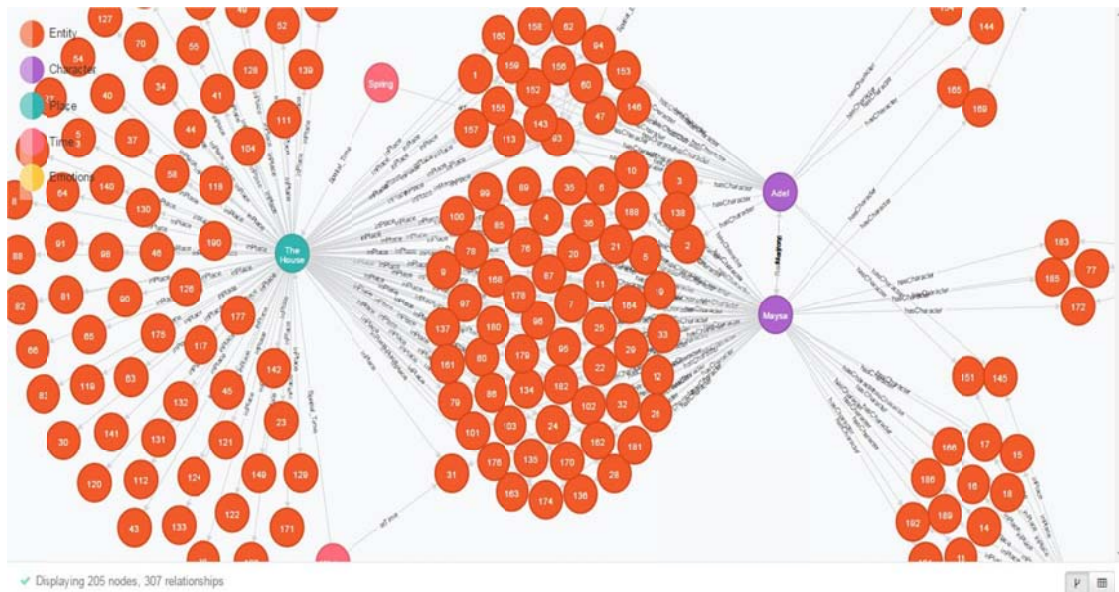
Figure 21: in-Place - Expanded by Entity 93

The expansion results in the appearance of two characters, Adel and Maysa, who are in turn connected to the clusters of entities to their left and right. The entities to their right are not ones connected to 'the house' meaning they are happening elsewhere. The scale of the entities belonging to the house versus those that do not is remarkable. Moreover, the fact that Maysa's entities are mostly connected to this important place is

highly significant: she is the protagonist of the encoded part of the novel, she is trying to

learn about her past and her ancestors and she is living in their place ('The House'). Had it

been otherwise, the network would suggest that Maysa's detachment from the place shows

that she is not being affected or directed by her findings. However, this is not the case. She

noticeably belongs to where she chooses to live and give birth, and so the imprint of this

space asserts the interpreter that this is not simply an experiment, but one that reveals itself

from within the deeper structure of the novel and its proper character.

As one notices from this reading, the NAP visuals allow a multidimensional

reading of the relationships and structures within a novel, opening new analytical options

for the readers. This tool also provides the data manipulation tools necessary for one to dig

deeper within the information at hand, so as to reach a point where most of the collected

data can be explored on demand by querying and visualized for the scholar to read, analyze,

and discuss.

C. Palladio and Gephi Vs. NAP:

For NAP to be accepted as a legitimate tool, it first needs to prove itself against

tools of similar functionality (i.e. Social Network Analysis tools). First of all, one can

comment on the data collection that is similar in Palladio and Gephi yet differs in NAP.

The two readily available tools offer some freedom to the scholar to collect data in a tabular

fashion; however, they limit its design, as well as its content. In other words, what is freer

on the outside is what is actually quite limiting to the scholar. On the other hand, whereas

NAP seems to limit the scholar through structured questions, it actually creates an

organized structure that is either as loose or complex as the work at hand. The guidance

provided by NAP is merely an interface-based aspect that opens the reader's eye to what may be lost behind the intensity of the novel, or the flow of the plot.

In addition, Gephi and Palladio lack labels identifying the types of relationship between one element and the other, while NAP tags each connection with a label of the scholar's choice. This affects the data outcome as it not only defines the structure, but also groups the relationships by their type, hinting at the connectedness patterns within a novel. On a similar note, NAP allocates properties to nodes, as well as inherent relationships, whereas Palladio and Gephi have bare nodes and non-value relationships that are not specific to any given node.

When it comes to the graph visualization, unlike the other tools, NAP offers clickable and expandable nodes which play a role in an automatic expansion of the data bringing forth hidden or unnoticed connections. These connections are possible between the multitude of elements available within a network, creating an interconnected complex structure that can be as faithful to the novel's structure as needs be; in contrast, Palladio and Gephi can only link two elements at a time, conditioning the connections by filtering the data (if desired by scholar).

As represented in the three sample visuals and analyses, Gephi and Palladio offer limited options for the scholar to explore multidimensional data. Although they both allow meaningful and relevant interpretations taking the analysis steps further, they lack the depth in the exploration of inter-connections. NAP fills this gap, as shown above with the expansion of the entity in relation to places. While the initial network consists of entities and places, the expansion introduces characters as well as time frames. This feature induces

a reading across several elements of the novel at hand, which will be explored later on in this thesis. To be fair, Gephi was never designed to deal with humanistic data, and Palladio is a platform under construction in a web-based environment that is slowly growing while adapting. NAP will ultimately be more satisfying to a user who desires a standalone, computer-based data visualization option for a literary environment. While Palladio is able to faithfully represent an event oriented analysis of Alameddine's *Koolaids*, Jarrar's *Somewhere, Home* called for a more developed tool to embed, dissect, and represent its structural complexity, unlocking some of the mystery and complexity of Lebanese post-war fiction.

CHAPTER II

THE NOVEL ANALYSIS PROGRAM (NAP)

A. Purpose of Development:

The Novel Analysis Program (NAP) is a tool that I have developed for the purpose of this literary research project, which will be shortly developed to be used by other scholars on an online platform. After working with several social networking tools such as Gephi and Palladio, and while trying to encode the complexity of setting, time and character in *Somewhere, Home*, it has become clear that some complexities in postmodern novels cannot be captured in a spreadsheet that is uploaded into a visualization tool: there needs to be a tool that allows for such data to be born connected, interrelated and yet independent of its connections. For a data corpus to be faithful to its source, i.e. novels in this particular case, it should resemble the source's structure, and share its aspects. Therefore, it is clear to the author of this thesis that a program is needed where both data and the corresponding novel share common grounds. *Somewhere, Home's* complex structure imposes a special kind of encoding path, not to be necessarily shared with *Koolaids*. The latter assigns different importance to the connections and relationships. To satisfy the encoding requirements of the former novel, the NAP tool was designed to reflect the work, its structure, and its spatial ambience.

The idea started with the problem of having to organize data in a tabular format, which was simply not satisfactory for the kinds of relationships found in the novel. The first thing the coding targets is the creation of relationships between elements of a system. These have to connect different elements together, yet on different layers so that not all of them have the same place with regard to the novel's structure. That is, even if

the elements are connected, it does not mean that they are restricted to one thing or another, but like the novel's structures, a multitude of layers is allowed (depth and density). All of the various data elements in the novel are not all connected to each other in the same way. For example, gender is assigned as a property of a character. On the other hand, place is an element that has its own properties, and is to be related to the entity. Entity is the parent of all corresponding elements. A third element related to the characters is emotion, a very important aspect of the Lebanese post-war novel. Hence, each character at each instance is assigned the appropriate emotion, if it is applicable. In order to track the element of memory and as it is an important aspect to be highlighted, the relationships between the characters are labeled by type (Real, Memory…), along with an encoding of time, which is not very specific in this novel. In that way, the memory element is concretely displayed and put to play within the network, through the labels of relationships and the time nodes.

The reason behind the development of this code and thus this tool is that while scholars seek to understand works of literature and read them in computationally-assisted ways, it is crucial to have the tools so as to be able to represent the literature with a consummate complexity. In other words, when one encodes a given novel (in what could be called the second step of critical reading), the tool automatically creates the data structure in a way that mirrors that of the novel's, allowing access to visuals, thus opening the next door of elaborate analysis.

B. Language and Database:

To deliver the best outcome, the programming language used for NAP is Python, as it is one of the best data analysis computer languages, with many functions, variables, and expressions. As for the database, Neo4j is best suited for this program,

since it is a relational database, with a compatible Python module. Python and Neo4j together allow thus for successful data collection and data analysis, for reasons to be separately discussed below.

To begin with, Python and its libraries offer data-oriented programming, which means that data collection and analysis is optimized. Although Python could be called a scripting language, since it "can be used to write quick-and-dirty small programs, or scripts" it can still be used to build "mission-critical software" (McKinney 2). This language is not only used for industry applications, but also for academic research, due to its multi-functionality: "For data analysis and interactive, exploratory computing and data visualization, Python will inevitably draw comparisons with the many other domain-specific open source and commercial programming languages and tools in wide use" (McKinney 2). In addition, the Neo4j graph database has a Python compatible module which means that the two dance together. This has been my choice to design a tool for literary analysis.

The Neo4j database is one that can hold interconnected and interrelated data, allowing extraction in different forms, all the while revealing the database in a graphed network. The user can explore the database with specific queries so as to extract, filter, represent, and manipulate the data. Manipulating the data drops all pejorative and dissuasive meanings, suggesting that one can scale down the data, clean it of duplicates, focus on a specific area, and so on. The researcher can take a needed section of the data and zoom onto it, one can make sure the data is not repetitive, as well as having the possibility to direct the search in any way through typed queries.

C. The NAP Code:

Computer code is the set of instructions that you give the machine to perform certain operations. In order to understand the program's functionality, the code will be explained line by line, command by command. The critical process behind the steps will be put forth, highlighting how such coding can enhance and culminate in literary analysis. Firstly, the most important variables will be defined, as these are used abundantly in the code that follows.

Table 1: Python Variables

Variable	Definition
Gdb	Defining the graph database
Def	Definition: defines a given function
If	Condition: imposes a condition to be acted upon
Else	Condition: in case condition is not true, apply the 'else' command
For	Loop: goes over a given series of items, and applies corresponding command
Print	Prints the statement that follows
Return	Returns the entered data, i.e. adds it to the database
raw_input	Commands the program to take input from the user

gdb.labels.create	Creates a label in the database
gdb.nodes.create	Creates a node in the database
x.relationships.create ('y', Y)	Creates a relationship 'y' between the x element and the Y.
While	Loop: while the condition is true apply command, otherwise stop the loop
gdb.query	Allows the program to query the database for the needed item

Below is the code for NAP (it has also been attached separately in the appendix.) It will be explained line by line, command by command, so as to present the idea behind the ties between the elements, and the functionality of the program. To distinguish the code from the description and explanation, the former will be given in italics and bold.

from neo4jrestclient.client import GraphDatabase: importing the graph database from the source at neo4j allows the program to access it and use it to store the data within. Neo4j is a graph database that provides a Python module, thus this line also imports the corresponding library for the code to match and run appropriately.

gdb = GraphDatabase("http://localhost:7474/"): this defines the graph database location and how to access it. Although it is an http link, it does not need internet connection to run as it points to a local host on one's own servers.

The section to be discussed below is the one defining the functions. Although Python has its own functions, it also allows the custom defined one for flexibility as well

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def create_entity():: Creating an entity allows the user to mark the entries with a number. It can/will also allow strings of characters (for event entries) and not only integers. For the purpose of NAP, it is used so as the user can store the information to one entity so that each instance has its own number.

The function consists of five steps:

entities = gdb.labels.create('Entity'): create a label "Entity."

enter = raw_input('New Entry: '): take input from the user, asking him/her for a "New Entry."

entry = gdb.nodes.create(e = enter): create a node within the "entity" label which property "e" is the input entered by the user in command "enter."

entities.add(entry): add the node entered in command entry to the label created in command entities.

return entry: produce the entry.

def display_existing_entity():: display existing entities, allowing the user to know at which entry one is, so as not to lose count or duplicate entries. This function was not defined from the beginning of the coding process. However, while testing the tool, I have noticed that it is hard to keep track of the entity and it would slow the encoding remarkably if one was to check the database every time one loses count. Moreover, the literary critic-encoder cannot be completely sure of the numbering, especially with the growth of the data. Therefore, it seemed safer to display the entities for the encoder. This does not mean that the data will be flawless for this is still part of the manual work.

The function consists of three steps:

existing_entity = gdb.labels.get('Entity').get(): access the label named "Entity" to get information from it.

for existing in existing_entity:: Loop through the retrieved label and its information. Take "existing" to be each of the elements found in the set being looped.

print existing['e']: print the "e" property of each existing element. "e" in this case is the number of the entity. This creates one problem at this point, which is the fact that the tool displays the numbers under each other so the list would require scrolling for the user to see the number to follow. This will be dealt with at a later point.

def add_character(entity): Add a new character to the data. Adding a new character is one of the fundamentals of NAP as it deals with the structure of novels and these are remarkably affected by the characters steering the plot. In addition, in the case of Jarrar's *Somewhere, Home*, the characters and their relationships form the internal structure of the novel, which makes character additions one of the fundamental steps of the encoding process.

This function consists of eight steps, for it also associates properties to the character added, as well as links the character created to its corresponding entity:

characters = gdb.labels.create('Character'): create a label "Character."

name = raw_input ('Character name: '): take input from the user asking him/her for "Character name."

gender = raw_input ('Character gender: '): take input from the user asking him/her for "Character gender." . However, it is treated as a property and not a stand-alone element since it is the case in the actual structure of the novel where the characters have genders and no gender stands alone. Thus it is dependent of its character. It is important to note that in a traditional data collection process (filling up an excel sheet), gender would be treated as an element itself.

status = raw_input ('Is the character alive or dead? '): take input from the user asking

him/her to answer the question: "Is the character alive or dead?" The status is important

to be collected so as to track the reality of the character's existence within the realm of

narration.

char = gdb.nodes.create(name=name, gender=gender, status=status): create a node

within the "Character" label, taking the three properties name, gender, and status, as

described above.

characters.add(char): add the nodes to the label "Characters."

char.relationships.create('hasCharacter', entity): create a connection/relationship

between the created character and its corresponding entity. This step will have more

value later on as the code develops , since all the elements will eventually be connected

to their corresponding entity, allowing entities to connect other elements trough

characters for example.

return char: produce the character.
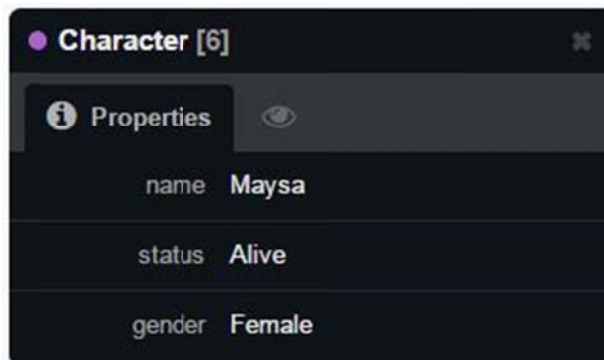
Figure 22: Character Properties

This image shows how the properties of a character are displayed in the

database. In order to reveal this window, the user should click once on the node of the

desired character on the graph of the database.

*def display_existing_characters():***:** display the existing characters allowing the user to choose from previously entered characters so that one does not have to enter the character and his/her properties more than once. Such a function is relevant only with the existence of the one to follow.

This function consists of six steps:

*existing_characters = gdb.labels.get('Character').get()***:** access the label "Character" to get the information in it.

if existing_characters: imposing a condition that if there are "existing_characters" (i.e if there are characters in the label "Character") do the following:

for existing in existing_characters: Loop through the retrieved label and its information. Take "existing" to be each of the elements (characters) found in the set being looped.

*print str(existing.id) + " " + existing['name']***:** Print the id number of the existing element (assigned by the database), and the property "name" of the character. The user will have to type in the id number of the character which is why it is displayed.

else:: if there are no characters in the label,

print "No existing character yet!"

*charcter = add_character(entity)***:** execute the "add_character" function, which asks the user to enter a new character and his/her properties.

def choose_existing_character(entity, question='Type the id number of the existing character: '):: If the character already exists, allow the user to choose from the existing characters. A step like this one saves the time of filling in the same information again and again, but most importantly, it prevents the data from having duplicated characters.

In other words, each character exists once in the data, and all instances relevant to this one character are connected to him/her.

This function consists of five steps:

*display_existing_characters()***:** display the existing characters.

name = raw_input (question): ask for the name of the character, by entering the id number, answering the command defined in the function: "Type the id number of the existing character."

*character = gdb.node[name]***:**link this entered character to the one already available in the database.

*character.relationships.create('hasCharacter', entity)***:** assign the chosen character to the corresponding entity.

return character: Produce the chosen character.
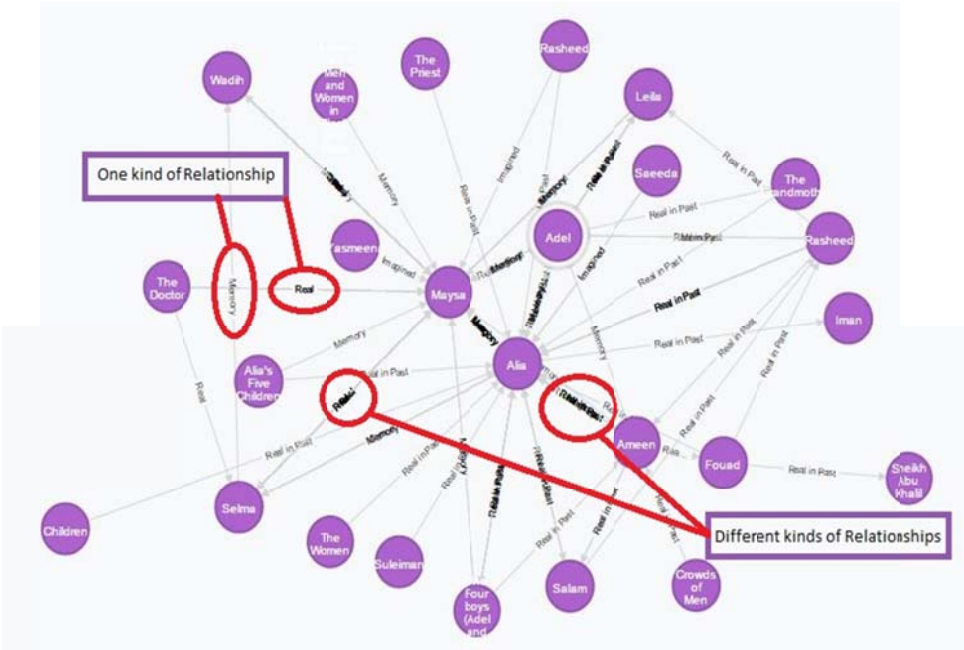
Figure 23: Characters' Relationships

Figure 23 represents the relationship links between the characters, in the form of lines with arrows at their ends. As annotated, when the relationship between two characters is

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of one type, the label is clear. However, when the relationship is of multiple types, the labels get mixed up and legibility of the graph suffers. This issue can be dealt with by selecting the type of relationship desired and looking at the connections in the tabular form provided by the database, as shown in Figure 24.below.

Figure 24: Memory Tabular Relationships Sample

def add_location(entity):: specify a location at which a given instance took place. The locational information inputted here helps us look at the overall geography of a novel. It is treated as an element, since it is as such in the work studied. It is important to keep the coding consistent to the novelistic structure, for the results to be reliable and credible.

This function consists of eight steps for it includes adding properties to the location, as well as linking the location to its corresponding entity:

location = gdb.labels.create('Place'): create a label "Place."

*pl = raw_input ('place: ')***:** take input from the user asking him/her for "place."

*gran = raw_input ('Granularity: ')***:** take input from the user asking him/her for the "granularity" of the place. The granularity means the type of the place, at different scales (whether it is a country, a city, a building, a house, etc.),

*coor = raw_input ('Coordinates (as follows: lat, long): ')***:** take input from the user asking him/her for the "coordinates" of the place in the form latitude, longitude. In order for a digital map of locations in novels to be created, this information is necessary. Such functionality has not been executed yet in NAP; ideally, it would allow users to input known coordinates or to choose locations from a map interface. It is to be developed in a future iteration of NAP for its benefits for the study of literary works.

*place = gdb.nodes.create(pl=pl, Granularity=gran, Coordinates=coor)***:** create a node within the "place" label, taking the three properties name(pl), granularity, and coordinates, as described above.

*location.add(place)***:** add the nodes to the label "Place."

*place.relationships.create('inPlace', entity)***:** create a connection/relationship between the created location and its corresponding entity. This step starts to have more value, since more elements are being connected to their corresponding entity, allowing entities to be connected to each other through elements, thus interconnecting the elements themselves.

return place: Produce the place.
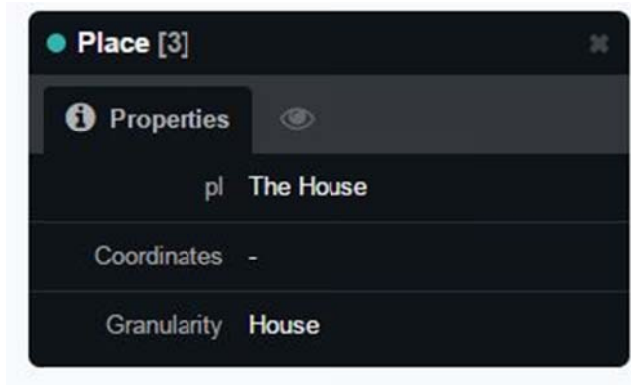
Figure 25: Place Properties

        The place properties revealed by clicking once on the wanted node show the granularity of the place, the name, and the coordinates. These can be extracted for specific analysis of given instances, as well as keeping track of such information in one's database, to later find patterns or create maps.

def display_existing_location():: Displaying the existing locations so that the user can choose from existing ones, thus not entering properties all over again. Similar to displaying existing characters, this function is only relevant with the existence of the one to follow.

*existing_location = gdb.labels.get('Place').get()***:** access the label "Place" to get the information in it.

if existing_location:: imposing a condition that if there is an "existing_location" (i.e if there are locations in the label "Place") do the following:

for existing in existing_location:: Loop through the retrieved label and its information. Take "existing" to be each of the elements (locations) found in the set being looped.

*print str(existing.id) + " " + existing['pl']***:** Print the id number of the existing location, and its "pl" property which is its name.

else:: If there are no existing locations, do the following:

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print "No existing location yet!"

*place = add_location(entity)***:** execute the "add_location" function, which asks the user to enter a new place and its properties.

*def choose_existing_location(entity, question='Type the id number of the existing location: ')***:**: allow the user to choose from the existing characters saving him/her the process of creating the same location time after time, in addition to preventing duplicate places and having each place have all its proper entities related to it.

This function consists of five steps:

*display_existing_location()***:** display the existing locations for the user to choose from.

*pl = raw_input(question)***:** Ask for the name of the place by asking the user to "Type the id number of the existing location."

local = gdb.node[pl]: *]***:**link this entered location to the one already available in the database.

*local.relationships.create('inPlace', entity)***:** assign the chosen place to the corresponding entity.

*return local***:** Produce the chosen place.

*def add_emotion(entity, Character):***:** add an emotion to the data (the emotion of the character in question). The emotions being elements studied in literature, it is deemed essential to associate them to the character experiencing them in a given instance. This information is encoded to note down the feelings experienced by given characters (or genders) at a given time in a specific place. This is one of the many aspects that can push the analysis a step further.

This function consists of eleven steps for it displays acceptable emotions for the user to choose from, as well as links the emotion to its corresponding entity, character, and place:

emotions = gdb.labels.create('Emotions'): create a label "Emotions."

List_of_emotions = ["Acceptance", "Anger", "Anticipation", "Anxiety", "Aversion", "Contempt", "Courage", "Dejection", "Desire", "Despair", "Disgust", "Distress", "Elation", "Expectancy", "Fear", "Guilt", "Grief", "Happiness", "Hate", "Hope", "Interest", "Joy", "Love", "Pain", "Panic", "Pleasure", "Rage", "Sadness", "Shame", "Sorrow", "Subjection", "Surprise", "Tender-Emotion", "Terror", "Wonder"] (adapted from Ortony and Turner, 1990).

print List_of_emotions: printing this bounded list of emotions and making the user choose one of them again aims at the consistency of the data. Of course, it is possible that the emotions do not exactly match the list provided here (which I have taken from…), but the critic is reminded that a database and a visualization do not give the last word on a novel, but are a conversation about it and they ultimately point back to the primacy of the artistic creation and invite us to ask new questions for subsequent analog close readings. A bounded list of emotions, although at first glance reductive, allow for organized data and thus a more relevant digital reading and analysis. Had the emotions been free from restrictions, the data entered would be varied to a point that cannot be efficiently tracked and put to use.

*Emotion = raw_input ('Emotion (choose from list): ')***:** ask the user to choose an emotion from the available list and type it in.

*while Emotion not in List_of_emotions:***:** conditions the actions so as to do the

following if the user enters an emotion that is not part of the pre-determined list. The

while loop keeps repeating itself until the user chooses from the list.

print 'Please choose from available list.'

Emotion = raw_input ('Emotion: '): take input again.

*emotion = gdb.nodes.create(em = Emotion)***:** create the emotion node within the label

"emotions."

*emotions.add(emotion)***:** add the node to the label.

emotion.relationships.create('isEmotion', entity): Link the emotion to the

corresponding entity.
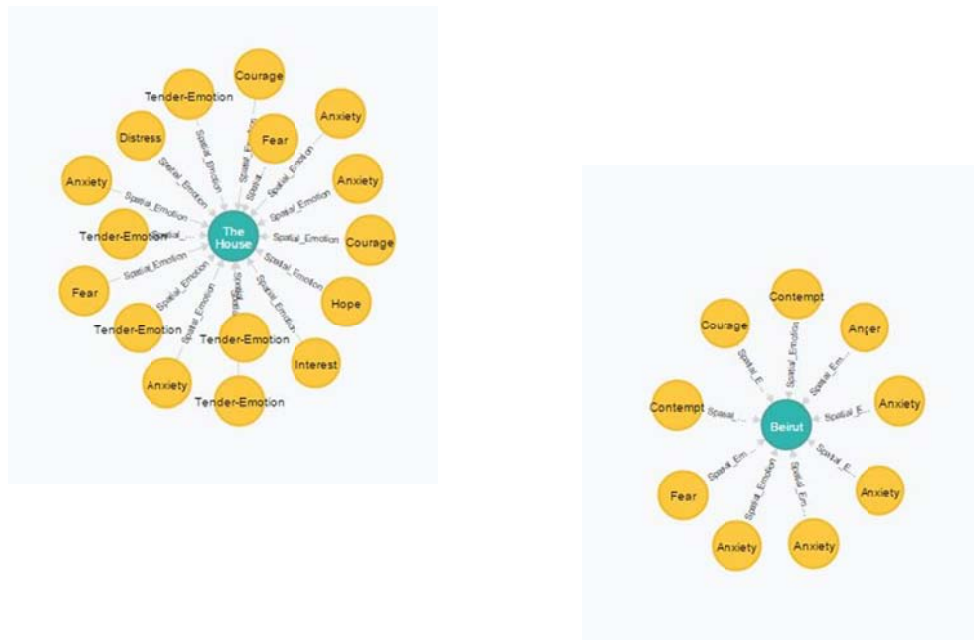
Figure 26: Spatial Emotions

Figure 26 illustrates how the relationship between place and emotion command

translates graphically. In the above image, one notices the formation of divergent

emotional constellations around 'the house' and 'Beirut.' These two places being very

important to the structure of the novel are reflected in a structural formation onto the

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network, highlighting the clustering of emotions around each place respectively. It is important to keep track of this connection so as to open the possibility of studying the emotions experienced in a given place, and deducing patterns. The same applies for spatial time (see Figure 27).

emotion.relationships.create('hasCharacter', character): Link the emotion to the corresponding character.

emotion.relationships.create('Spatial_Emotion', place): Link the emotion to the corresponding place.

*return emotion***:** Produce the emotion.

*def add_time(entity):***:** add a time notion to the entity being encoded. Time being an element as well, it is treated alone, to be linked to the entity and the place, for the purpose of visualizing these links and inducing further analyses.

This function consists of eight steps, as it links the time to its corresponding entity and place:

times = gdb.labels.create('Time'): create a label "time."

*temporal = raw_input('Time: ')***:** take input from the user asking him/her for the "time."

*gran = raw_input ('Granularity: ')***:** take input from the user asking him/her for the "granularity" of the time i.e. Month/Date/Year, Hour…

*time = gdb.nodes.create(t = temporal, Granularity=gran)***:** create a node within the time label, with properties 'temporal' and 'gran' from the above commands.

*times.add(time)***:** add the node to the label.

time.relationships.create('atTime', entity): link time to its corresponding entity.

time.relationships.create('Spatial_Time', place): link the time to its corresponding place.

Figure 27: Spatial Time

return time: produce the time.

The program begins here, and the user inputs data as asked.

ans = raw_input ('Entry? (1 for yes, 0 for no)'): this command take numerical input: if the user enters 0, the program shuts down assuming one does not want to continue.

gdb.query("CREATE INDEX ON:Character(name)"): allows the creation and allocation of an index id to the character on the 'name' property, for it to be displayed to the user via the 'display_existing_character' function.

gdb.query("CREATE INDEX ON: Place(pl)"): allows the creation and allocation of an index id to the place on the 'pl' property, for it to be displayed to the user via the 'display_existing_location' function.

gdb.query("CREATE INDEX ON: Entity(e)"): allows the creation and allocation of an index id to the entity on the 'e' property, for it to be displayed to the user via the 'display_existing_entities' function.

while ans != '0':: as long as the answer is different than 0, do what follows:

show = display_existing_entity()

entity = create_entity()

To determine whether the character is new or existing and to fetch any existing character information:

*addition = raw_input ("New character? (yes/no)")***:** asks if the character is new or existing, to determine the upcoming steps.

*if addition == "yes"***:**: if the user says that the character is new:

character = add_character(entity)

else:: if not, then the character already exists, thus:

character = choose_existing_character(entity)

To determine the relationships between characters and to define them:

connections = raw_input ('Does the character have a relationship with another character, in this specific instance? (yes/no)'): ask the user whether this character has a relationship with another character.

*if connections == "yes"***:**: if the character is connected:

*is_new = raw_input ('New character? (yes/no)')***:** ask if the related character is new or existing.

*if is_new == "yes"***:**: if the character is new:

related_char = add_character(entity)

else: if the character already exists:

related_char = choose_existing_character(entity)

rel = raw_input ('What is the type of the relationship? ') ask the user to input the type of the relationship between the two characters in question.

related_char.relationships.create(rel, character): link the characters as per the user's input.

To determine whether the location is new or existing and to fetch location information:

new_place = raw_input ('New Place? (yes/no)'): ask the user whether the location is new or existing.

if new_place == "yes":: if it is a new place, the user has to create the location and fill its properties.

place = add_location(entity)

else:: if not, then the user should choose from the existing:

place = choose_existing_location(entity)

To determine whether the characters are having any emotions in this given entry, and to assign corresponding emotion:

emotional = raw_input (character.get('name') + ' Emotion? (yes/no)'): ask the user if the chosen character has an emotion in this case.

if emotional == "yes":: if one does, then the user chooses one:

if connections == "yes": check if the character is connected to another character (as entered by the user earlier), and if yes, then ask the user about the related character's emotion (same as previous character):

emotional_related = raw_input (related_char.get('name') + ' Emotion? (yes/no)')

if emotional_related == "yes":

add_emotion(entity, related_char)

To get the time information:

temporal = add_time(entity)

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To check if user wants to continue and to act accordingly (if the user enters 1, it means one wants to continue so the program starts over beginning with displaying the entry numbers already in the data):

ans = raw_input ('Entry? (1 for yes, 0 for no)')

The data collected – nodes, relationships, and properties - are all organized and structured in the database, displayed for visualization as presented in the figure below. By clicking on a selected element, an automatic query is run and a visual is generated. Although there are general queries set up, one can still write more specific ones in order to visualize and retrieve that data one deems beneficial (as will be experimented with in Chapter 3).

Node labels

Time   Emotions   Place
Entity   Character

Relationship types

hasCharacter   Memory   inPlace
atTime   Spatial_Time   isEmotion
Spatial_Emotion   Real in Past   Real
Imagined   Real in Pasr   Real in Pas
Cancel   Real

Property keys

Coordinates   e   status   em   t   pl
Granularity   name   gender
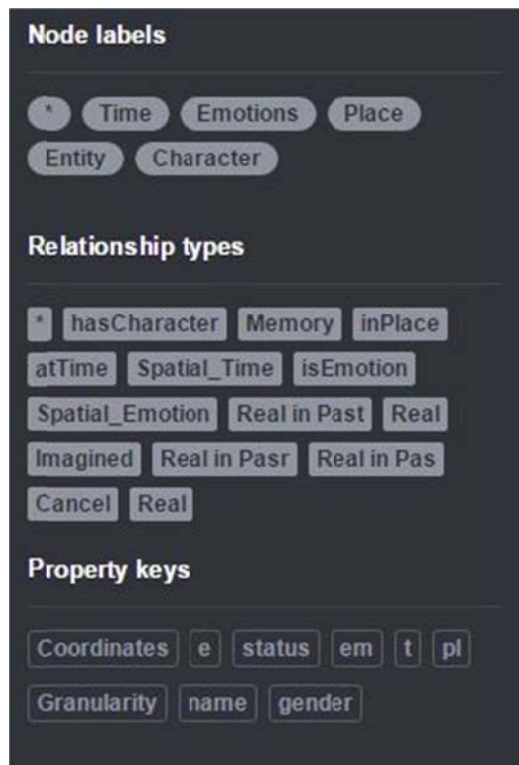
Figure 28: Elements and Properties for Query Selection

D. The Code and Literature:

When attempting to read and analyze a work of literature, especially by means of a digital tool-driven reading, one can aspires to be able to view the novel as a whole, to get the feel of it as one large system with complex layers, the connections and relationships of which lead us to meaningful interpretations. Using a directed means "capturing" elements of a novel through data collection, I have argued here is a means of close reading. Furthermore, the visual output of the NAP tool provided new lenses through which to think through, again, the novelistic work. However, this is not the only relationship between writing code and literature. The critical process behind setting up the back-end of a computational tool meets with the literary critical perceptions of novels, in various ways to be discussed.

There is an issue of critical thinking that precedes the data collection phase, and that is the very design of the code. I have attempted to show in this chapter how order to be able to write a code, one needs to have a purpose. One needs to understand not only the instructions you give the computer, but also what the interrelations of the different kinds of data are. When writing a tool that is to be used for literary analysis, one needs to understand something about the objects that will be studied using the program. Hence, before starting with the actual writing, it is important to have a deep understanding of the corpus, its place among other fields, and its main elements that shape its structure. As basic as this may be, it is the essential step before digging deeper into the material. The process of knowing how to code also comes through an iterative exploration of the literary objects at hand. The explanations in Chapter One of how Gephi and Palladio work with literary data were not only narratives of incomplete, or failed attempts, at representing these two Lebanese post-war novels. They were also steps along the way to designing a better way of seeing the structures. In other words,

after figuring out the bigger picture and the limitations of one form of data and visualization, I was able to design another. Having an idea of the larger contours of the data the zooming in starts, so as to launch the detailing and schedule the delicate tailoring. This step is when the aspects and functions are decided upon, with disregard to the actual code. In the case of NAP, this is where I decided that the tool is to create the data in a connected way, linking elements to each other, assign properties to appropriate elements, storing the data in an organized and efficient way, allowing for a more nuanced visual representation. Having both a larger picture of the data and of the structure, the coding can then begin. The similarity between critical coding and critical reading in this step presents itself through the detection of the elements, and the setting up of the aspects and concepts. Just as one needs to understand the element of the corpus, one is to understand the major elements in a novel that need to be kept in mind while reading. In addition to this, the aspects of a novel (i.e. themes, and literary patterns) are to be identified before the literary analysis actually begins. This is not that different from the process of analog literary criticism, where many readings, drafts and redrafts of writing take place before ideas are finalized.

The second step is the first phase of the coding, during which the coder draws the primary structure. This phase consists of setting up the essential definitions, creating the primary relationships, and figuring out what is to be a property and what is an element. In relation to literature, this goes hand in hand with starting to dissect the structure of the novel, scratching the surface of its plot, not yet interacting with it, only setting up the experimental field.

Thirdly comes the bulk of the work, where the code starts to grow and becomes testable (one can run it and check for errors). Each and every step in this phase is the

result of an analytical and critical decision, based on the depth of the expected outcome. This part of the work is the most directly related to critical and literary reading, since it inspires its progress from the critical literary background, so as to weigh and examine the decisions. Each added function or command is built on a careful look at the traditional process of analysis, engaging with it because it suggests the start point, and hints at the analytical potentials. A critical coder is to be aware of the requirements of the field of study, in order to be able to introduce something new to the domain, pushing things forward and not just complicating the process.

The last step, one which is common to the study of literature, is finalizing one's work. Just as a literary analyst revises his/her work to check for consistency, gaps, or potential development, a critical coder checks mostly for the same. The difference between computational and traditional conclusion is that the former is directed by the errors that point out what needs fixing. These errors pop up every time one tries to run the program but something is wrong. The value of this presents itself in the coder's ability to keep track of minor writing mistakes. In addition to the ongoing process of validation, the last step for finalization is when the coder tests his/her tool with actual data collection and representation. This is when one will learn definitely if there are any structural changes that need to be made, or if there is any missing element to be added.

As one may notice, critical coding not only has common grounds with critical reading, but actually one complements the other. With no knowledge in critical reading, one does not have enough vision to develop an efficient and valuable tool (and this is certainly the case of many social network analysis tools published today that are not adapted to the needs of literary scholars), while critical coding itself adds perception to

the literary analysis. The technical and calculated process helps to point out issues that otherwise remain hidden under the dominance of surfaced aspects of works in question.

E.   Limitations and Future Steps:

As any other tool, NAP has its limitations and future steps. So far, NAP opens as a functional command window, not as the aesthetically pleasing typical graphic user interfaces (GUI) used commonly today in mainstream computing. In addition, it needs to be run along with the database so that it works properly, and the process should be done manually. It is easy to image some future steps for this prototype in each of the program's aspects, starting with its aesthetics, all the way to its automated functionality. Imagine if NAP will be available in two formats: as a web-based tool or as downloadable standalone software. It could have automated interfaces for both data representation as well as data extraction, for the purpose of having a user friendly program that truly makes encoding more efficient, and more fun. One can imagine NAP combined with forms of natural language processing (NLP) that automatically detect named entities like names of people or places, the number of occurrences within the work, or subsections of the work. This has been accomplished to some degree of accuracy by some working in informatics. With machine learning, the process could be sped up with "guesses" made by the computer based on previous decisions of the critic. Each of these expansions of the basic functionality of NAP, however, would require a significant amount of intellectual labor and collaboration with specialists in other domains of informatics.

CHAPTER III

USING COMPUTATIONAL TOOLS FOR A SOCIAL

NETWORK ANALYSIS OF A SAMPLE CORPUS

When reading a novel, one basic thing a critic does is looking for elements of

setting (time and place), in addition to studying the evolution of characters, while trying

to understand the development of the plot. Traditional ways of reading, that one

imagines to take place in the mind of the critic and in notes that one takes, restrict the

scope of the analysis to a small number of aspects; digital criticism, that is a criticism

that uses flexible databases to model and store a number of complex relationships,

allows one to look at specific markers of each, seeking for correlations across the novel

at hand, across and between the aspects mentioned above.

This chapter will study Rabih Alameddine's *Koolaids*, and the first part of Nada

Awar Jarrar's *Somewhere, Home*. The corpus consists of a complete novel and a part of

the other. The reason for the incomplete quality of the data for Jarrar's novel is that the

encoding process for the second is a complex one that if practiced onto the entire novel

will exceed the scope of this thesis. In addition, the scale of the data for one part of

Somewhere, Home is larger than that of the full dataset for the entire novel *Koolaids*.

This might seem surprising, however, it is worth noting that many research projects in

the digital humanities reuse data that has been created by others, or are based on group

research where a number of actors are creating the data together. Since a thesis in the

field of English Literature is usually a solitary act, and especially since, no one to my

knowledge has (at the time of writing this thesis) attempted to analyze Lebanese

Anglophone literature using digital tools, I was left with only one option: creating the data myself. Originally, this thesis was going to involve the data of three works of fiction fully encoded. This proved to be more work than was possible.

The format of this section will put to play both traditional critical reading, as well as computationally-assisted analysis. Since this thesis aims at experimenting with the interaction of both digital and traditional, the last part of this chapter will compare the two novels at hand, going from the findings of the resulting analyses.

"Images, like histories and technologies, are our creations, yet also commonly thought to be 'out of control' – or at least out of 'someone's' control, the question of agency and power being central to the way images work" (Mitchell 6). This sentence puts together images, history, technology, authorship, power, and creativity. What remains explicitly exterior to it, yet implicitly as dominant as any other element, is the element of words. Images translate histories, give elegance to technologies, illustrate our creations, tame our beasts (at some times), and exist with power and agency; words are accomplices in this too. Just as agency and power are central to the work of images, they are central to the work of words. If one puts both images and words to work, together, in a united sense, agency and power would make the work in question out of the control of its authors, and would be reported to the audience, just as histories and technologies, to be absorbed and invested, outside of their own realm and authority.

Creating a social network from a novel is a time-consuming process that arguably results in a translation from word to image. The words' element does not exclude itself from the final result, but allows the characters of the novel in question to be visually present on the image. Agency and power, thus, are those of the characters and their interconnectedness, instead of those of the creator's: one is simply a servant to

the novel itself, and the software generating the networks. The main agent and what is actually in power over the resulting network or image is the text itself. The images and words are hence in power over the creator of the image, however, the audience has the right to read and interpret the data as it sees fit, for this is now its project to decipher (as long as it remains faithful to the novel and the networks).

The process to be discussed is one that transforms the same piece of art, into another form, relying on the art of translation, using digital tools. According to Adorno:

[t]he different arts may aim at the same subject, but they become different because of the *manner* in which they mean it. Their substantial content lies in the relation between the *what* and the *how*. They become art by virtue of this substantial content. But this needs the *how*, their particular language; if it went in search of something larger, beyond the particular form of art itself, it would be destroyed (Adorno 377).

The 'manner' in this project is what differentiates the images from the novel source, and what thus allows different interpretations. The *what* and the *how* are elements in the networks, while theses are textual forms in the novel. The 'language' here is the image, the lines, as well as the use of words (to name and identify the characters), so as to remain within the essential form of art given within the novel. There should not be destruction of the art work, but a deconstruction through thorough analysis of component parts and thus an enhancement of it through analysis. A visualization is but a transformed version of the various constituent elements encoded by the critic.

The image is the sum total of a large number of small decisions, microanalyses if you will, about elements of character, events, and others, to reach an analysis that is

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perhaps accessible through close reading of the text itself, but difficult to conceptualize given the sheer number of them.

The point of this is to trace the connections hidden between the lines: when one is reading a novel, one follows the plot, gets hooked to a few characters, looks for dilemmas, hunts for political analysis, gender analysis, or even character relations. A critic not working with digital tools may notice such connections, and even try to keep track of them. Yet, when one instance puts together many characters in what seems to be a minor reference, the reader may skip it, or could be inclined towards ignoring it. This is one of the advantages of social networking, for when encoding (representing the text in a network) we pay close attention to interactional details, which reveals in their aggregate patterns that could otherwise be ignored.

A. *Koolaids*:

The data collection for this novel was processed via the Palladio tool, following a specific process arranged in the format of a table (see Figure 1, Chapter 1). To start, **events** are instances that have to meet specific guidelines. Since Alameddine's *Koolaids* is a novel that is directed by the events taking place within, it seems affordable to compromise other heterogeneous contents, at the cost of having an event-directed data. The novel itself gives the reader the sense of following through occasions being narrated in accordance to elements that are its components. Therefore, any event that falls outside of the novel's overall "environment," such as hallucinations, political speeches or letters, and any other instance that does not happen within the active and conscious choices of the characters, is not encoded as an event. Furthermore, as intimacy situations between men have been described in a mostly emotion-less fashion, and since such events result in others loaded with emotions and affective to the novel's

plot, they are not encoded. There is however an encoded intimacy situation between a man and a woman, and that is due to the emotions revealed and its direct relevance to the plot. I am willing to reconsider the intimacy issue if it is suggested that it would affect the results in any way. The exclusion of the coding is a note that will be further discussed, accompanied by literature on the topic, it being one of the difficulties of this discipline. Yet, it remains essential to remark that such decisions are what keep the literary analysis in a study assisted by computational tools.

The **characters** are not necessarily the subjects of the events, but could be emotionally affected (by the consequences of the event) and thus lead to an analytical discussion. The **gender** is encoded due to its importance to the study.

The **place** is where the event occurs, as specified (or implied) by the narrator. If the place can be pinned down on the map, then **coordinates** are allocated to it. The **place granularity** is the type of place mentioned (house, building, city, country, street, etc.) Granularity is important for one's understanding of the space element, which will be elaborated and carefully studied in a later stage. This being said, **time** and **time granularity** may be highly connected to space, thus they are encoded. Whatever the narrator provides the readers with, even if just an hour on any random day, is encoded. The time granularity goes from hour, to month-day-year (MDY), to year (Y). The author mentions different kinds of dates in different sections. The **emotion** is the one experienced by the character in question, and does not define the global state of the event.

The **page** number is encoded for a potential significance of the fragmentation of the novel. The last element in the table is the **precision.** Since the text presents a great number of situations where the events, setting or emotion could be ambiguous, the

encoding process is one full of potential uncertainties. The precision scale is designed

to account for that: 1 is precise, 2 is closer to precise yet the encoder is not completely

sure, and 3 is not precise. The precision scale represents the degree of personal

judgment the encoder puts into a given instance. That is, 1 means that the narrator

explicitly gives out the information encoded. Precision could involve elements such as

event, character, or emotion. This data collection is then translated into visuals to be

critically read and analyzed.
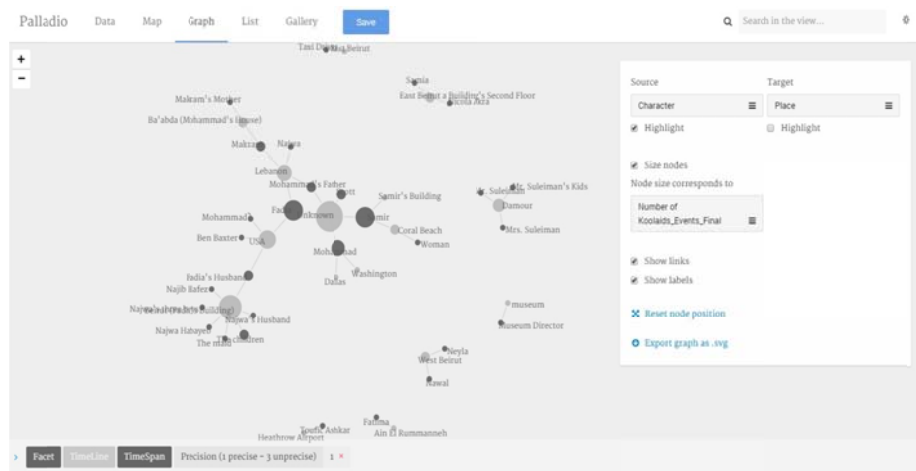
Figure 29: Character-Place Relationship

The 'Character-Place relationship' graph shows the distribution of the characters

on the places of the novel, showing clusters and scattered nodes. As a social network, its

clusters where one finds condensed information, are the places that draw our attention

and beg interpretation. Thus, the network leads us towards looking at it as a whole, but

focusing on its clusters. The graph in Figure 29 consists of eight separate groups of

connections, of which one is the most significant and has the most dominant places in

the novel. The character nodes have been highlighted while those of the places are

lighter. Another important note to keep in mind is that this graph is filtered to the

precision of 1. In other words, the data put into this network is considered to be certain in the opinion of the encoder.

To start, the small connections standing alone, scattered over the graph do not strike as having a consistent pattern. Some of the places are specific private places (East Beirut a Building's second floor), others are specific public places (Heathrow Airport). However, one notices that the outlying characters scattered along with these places are not main ones, they are however, essential to the plot. From the first reading of the graph, looking at secondary place nodes, one realizes that these have secondary characters connected to them, making these relationships fragile enough to be disconnected from the main character-place network, but valid enough to stand each alone in the whole of the graph. This disconnectedness however should not be seen as a limitation, but rather an extension to the bigger picture. Looking at the form of the entire graph, one notices how the smaller independent networks draw half a circle around the bigger one. Linking this to the novel itself, one feels how the secondary characters and places are distributed across the novel, in a way that accompanies the main characters, yet leaves them at a distance that allows them to grow beyond restrictions. They passively provide an active environment for the other elements to position themselves across the novel in an interconnected, clustered way.

When it comes to the main network, the most striking element is the place node 'Unknown,' which is the biggest of all place nodes, centering itself within the graph, connected to eight other places, through the characters it is related to. The characters (Samir, Mohammed, Fadia and Scott) related to 'Unknown' are even more telling than the node itself; these are mostly the novel's main characters. This leads us to an interesting conclusion that the main characters are mostly associated with an unknown

place. The realm of the unknown being unlimited yet greatly vague, hints at the novel's dominant view of spatiality. The location of *Koolaids* is largely unknown, divorced from geographical precision, expanding its flow over many places. The non-specificity of the place with the link to important characters highlights the weakness of places and Alameddine's use of a more ambiguous 'space.' The characters evolve in an undefined, intangible zone.

It could be argued, therefore, that *Koolaids* while constantly alluding to real locations undercuts a geographical realism. The presence of specific and known places in the novel gives the reader a modicum of setting, and yet, it deconstructs the geographical reality by leaving the majority of the events with no specific locational references. In other words, the reader is comfortable knowing that this novel's events happen in specific places, but is given the opportunity of constructing his/her own spatial realm, for the novel has characteristically deconstructed its own.

Such finding is also applicable when tackling the relationships between places and events, as shown in the figure below (Figure 30).
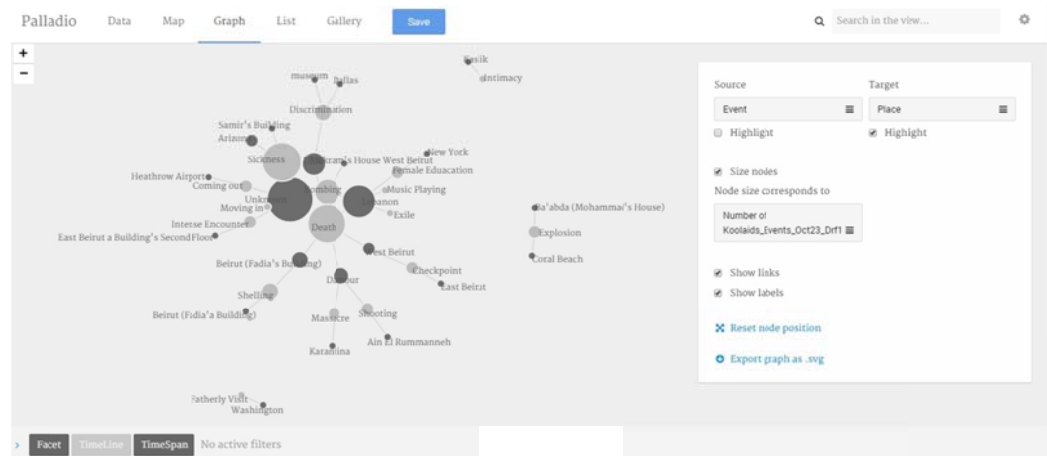
Figure 30: Event-Place Relationship

The two most dominant events are death and sickness, after which comes bombing. These being obvious events to fall in a post-war novel, they will be happening in places that will draw the plot's map. In turn, these events are directly linked to the unknown place, but also to Lebanon. The country in question does not come as a surprise in an Anglophone Lebanese work, but is meaningful to the analysis, especially when outranked by the unknown place: the unknown node is bigger than that of Lebanon, thus it is more dominant. The association of the mother country of the protagonists and the unknown, in relation to events, hints at the unknown state in general: that of the country, that of the characters, and that of the events. Giving an air of mystery in the places of occurrence, the narrative opens itself to a world of possibilities: that of countries represented as nodes, and of ones embedded within the unknown node. Although one may argue that these places could be known from the context, it is not as much the case. The data collection being a critical reading process, takes into consideration this ambiguity, and deals with it by association. While it can be argued that there are no unknown places and that it can be deduced from the context, the data collection tries to measure whether the place is actually known, or is unknown yet associated with a known place. It even looks into whether it is an unknown place related to other through the association of events. Yet, some events are not allocated to any specific place in the writing, and so are noted as happening in no specific place ('unknown'). This undefined spatiality falls heavy on the reader, breaking the place barrier into an infinite number of possible locations, gathered in a huge virtual space. Always coming back to Lebanon via the size of the nodes and the connectedness, this country could be marked as an exceptional center to a deconstructed, yet centralized spatial existence, baring the happening of the work's events, but not necessarily its

characters. That is, it is true that a lot of the events happen in Lebanon, and are

connected to Lebanon, but this does not impose the same deduction onto characters'

spatiality. The characters can be linked to Lebanon, for example, but it does not mean

that like the events they solely exist there.

These graphs connecting characters and events to places, through an event

oriented system, reveal the issue of space vs. place, which approves of the

encompassing nature of the narrative. It is a note to be kept in mind, as it will also be

discussed with regard to *Somewhere, Home*, and referred to as one of the network

analysis features that push the research forward.
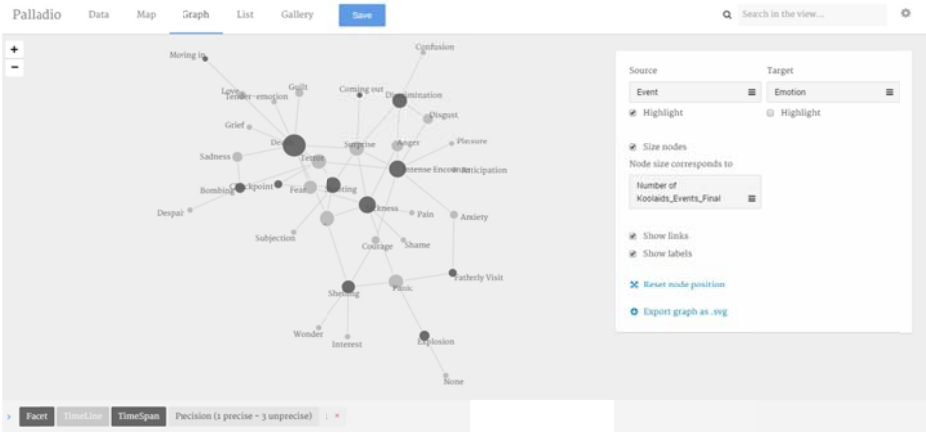
Figure 31: Event-Emotion Relationship

Moving to another type of relationship, having at its heart the emotional

element, the figure above represents the network created between events and emotions,

at the precision of 1. The four main events are death, followed by sickness, then

discrimination and shooting. The distribution of the related emotions is as follows:

- Death: surprise, terror, fear, sadness, guilt, love, tender-emotion, and grief.
- Sickness: surprise, fear, panic, anger, pain, and shame.
- Discrimination: surprise, anger, disgust, and confusion.
- Shooting: surprise, terror, fear, and subjection.

The first striking feature of this graph network is the common emotion between all four major events, surprise. This emotion is one that is meant to be experienced not only by the characters of *Koolaids*, but also by the readers. The flow of the events, the narrative structure, and the characters' evolution, all contribute to an environment that is uncommon to readers—not necessarily because of one's background—but because of the unconventional content. In addition, the 'surprise' node is one that is to be highlighted for its positioning in the graph and its connection to more than just the top events, but also others. The fact that this emotion is connected to so many events creates interconnectedness between these events, based on a shared emotion. This means that a shared emotion creates relationships between the events themselves by being connected to that given emotion's node. This aspect implies a structural relatedness between events, which goes back to narrators who have induced the feeling. *Koolaids*, having more than one narrator, all of which are not very obvious at many points, loses the reader in their shared narrative. Emotions, rather than events, take on centrality in *Koolaids*.

Furthermore, fear comes second in communality of emotions, and induces a feel of the atrocity of the work's content. Although it is not as connected in the network as surprise, it still points to a key emotion shared by characters, and passed on to the readers. As one moves along the novel's events, one fears the next page for it is to be hiding another step towards the darkness of war. It is worth mentioning that fear, although associated with heavy events in the plot, is also linked to minor plot elements like 'checkpoint.' While reading such an incident, the emotions build up, and then oscillate to peak upon a heavy event. Such an experience is productively represented in the network, since the degrees of relatedness represents the oscillations of the emotions

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and events as narrated in the novel. Thus, analyzing the network, one can observe the interconnections of event and emotion that simultaneously creating both confusion and anticipation in the unfolding of the text

The issues of spatiality and emotions thus share a reaction towards the unknown: the spatiality allows an embrace of an infinite (albeit uncertain) geography, and emotions are combined to induce an aroma of the mysterious.
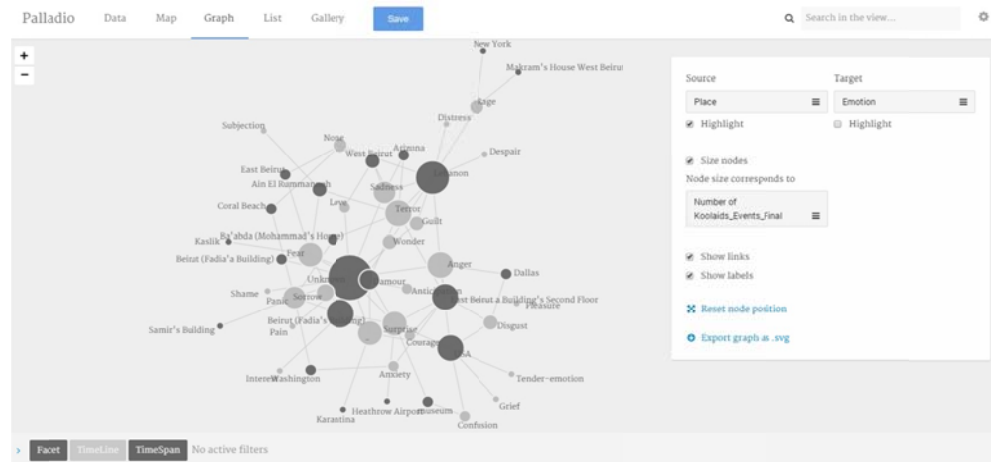
Figure 32: Place-Emotion Relationship

In Figure 32 attempting at representing the relationships between places and emotions, the unknown place and Lebanon are dominant. On the other hand, the most dominant emotions are terror, anger, fear, surprise, and sadness. The combination of these feeling and those spaces creates a network that disperses itself with almost no clusters at all. One does not see a series of emotions clustering around one given place, or vice versa. This being the case while having a multitude of emotions within two major places seems to be unconvincing. Yet, the fact that the main place is the 'unknown,' and that there are a significant number of minor places, opens up a discussion on the scattering of emotions from within the unknown to the outside possibilities of places. The explosion of small particles of place in parallel to that of

emotions collides to form an emotional space that, again, does not know geographical

boundaries. In other words, the largest node being the unknown, does not stand alone in

the network, yet is central to it: if one take out 'unknown,' the network will break. The

centrality of this node thus has a figurative gravity effect, attracting the emotions but

allowing each to exist on its own. This in mind, the emotional space is larger than one

would expect, yet is firmly grounded in the unknown. Such a controversial combination

highlights the artistically controversial work in question, putting to play two elements to

reflect upon all others.

Figure 33: Emotion-Gender Relationship

Of the most prominent elements of Lebanese post-war novel, gender, is tested in

its correlation with emotions, trying to study the flow of feelings across male and

female characters. Figure 33 is one that is distinguished by the clustering of the emotion

nodes between those of the gender ones. The collection of emotions related to both male

and female characters is an interesting one, for it counteracts gender stereotypes. The

quantity and quality of emotions shared between males and females as illustrated in this

graph suggest that this element is one is shared between two extremes that supposedly

do not meet on this territory. Emotions such as panic, sadness, and fear, are ones that

imply weakness and femininity. The fact that these are shared in one cluster, defies the reader's expectations, and gives visual support of the fact that men in *Koolaids* experience such emotions.

The second cluster, which is as representative, is the one unique to male characters. Pain, despair, and tender-emotion are three of the nodes in question, ranking highly on the spectrum of feelings and emotions (i.e. are important are remarkable). These, along with the rest of the collection, open a discussion on the message behind this structure. To be able to answer this question, one must look at the cluster belonging to the female gender: it consists of two unique emotions which are distress and subjection, and unknown emotions. The size of this cluster suggests that the novel is not categorizing women as sentimental human beings, experiences a multitude of feelings that take control of them. On the contrary, if one is to weigh by size, then the male gender is the one experiencing the most emotions, be they common or unique.

When critically looking at this network and contrasting it with the elements of the novel, one understands this departure from normative depictions of gender, as the male and female characters are not traditional ones. Each of these characters has a story that enables a rush of emotions into the character as much as the reader. Therefore, the network supports the reading of the novel and visually reflects the complexity of the characters and their evolution.

Summing up the visuals represented and discussed that illustrated the interrelationships of place, event, emotion, gender, and characters, it could be said that some of them support the reader's hypothesis of a genre relative connection between the mentioned elements. However, when it comes to spatiality, networks complement each other so as to draw upon an unknown, indefinite space, which is produced via the

complexity of the interaction of places, characters, and emotions. The intentional undefined location in a remarkable number of events is behind the generous space offered by the narrators, for the readers to dwell freely with the events, experiencing a diversity of emotions, approved by the characters themselves.

It is important to keep in mind that *Koolaids* has been analyzed from a SNA point of view using Palladio. The limitations of this tool for a literary work (in comparison to NAP) could have influenced the resulting analytical outcome.

B. *Somewhere, Home*:

Somewhere, Home is a post-war Lebanese novel by Nada Awar Jarrar, that revolves around 3 women's return to the past—Maysa, Aida, and Salwa—whether through the physical, or the virtual (imagination, memory, etc.). Maysa physically returns to her grandparent's house, where she used to go when she was a child, and starts to recall incidents that took place at certain periods of time, almost always through the eyes of the characters, of whom some are from the past and others from the present. Aida, also physically, returns to search for the Palestinian refugee who was like her second father when she was a child, also bringing to the picture many characters from the past. As for Salwa, she virtually returns to her past, from her hospital bed, when her family (from the present) is surrounding her; yet, she is still somehow far from home. In this novel, the focus is on home and memory, through the interactions between characters. The focus of this paper will be on Maysa's part (Part I), who is living her grandmother's experience through her pregnancy and staying at the village house. This part emphasizes memory and home through the recalling of past characters, and their diverse interactions with present ones. Memory and multitude of temporality in characters is crucial here, yet I argue that the importance of memory, emotions, and

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space can be highlighted on a great and revealing scale, when represented through networks.

In this section, I will present selected images that represent the social network of Maysa's section in the novel (Part I), and will attempt a close reading, discussing what one could not have read without the networks presented. Mitchell expresses it in his claim on pictorial turn:

> Whatever the pictorial turn is, then, it should be clear that it is not a return to the naïve mimesis, copy or correspondence theories of representation, or a renewed metaphysics of pictorial 'presence:' it is rather a postlinguistic, postsemiotic rediscovery of the picture as a complex interplay between visuality, apparatus, institutions, discourse, bodies, and figurality (Mitchell 16).

This turn is put to use in the following readings, for it completely cherishes the interplay presented by Mitchell, and takes a postlinguistic step, so as to free the characters from their linguistic boundaries (since the interactions are not limited to the spoken word). Applying Moretti's notion of the network as experimentation with narrative, I will also experiment with the network creating images and will discuss the experimental images, in terms of ones that bring to the surface issues well hidden between the lines of the novel (as words). The images are screenshots of the networks. Since the social networks in this specific project are not dynamic, the images do not change any element nor fix what is meant to be moving.

Figure 34: Character Relations

The network above represents the relationships between the characters in the first part of Nada Jarrar's *Somewhere, Home* (the section that is the subject of discussion in this part). It is important to point out that Part One of the novel is about Maysa and her journey in discovering herself through experiencing natural birth in her grandparents' house. The analysis of the visual representations is one that shows the logic behind the encoding and the analysis.

Reading the characters' relationships network, Alia's node represents itself at the heart of it, distributing the relationship amongst other characters, including Maysa, who is the narrator of this part. While Maysa would be expected to be the controlling node, Alia is. The fact that the grandmother is positioned as such, in a very basic network, suggests that she is the most influential character in the encoded part. Since Alia is Maysa's grandmother, and the one whose experiences she is trying to relive, this does not come as much of a surprise. However, as the reading of the graph continues, one sees indirect connections between Alia and other characters, through her connection with the others. The advantage of NAP and Neo4j's visuals is that they allow appreciation of connections beyond connections (this could have allowed a more

advanced access at the interconnections between the elements of *Koolaids*). Hence, Alia's power is not simply derived from her direct connections, but from the ones that happen through other links.

Figure 35: Memory Relationships

Furthermore, filtering by relationship type gives us an argumentative advantage, as it separates the relationships by their time layers, from memory, to real in past, to real, and to imagined. In Figure 35, the relationship types are the one that are remembered. These constitute a condensed network, but not the biggest one generated from the first part of *Somewhere, Home*.

Figure 36: Real Relationships

The network showing the real relationships is the smallest of all the networks of this kind. Figure 36 is the network on the relationships that actually happened in the past, and the last of its type is the one showing imagined relationships between the characters. The size of the networks is representative of the strength of each type of relationship. Thus, the first conclusion on can make is that in the part of *Somewhere, Home* analyzed, the main interactions are ones that were real in the past. That is, an instance where two characters interacted at a past time belongs to this type, while when a character is remembering the other in the past, the relationship is a memory.
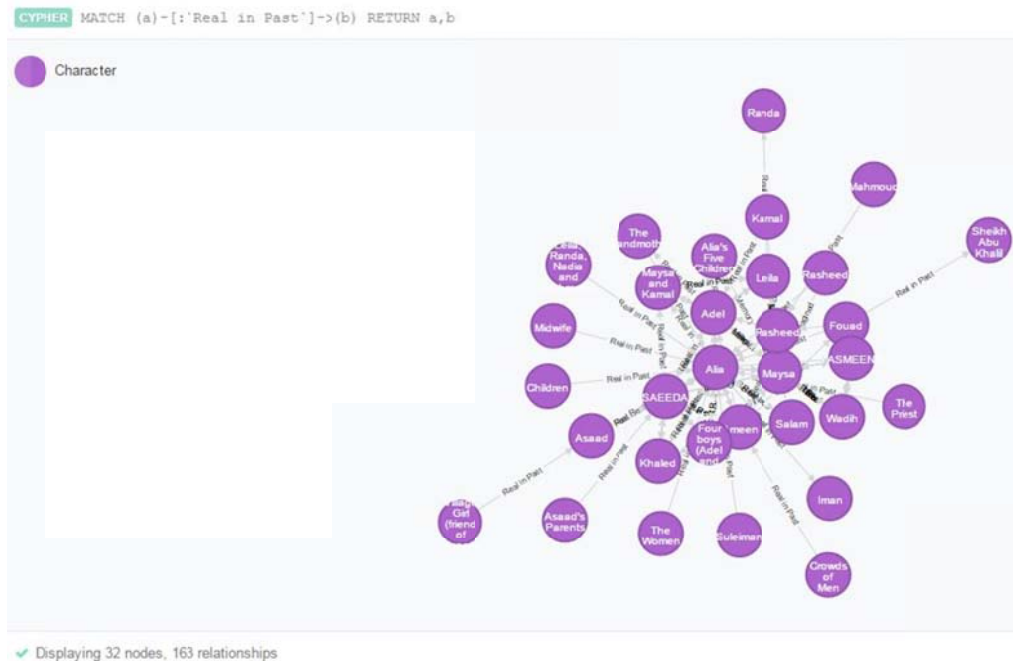
Figure 37: Real in Past Relations

As in the basic relational network, Alia is the one who drives the interactions, positioned right at the heart of the network. Therefore, one knows that it is Alia's dominance during the past, affects the evolution of the characters and their interactions, throughout the narration. In addition, looking at the imagined relationship graph, a triangular shape attracts the interpreter (see Figure 38). The characters who are at the edges of the triangle are Ameen, Leila, and Yasmeena; within the sides are Adel, Alia, and Maysa. Ameen, the grandfather, being at the head of the connectedness triangle of the imagined relationships is thus someone who is consciously called upon, to affect one instance or the other. What should be considered, however, is the fact that the narrative seems to be directing the readers towards a non-patriarchal environment, while the graph shows the complete and utter opposite. The conclusion derived is that the narrator's means of attacking the patriarchy is by implementing an embedded, even undercover patriarchal structure. The other two edges at the base of the triangle being

Leila (Maysa's mother) and Yasmeena (Maysa's daughter) shows the strength of the females who are separated by the narrator's textual element. Hence, although she invites her grandfather to head a triangle of intentionally imagined relationships, she does so to have it based on two female character, and herself at the center of the base. The importance of this graph is derived from the fact that the imagination process is mostly an active and conscious one that is the most controlled by the characters in action.
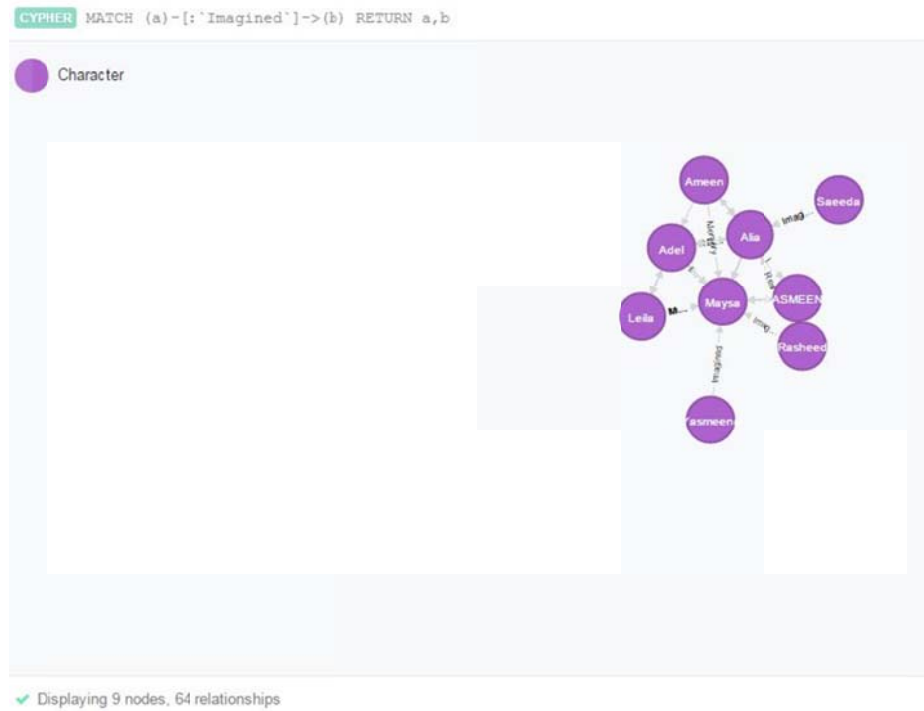
Figure 38: Imagined Relations

From the relational networks, one is able to read through the narrative structure, and understand the tactics used by the narrator to achieve the message intended, in a calculated and visualized way. What seems to be obvious to the reader when it comes to Maysa's refuting of the patriarchy is revealed to be of an intense manipulative strategy: Maysa chose to attack the patriarchy by mocking it.

In addition to the social network analyzed, it is worth reading through a spatial network that highlights the emotional status of the main place in this part.
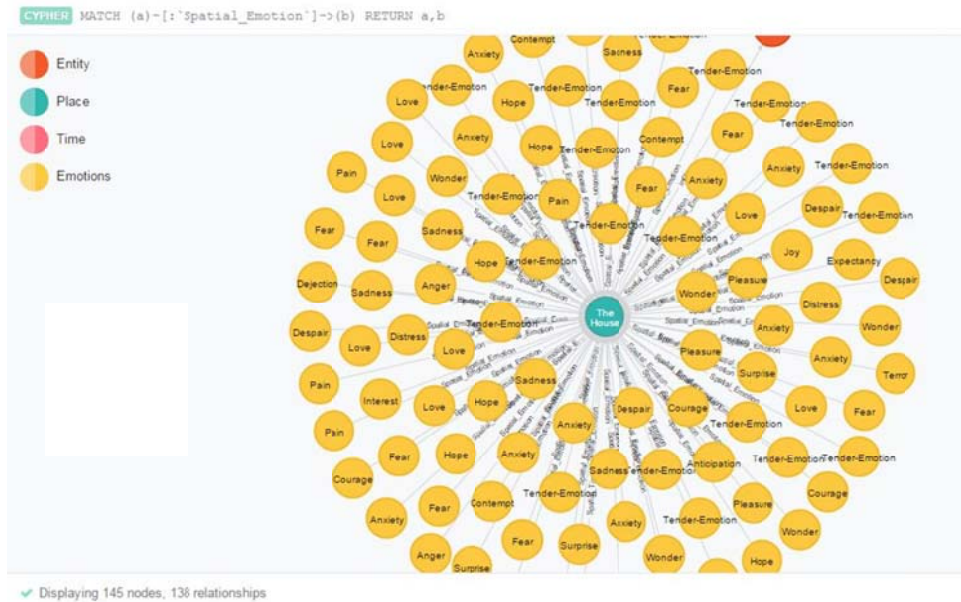
Figure 39: Spatial Emotions

      The figure above is NAP's resulting network of spatial emotions, which reveals the connections between places and the emotions associated to them. From the numbers of places actually involved in the encoded part, the network centralizes 'the house' and does not show any other place. Based on the calculations and the algorithmic treatment of the data, the network shows the node that is the heavies and the most relevant, if it has to restrict some part of the visual. In other words, when there is risk of compromising data, the database reveals the information that is the most essential to the data within. It can be herein concluded that the house is the place associated to the most varied emotions, and the place most relevant to the data body.
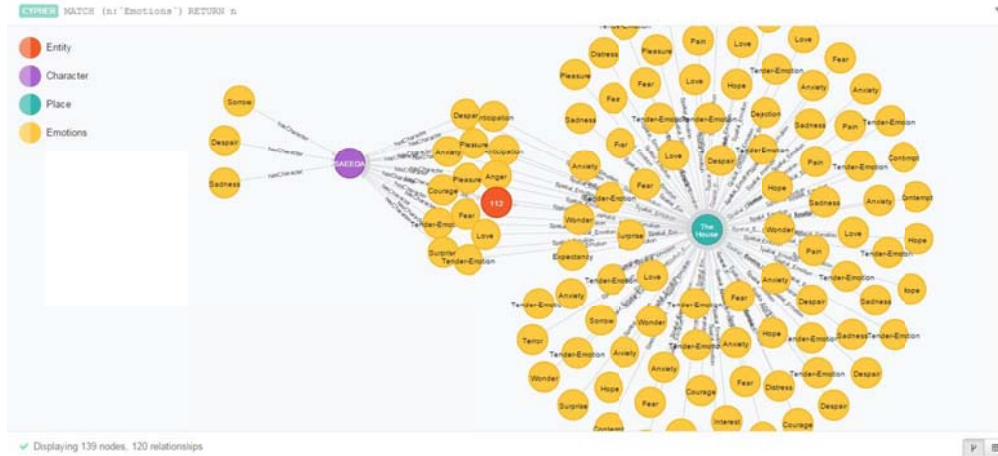
Figure 40: Spatial Emotions Expanded

Upon expansion of one of the emotion nodes, the related entity and character are revealed, with the cluster of emotions corresponding to this specific character. Therefore, one can read Saeeda's (Alia's daughter) emotions, having only one positive experienced feeling which is pleasure. All other emotions experienced by this character in this specific place are negative. This information tells that as much as Alia's granddaughter is attached to the house and alludes to be living a good experience, Alia's daughter has lived the opposite. Thus, another message is embodied, suggesting that the stress that can be verbally read within Maysa's narrative, is one derived from unpleasant feminine experience in this house before her. It could be also argued that Maysa's rebellion and refusal of falling victim to the negativity around, is her way of getting her grandmother's and aunt's revenge from this place that has lost its positive aura to the bitterness of these two characters. In a parallel attempt, it is Maysa's revenge for the house itself, as it is supposed to be the joyful childhood place, which may be said to explain her determination on having her baby girl born naturally, in 'The House.'

To sum up the analytical overview of these novels using digital tools, it should be explained that a tool with a deeper and more complex access to data automatically

allows deeper analysis. In other words, when the interpreter is allowed to access layer

after layer of informative visuals, one then has access to more critical findings that can

be related to the traditional critical reading of a work, and thus push the research steps

further, making connections, and interrelated claims. Such complex argumentation is

actively supported by the visuals, being networks that put forth links and relationships,

previously hidden to the naked eye.

CONCLUSION

To bring this work to a conclusion, it can be said that critical coding allows researchers to deepen their experience with literature, by creating tools (social networking ones, or others) that allow visual representations of collected data. As presented in the chapters above, the tools readily available provide the user with visuals that translate the data into networks that reveal connections some of which are detectable via close reading; however, the greater value of such techniques is the revelation of the indirect links between elements. Hidden patterns cannot be detected while reading a novel for one is taken with other literary explorations.

The data collection process pushes one in the direction of looking for specific elements that lose their value in the mix of the novelistic environment. In other words, the reading experience distracts one from different aspects, to shed light on what seemingly matters more. What is not surfaced is the importance of some little details that steer the plot the way it needs to go. The manual extraction process, although extremely delicate and terribly time consuming, has the advantage of forcing the collector to read thoroughly, create a system of encoding, and making critical decisions to what needs to be exposed and dug out.

In addition to the data collection, the element of the visual results is one that pushes the interpretation forward, by providing visible information. Not only is the outcome concrete, but it points out relations and findings that could not be detected otherwise. In this project, novels were translated into a series of images that allow a different perception, not of the work as a whole, but of the relationships between characters, emotions, and places. The importance of the images is not to only transmit a

message more effectively, but to open ways to different and new interpretations, that were not possible under the dominance of the words. Freeing the characters from the weight of words from which they were inseparable, and allocating to them another type of weight - that of pure inter-relation with other characters - is what shifted the dominance from memorial existence to actual presence. As Mitchell puts it, "[i]n Europe one might identify with phenomenology's inquiry into imagination and visual experience; or with Derrida's 'grammatology,' which de-centers the material traces of writing" (12). That is why, de-centering the elements of words, which cornered the characters in illusionary zones, allows a centering of those same characters in the realm of a novel, without limiting them to what pins them in their grounds.

When it comes to Alameddine's *Koolaids*, NAP was not put to use for two reasons. First of all, the networks were created using Palladio before NAP was written. Second, there was no need for the creation of a more complex tool, since the images were valuable and analysis could be derived. However, was I using NAP, there would have been deeper analysis and another set of data. In other words, a basic SNA tool was satisfactory for a study that was mostly interested in an event directed approach; yet, a more developed too would allow one to find more connections and interrelations throughout the elements, even if the focus was only one. This would allow an inescapable range of new interpretation and hypotheses.

On the other hand, Jarrar's *Somewhere, Home* has pushed towards the creation of a more developed tool, for a basic one is not one that appreciates the complex structure of the novel, especially that it is not to be analyzed focusing on one specific element, neither can it be approached that way. The fact that the only effective way to computationally analyze this novel is to create a new tool writing a different piece of

code has a greater implementation. This tells on how not only computational tools can enhance literary studies, but as importantly how literature itself can ask for its own computational packages, hence pushing the digital discipline forward. If one is to appreciate the digital in digital humanities, one is to equally be thankful for the humanities in the domain. If it were not for complex genres and texts, and were there no critical challenges and literary hypotheses, one would not find the need to come up with something new, and thus would not try to push the available techniques at least a step forward.

In chapter 3, when discussing Maysa's strategy of exploring her past and its effect on her present, it has been revealed that although she is targeting patriarchy and trying to break its power, she does so by exhausting it and putting it at the core of the relationships. This is a feature that hides itself behind the anger of the women and Maysa's critique of the manly attitudes of the male characters. In addition to this, Maysa centralizes Alia at the heart of the interactions, but heavily involves Ameen and the boys. It is true that this can be read, however, they seem to be secondary to the discussion while in fact they are actively influencing the structure of the networks. Joumana Bayeh in her book *The Literature of the Lebanese Diaspora* discusses this specific issue as follows:

> While it is true that Jarrar inverts this [masculine] structure in part I, positioning women and their memories as architects of their own history, upon closer examination it becomes clear that certain marginalized male characters retain a commanding role (128).

While Bayeh starts of from Derrida's *Archive Fever* in order for her to support her findings, the social network of *Somewhere, Home* presented in this thesis visually

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supports her statement. This confirms what was argued previously, claiming that the intention of the tool created is to reflect the structure of the novel via its data as well as the visuals. Therefore, NAP's visuals succeed in giving a visual representation of the first part of the novel, wandering through the elements involved in the synergy of the narrative.

It is true that the point behind the Novel Analysis Program is to allow users to encode and collect data accurately, as well as to store them in an automatic organizational way, yet, it is also developed so as to remain loyal to the text at hand. There is a relationship between the tool itself and the text, whereby in its backend the tool is based on literature and critical theory. The code of the program asks for the elements that are usually dealt with for critical analysis. Unlike other social networking tools, NAP is one specially tailored for the analysis of novels. The coding is a critical process merging between literature and the technicality of analysis, actively forcing the generation of interconnections between literary elements. The functions that are defined at the beginning of the code are linked to textual interpretation: in order to create the essential functions, the questions asked are about what shapes a novel, what directs it, what solidifies its structure, and why. The answers to these questions are the definitions of the essential functions. After this, the questions become technical, dealing with accuracy and delicateness of encoding. In other words, one asks how the data collection can become more specific, more organized, and more finely sorted. What answer these questions are the secondary defined functions, displaying previously stored information to the encoder, providing him/her with knowledge on what has been collected, linking new entries to existing ones.

Put to practice, the code becomes a running tool that is specific for literary analysis, addressing issues of gender, place, characters, temporality, and others. The added value is the automated creation of relationships between these elements, so as to have the database look like the novel, sharing with it the details of structural complexity. However, the process of data collection can become overwhelming to both the encoder and the database, affecting the results of the research. Therefore, it is important to define a scale for the data required, stating by defining the purposes of the research. The magnitude of the data is not as important as its quality, for an oversized database can crowd the network with unnecessary data. Hence, one needs to keep track of the storage process, cautiously monitory the development of the graphs and networks, keeping the in a parallel progress with the evolvement of the novel being studied.

Another thing that needs to be revisited is the type of data created and its nature. The nodes, properties, and relationships that are born from NAP into the Neo4j database are data that cannot be manually created. One cannot create such a complex data set in a table, for it is multilayered with different levels of information. In addition, when the data is stored in the database, it is automatically linked and connected: information is added or connected to previous nodes, relationships are formed and connected, and labels are filled with their children data. Then, and as the data is properly organized, it is turned into visualizations that provide networks allowing easier reading of it. The visuals can be manipulated and expanded, for one to make sense of the networks studied, while keeping an option for the user to extract the data in different formats, to be utilized elsewhere.

On a last note, the relationships that are created vary from one novel to the other and from one encoding path to another. While entities for *Somewhere, Home* means the number of the instance noted, these mean events for *Koolaids*, and can mean pages of another novel. Furthermore, the types of the relationships are open to the user to determine them, so they will vary from one work to the other. To take NAP to a further step, an option was added to the code, allowing one to encode two novels into the database. The results will have main nodes that are the novels, which can be related to each other through places, time, or even emotions, allowing the expansion of the study from specific works to a genre. This would be one major step for literary analysis, concretely linking between the novels, finding patterns across a given literary genre. The revelations shown in this project for a part of a novel can be applied to a study with bigger data, of an enhanced magnitude, hanging the path of reading literature for interpretive purposes, generating both micro (novel specific) and macro (genre specific) data, thus revealing micro and macro relationships and patterns. The hope for NAP is to have it more developed so as to become an online tool that can be used by scholars and researchers, to apply SNA to literary works.

APPENDICES

Appendix 1: NAP Code

Below is the NAP code (Python Language). It is indented according to the *Sublime* programming software. Commands indented under the one above it belongs to it.

```python
from neo4jrestclient.client import GraphDatabase

gdb = GraphDatabase("http://localhost:7474/")

#Defining the functions:

def create_entity():

  entities = gdb.labels.create('Entity')

  enter = raw_input('New Entry: ')

  entry = gdb.nodes.create(e = enter )

  entities.add(entry)

  return entry

def display_existing_entity():

  existing_entity = gdb.labels.get('Entity').get()

  for existing in existing_entity:

          print existing['e']

def add_character(entity):

  characters = gdb.labels.create('Character')

  name = raw_input ('Character name: ')

  gender = raw_input ('Character gender: ')
```

```python
        status = raw_input ('Is the character alive or dead? ')

        char = gdb.nodes.create(name=name, gender=gender, status=status)

        characters.add(char)

        char.relationships.create('hasCharacter', entity)

        return char

    def display_existing_characters():

      existing_characters = gdb.labels.get('Character').get()

      if existing_characters:

            for existing in existing_characters:

                    print str(existing.id) + " " + existing['name']

        else:

            print "No existing character yet!"

            charcter = add_character(entity)

    def choose_existing_character(entity, question='Type the id number of the existing

character: '):  #allows choosing from existing characters.

        display_existing_characters()

      name = raw_input (question)

      character = gdb.node[name] #to link this entry to the one already there.

      character.relationships.create('hasCharacter', entity)

      return character

    def add_location(entity):

      location = gdb.labels.create('Place')

      pl = raw_input ('place: ')
```

```python
    gran = raw_input ('Granularity: ')

    coor = raw_input ('Coordinates (as follows: lat, long): ')

    place = gdb.nodes.create(pl=pl, Granularity=gran, Coordinates=coor)

    location.add(place)

    place.relationships.create('inPlace', entity)

    return place
def display_existing_location():

    existing_location = gdb.labels.get('Place').get()

    if existing_location:

            for existing in existing_location:

                    print str(existing.id) + " " + existing['pl']

    else:

            print "No existing location yet!"

            place = add_location(entity)
def choose_existing_location(entity, question='Type the id number of the existing
location: '): #allows choosing from existing locations.

    display_existing_location()

    pl = raw_input(question)

    local = gdb.node[pl]

    local.relationships.create('inPlace', entity)

    return local
def add_emotion(entity, Character):

    emotions = gdb.labels.create('Emotions')
```

```python
        List_of_emotions = ["Acceptance", "Anger", "Anticipation", "Anxiety",
"Aversion", "Contempt", "Courage", "Dejection", "Desire", "Despair", "Disgust",
"Distress", "Elation", "Expectancy", "Fear", "Guilt", "Grief", "Happiness", "Hate", "Hope",
"Interest", "Joy", "Love", "Pain", "Panic", "Pleasure", "Rage", "Sadness", "Shame",
"Sorrow", "Subjection", "Surprise", "Tender-Emotion", "Terror", "Wonder"]
        print List_of_emotions
        Emotion = raw_input ('Emotion (choose from list): ')
        while Emotion not in List_of_emotions:
                        print 'Please choose from available list.'
                        Emotion = raw_input ('Emotion: ')
        emotion = gdb.nodes.create(em = Emotion)
        emotions.add(emotion)
        emotion.relationships.create('isEmotion', entity)
        emotion.relationships.create('hasCharacter', character)
        emotion.relationships.create('Spatial_Emotion', place)
        return emotion
    def add_time(entity):
        times = gdb.labels.create('Time')
        temporal = raw_input('Time: ')
        gran = raw_input ('Granularity: ')
        time = gdb.nodes.create(t = temporal, Granularity=gran)
        times.add(time)
        time.relationships.create('atTime', entity)
```

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```
        time.relationships.create('Spatial_Time', place)

        return time


        #Program starts, user inputs data:

        #Fetch character information:

        ans = raw_input ('Entry? (1 for yes, 0 for no)')

        gdb.query("CREATE INDEX ON:Character(name)")

        gdb.query("CREATE INDEX ON: Place(pl)")

        gdb.query("CREATE INDEX ON: Entity(e)")

        while ans != '0':
    # 0 stops the program.

          show = display_existing_entity()

          entity = create_entity()                                    #
Numbering the entries

          #New character Vs. Existing:

          addition = raw_input ("New character? (yes/no)")

          if addition == "yes":

                  character = add_character(entity)

          else:

                  character = choose_existing_character(entity)


          #Fetch relationship information:
```

```
            connections = raw_input ('Does the character have a relationship with another

character, in this specific instance? (yes/no)')

        if connections == "yes":

                is_new = raw_input ('New character? (yes/no)')

                if is_new == "yes":

                        related_char = add_character(entity)

                else:

                        related_char = choose_existing_character(entity)

                rel = raw_input ('What is the type of the relationship? ') #define the types

and unify them; state them in this command

                related_char.relationships.create(rel, character)

        #New location Vs. Existing:

        new_place = raw_input ('New Place? (yes/no)')

        if new_place == "yes":

                place = add_location(entity)

        else:

                place = choose_existing_location(entity)

        #Fetch emotion information:

        emotional = raw_input (character.get('name') + ' Emotion? (yes/no)')

        if emotional == "yes":

                add_emotion(entity, character)

        if connections == "yes":
```

```python
            emotional_related = raw_input (related_char.get('name') + ' Emotion?
(yes/no)')
                if emotional_related == "yes":
                    add_emotion(entity, related_char)
        #Fetch time information:
        temporal = add_time(entity)
        #entity = entity + 1
        #See if user wants to continue and act accordingly:
        ans = raw_input ('Entry? (1 for yes, 0 for no)')
```

Appendix 2: *Koolaids* Palladio Data Sheet

     Appendices 2 and 3 give a glimpse at the data collected for *Koolaids* [Palladio](2)

and *Somewhere, Home*[Gephi](3).

Gender	Place	Coordinates	Place Granularity	Time	Time Granularity	Emotion
Male	USA	39.76,-98.5	Country	Unknown	-	Confusion
Female	Beirut (Fadia'a Building)	33.886944,35.513056	Building	1976-03-20	MDY	Unknown
Male	Beirut (Fadia'a Building)	33.886944,35.513056	Building	1976-03-20	MDY	Fear
Mix	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	Fear
Female	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	Panic
Female	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	Unknown
Mix	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	Interest
Mix	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	Wonder
Male	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	Courage
Male	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	Wonder
Male	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	Courage
Female	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	-
Female	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	Wonder
Female	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	Surprise
Male	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	-
Male	Beirut (Fadia's Building)	33.886944,35.513056	Building	1976-03-20	MDY	-
Male	Unknown	-	-	1990	Y	-
Male	USA	39.76,-98.5	Country	Unknown	-	Anger
Male	Lebanon	33.9,35.533333	Country	1975	Y	Anger
Male	USA	39.76,-98.5	Country	5:19 AM (Unknown date)	Hour	-
Male	USA	39.76,-98.5	Country	5:19 AM (Unknown date)	Hour	Grief
Male	USA	39.76,-98.5	Country	5:19 AM (Unknown date)	Hour	Tender-emotion
Male	Unknown	-	-	September 5th 1988	MDY	-
Female	Unknown	-	-	September 5th 1988	MDY	Panic
Male	Coral Beach	33.852953,35.487162	Club in Beirut	Unknown	-	Panic
Female	Coral Beach	33.852953,35.487162	Club in Beirut	Unknown	-	None
Male	Ba'abda (Mohammad's House)	33.833333,35.533333	House	1978-02-0:	MY	Panic
Male	Ba'abda (Mohammad's House)	33.833333,35.533333	House	1978-02-0:	MY	Terror
Female	Ba'abda (Mohammad's House)	33.833333,35.533333	House	1978-02-0:	MY	Panic
Male	Unknown	-	-	Unknown	-	Anger
Male	Damour	33.733333,35.45	City	7:00 PM (Unknown date)	Hour	-
Male	Damour	33.733333,35.45	City	7:00 PM (Unknown date)	Hour	-
Female	Damour	33.733333,35.45	City	7:00 PM (Unknown date)	Hour	Surprise
Female	Damour	33.733333,35.45	City	7:00 PM (Unknown date)	Hour	Terror
Female	Damour	33.733333,35.45	City	7:00 PM (Unknown date)	Hour	Surprise
Female	Damour	33.733333,35.45	City	7:00 PM (Unknown date)	Hour	Terror
Male	Damour	33.733333,35.45	City	7:00 PM (Unknown date)	Hour	Surprise
Male	Damour	33.733333,35.45	City	7:00 PM (Unknown date)	Hour	Fear
Male	Damour	33.733333,35.45	City	7:00 PM (Unknown date)	Hour	Surprise
Male	Damour	33.733333,35.45	City	7:00 PM (Unknown date)	Hour	Fear
Female	Unknown	-	-	1995-12-18	MDY	Sadness
Male	Unknown	-	-	1995-12-18	MDY	Sadness
Male	Dallas	32.775833,-96.796667	City	Unknown	-	Anger
Male	Dallas	32.775833,-96.796667	City	Unknown	-	Disgust
Male	Unknown	-	-	Unknown	-	Love
Male	Unknown	-	-	Unknown	-	Love
Female	USA	39.76,-98.5	Country	7/4/1967	MDY	Anger
Female	USA	39.76,-98.5	Country	7/4/1967	MDY	Disgust
Male	USA	39.76,-98.5	Country	7/4/1967	MDY	Anger
Male	USA	39.76,-98.5	Country	7/4/1967	MDY	Disgust
Male	Unknown	-	-	Unknown	-	Guilt
Male	Unknown	-	-	Unknown	-	Anger
Female	Unknown	-	-	Unknown	-	Sadness
Male	museum	-	Hall	Unknown	-	Confusion
Male	museum	-	Hall	Unknown	-	Surprise
Male	Unknown	-	-	Unknown	-	Fear
Male	Simir's Building	-	Building	Unknown	-	Panic
Male	Arizona	34,-112	State	Unknown	-	Sadness
Male	Unknown	-	-	Unknown	-	Sorrow
Female	East Beirut	33.887558,35.520756	Region	Unknown	-	None
Male	East Beirut	33.887558,35.520756	Region	Unknown	-	Fear
Female	East Beirut a Building's SecondFloor	33.887558,35.520756	Region and Floor	Unknown	-	Anxiety
Female	East Beirut a Building's SecondFloor	33.887558,35.520756	Region and Floor	Unknown	-	Courage
Female	East Beirut a Building's SecondFloor	33.887558,35.520756	Region and Floor	Unknown	-	Surprise
Female	East Beirut a Building's SecondFloor	33.887558,35.520756	Region and Floor	Unknown	-	Anger
Female	East Beirut a Building's SecondFloor	33.887558,35.520756	Region and Floor	Unknown	-	Disgust
Female	East Beirut a Building's SecondFloor	33.887558,35.520756	Region and Floor	Unknown	-	Terror
Male	East Beirut a Building's SecondFloor	33.887558,35.520756	Region and Floor	Unknown	-	Pleasure
Male	East Beirut a Building's SecondFloor	33.887558,35.520756	Region and Floor	Unknown	-	Anticipation
Female	East Beirut a Building's SecondFloor	33.887558,35.520756	Region and Floor	Unknown	-	Anger
Female	Ain El Rummanneh	33.868858,35.520423	City	1975-04-13	MDY	Fear
Female	Ain El Rummanneh	33.868858,35.520423	City	1975-04-13	MDY	Terror
Female	Ain El Rummanneh	33.868858,35.520423	City	1975-04-13	MDY	Subjection
Female	Unknown	-	-	1975-04-13	MDY	-
Male	Karantina	33.9,35.533333	City	Jan-76	MY	-
Male	Damour	33.733333,35.45	City	Unknown	-	Sorrow
Male	Washington	38.895111,-77.036667	City	Fall 1983	TY	Anxiety
Male	Washington	38.895111,-77.036667	City	Fall 1983	TY	Panic

Male	Unknown	-	-	1988	Y	Pain
Female	Unknown	-	-	1996-07-05	MDY	Sorrow
Male	Makram's House West Beirut	33.895755,35.481016	House in Region	.	TY	Rage
Male	Lebanon	33.9,35.533333	Country	Unknown	-	Rage
Male	New York	40.7127,-74.0059	City	Unknown	-	Rage
Male	Arizona	34,-112	State	Unknown	-	Terror
Male	Unknown	-	-	Unknown	-	Sorrow
Female	West Beirut	33.895755,35.481016	Region	1989	Y	Sadness
Female	West Beirut	33.895755,35.481016	Region	1989	Y	Love
Female	Lebanon	33.9,35.533333	Country	1996-08-07	MDY	Sadness
Female	Lebanon	33.9,35.533333	Country	1996-08-07	MDY	Anger
Female	Kaslik	33.983056,35.618056	City	Unknown	-	Fear
Male	Lebanon	33.9,35.533333	Country	1976	Y	Guilt
Female	Lebanon	33.9,35.533333	Country	1996-08-12	MDY	Distress
Male	Unknown	-	-	Unknown	-	Anticipation
Female	Lebanon	33.9,35.533333	Country	Unknown	-	Terror
Male	Lebanon	33.9,35.533333	Country	Unknown	-	None
Male	Lebanon	33.9,35.533333	Country	Unknown	-	Wonder
Male	Lebanon	33.9,35.533333	Country	Unknown	-	Despair
Male	Heathrow Airport	51.4775,-0.461389	Airport in City	Unknown	-	Surprise
Female	Lebanon	33.9,35.533333	Country	1996-04-11	MDY	Sadness
Female	Lebanon	33.9,35.533333	Country	1996-04-11	MDY	Terror
Male	Unknown	-	-	1992	Y	Surprise
Male	Unknown	-	-	Unknown	-	Shame
Female	USA	39.76, -98.5	Country	Unknown	-	Surprise
Female	Unknown	-	-	1996-03-19	MDY	Guilt
Female	West Beirut	33.895755, 35.481016	Region	Unknown	-	Terror

Appendix 3: *Somewhere, Home* Gephi Data Sheet

Source	Target	Gender	Type	Time	Page	Section	Place	Coordiates	PlaceGranularity
Maysa A	Adel	FM	Undirected	FurhtestPast	3	Part One	The House	-	House
Adel	Alia	MF	Undirected	FurhtestPast	3	Part One	The House	-	House
Maysa A	Adel	FM	Undirected	FurhtestPast	4	Part One	The House	-	House
Unspecified	Adel	NM	Undirected	DistantPast		Part One	The House	-	House
Adel	Unspecified	MN	Directed	DistantPast		Part One	The House	-	House
Unspecified	Alia	NF	Undirected	AncestorsTime		Part One	The House	-	House
Unspecified	Ameen	NM	Undirected	AncestorsTime		Part One	The House	-	House
Unspecified	Rasheed	NM	Undirected	AncestorsTime		Part One	The House	-	House
Unspecified	Salam	NF	Undirected	AncestorsTime		Part One	The House	-	House
Unspecified	Fouad	NM	Undirected	AncestorsTime		Part One	The House	-	House
Unspecified	Adel	NM	Undirected	AncestorsTime		Part One	The House	-	House
Alia	Children	FN	Directed	DistantPast		Part One	The House	-	House
Maysa A	Leila	FF	Undirected	FurhtestPast		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Maysa A	Wadih	FM	Undirected	Present		Part One	The House	-	House
Maysa A	Selma	FF	Directed	Present		Part One	The House	-	House
Maysa A	Wadih	FM	Undirected	Present		Part One	The House	-	House
Maysa A	Wadih	FM	Directed	Present		Part One	The House	-	House
Maysa A	Wadih	FM	Directed	Present		Part One	The House	-	House
Maysa A	Wadih	FM	Directed	Present		Part One	The House	-	House
Wadih	Maysa A	MF	Directed	Present		Part One	The House	-	House
Maysa A	Wadih	FM	Directed	Present		Part One	The House	-	House
Wadih	Maysa A	MF	Directed	Present		Part One	The House	-	House
Wadih	Maysa A	MF	Directed	Present		Part One	The House	-	House
Wadih	Maysa A	MF	Directed	Present		Part One	The House	-	House
Maysa A	Wadih	FM	Directed	Present		Part One	The House	-	House
Wadih	Maysa A	MF	Directed	Present		Part One	The House	-	House
Wadih	Maysa A	MF	Undirected	Present		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Maysa A	Selma	FF	Directed	Present		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Selma	Wadih	FM	Undirected	Present		Part One	The House	-	House
Maysa A	Yasmeena	FF	Undirected	Present		Part One	The House	-	House
Yasmeena	Wadih	FM	Undirected	Present		Part One	The House	-	House
Maysa A	Yasmeena	FF	Undirected	Present		Part One	The House	-	House
Maysa A	Selma	FF	Directed	Present		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Maysa A	Selma	FF	Directed	Present		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Maysa A	Selma	FF	Undirected	Present		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Maysa A	Selma	FF	Directed	Present		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Maysa A	Selma	FF	Directed	Present		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Alia	Rasheed	FM	Undirected	FurhtestPast		Part One	The House	-	House
Alia	Salam	FF	Undirected	FurhtestPast		Part One	The House	-	House
Alia	Fouad	FM	Undirected	FurhtestPast		Part One	The House	-	House
Maysa A	Alia	FF	Undirected	Present		Part One	The House	-	House
Maysa A	The Doctor	FM	Undirected	Present		Part One	The House	-	House
The Doctor	Maysa A	MF	Directed	Present		Part One	The House	-	House
Maysa A	The Doctor	FM	Directed	Present		Part One	The House	-	House
The Doctor	Maysa A	MF	Directed	Present		Part One	The House	-	House
Selma	The Doctor	FM	Directed	Present		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Maysa A	Selma	FF	Directed	Present		Part One	The House	-	House
Maysa A	Alia	FF	Undirected	Present		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Selma	Alia	FF	Undirected	Present		Part One	The House	-	House
Maysa A	Selma	FF	Directed	Present		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Selma	Alia	FF	Undirected	Present		Part One	The House	-	House
Selma	Maysa A	FF	Directed	Present		Part One	The House	-	House
Maysa A	Selma	FF	Directed	Present		Part One	The House	-	House
Maysa A	Salam	FF	Undirected	Present		Part One	The House	-	House
Maysa A	Rasheed	FM	Undirected	Present		Part One	The House	-	House

Maysa A	Fouad	FM	Undirected	Present		Part One	The House	-	House
Maysa A	Adel	FM	Undirected	Present		Part One	The House	-	House
Alia	Salam	FF	Directed	Present		Part One	The House	-	House
Alia	Rasheed	FM	Directed	Present		Part One	The House	-	House
Alia	Fouad	FM	Directed	Present		Part One	The House	-	House
Alia	Adel	FM	Directed	Present		Part One	The House	-	House
Alia	Unspecified	FN	Undirected	Present		Part One	The House	-	House
Maysa A	Rasheed	FM	Undirected	Present		Part One	The House	-	House
Maysa A	Alia	FF	Undirected	Present		Part One	The House	-	House
Maysa A	Alia	FF	Directed	ClosePast		Part One	The House	-	House
Maysa A	Alia	FF	Undirected	ClosePast		Part One	The House	-	House
Alia	Maysa A	FF	Directed	ClosePast		Part One	The House	-	House
Maysa A	Alia	FF	Directed	ClosePast		Part One	The House	-	House
Alia	Maysa A	FF	Undirected	ClosePast		Part One	The House	-	House
Alia	Maysa A	FF	Directed	ClosePast		Part One	The House	-	House
Maysa A	Alia	FF	Undirected	AncestorsTime		Part One	The House	-	House
Alia	Ameen	FM	Undirected	AncestorsTime		Part One	The House	-	House
Ameen	Villagers	MN	Undirected	AncestorsTime		Part One	The House	-	House
Alia	Villagers	FN	Undirected	AncestorsTime		Part One	The House	-	House
Maysa A	Alia	FF	Undirected	AncestorsTime		Part One	The House	-	House
Ameen	Alia's Mother	MF	Undirected	AncestorsTime		Part One	The House	-	House
Alia	Salam	FF	Undirected	AncestorsTime		Part One	The House	-	House
Ameen	Alia	MF	Directed	AncestorsTime		Part One	The House	-	House
Alia	Ameen	FM	Undirected	AncestorsTime		Part One	The House	-	House
Salam	Alia	FF	Undirected	FurhtestPast		Part One	The House	-	House
Alia	Salam	FF	Directed	FurhtestPast		Part One	The House	-	House
Alia	Rasheed	FM	Undirected	AncestorsTime		Part One	The House	-	House
Alia	Fouad	FM	Undirected	AncestorsTime		Part One	The House	-	House
Alia	Adel	FM	Undirected	AncestorsTime		Part One	The House	-	House
Alia	Salam	FF	Undirected	AncestorsTime		Part One	The House	-	House
Ameen	Alia	MF	Undirected	AncestorsTime		Part One	The House	-	House
Ameen	Rasheed	MM	Directed	AncestorsTime		Part One	The House	-	House
Ameen	Salam	MF	Directed	AncestorsTime		Part One	The House	-	House
Ameen	Fouad	MM	Directed	AncestorsTime		Part One	The House	-	House
Ameen	Adel	MM	Directed	AncestorsTime		Part One	The House	-	House
Salam	Ameen	FM	Undirected	AncestorsTime		Part One	The House	-	House
Alia	Rasheed	FM	Undirected	AncestorsTime		Part One	The House	-	House
Rasheed	Alia	MF	Directed	FurhtestPast		Part One	The House	-	House
Ameen	Alia	MF	Directed	FurhtestPast		Part One	The House	-	House
Rasheed	Alia	MF	Directed	FurhtestPast		Part One	The House	-	House
Alia	Rasheed	FM	Directed	FurhtestPast		Part One	The House	-	House
Alia	Rasheed	FM	Directed	FurhtestPast		Part One	The House	-	House
Rasheed	Alia	MF	Directed	FurhtestPast		Part One	The House	-	House
Rasheed	Fouad	MM	Directed	FurhtestPast		Part One	The House	-	House
Fouad	Sheikh Salman	MM	Undirected	AncestorsTime		Part One	The House	-	House
Sheikh Salman	Fouad	MM	Directed	AncestorsTime		Part One	The House	-	House
Fouad	Sheikh Salman	MM	Undirected	AncestorsTime		Part One	The House	-	House
Fouad	Sheikh Salman	MM	Directed	AncestorsTime		Part One	The House	-	House
Ameen	Fouad	MM	Directed	FurhtestPast		Part One	The House	-	House
Alia	Adel	FM	Undirected	AncestorsTime		Part One	The House	-	House
Alia	Adel	FM	Undirected	AncestorsTime		Part One	The House	-	House

BIBLIOGRAPHY

Primary Resources:

Novels:

Alameddine, Rabih. *Koolaids*. London: Picador. 1998.

Awar Jarrar, Nada. *Somewhere, Home*. Portsmouth: Heinemann. 2003.

Digital tools:

Social Networking Software: Novel Analysis Program (NAP)

Humanities Design: Palladio (http://palladio.designhumanities.org/)

Social Network Tool (readily available): Gephi (http://gephi.github.io/)

Secondary Resources:

Adorno, Theodor W. "Arts and Arts." *Can One Live After Auschwitz: A*
     Philosophical Reader. Stanford: Stanford University Press. (2003): 368-387

Agarwal, Apoorv; Corvalan, Augusto; Jensen, Jacob; Rambow, Owen. "Social Network
     Analysis of Alice in Wonderland." New York: Columbia University Press.
     2012.

Bayeh, Joumana. *The Literature of the Lebanese Diaspora: Representations of Place*
     and Transnational Identity. London: I.B. Tauris and Co. Ltd. 2015.

Bodenhamer, David J; Corrigan, John; and Harris, Trevor M. *Deep Maps and Spatial*
     Narratives. Ed. Indiana: Indiana University Press. 2015.

Hout, Syrine. *Post-war Anglophone Lebanese Fiction: Home Matters in the Diaspora*.
     Edinburgh: Edinburgh University Press. 2012.

Humanities and Design Research Lab. Palladio. Retrieved from:
     http://hdlab.stanford.edu/tools/ on February 2nd, 2015.

Kawano, Yoh; Presner, Todd; Shepard, David. *Hypercities: Thick Mapping in the*

Digital Humanities. London: Harvard University Press. 2014.

Latour, Bruno. "Social Theory and the Study of Computerized Work Sites."

Information Technology and Changes in Organizational Works.

London: Chapman and Hall. (1995): 295-307

McKinney, Wes. *Python for Data Analysis*. Sebastopol: O'Reilly Media Inc. 2013.

Meeks, Elijah. "The Value of Network Visualization." 2011. Retrieved from:

https://dhs.stanford.edu/visualization/the-value-of-network-visualization/on

February 25th, 2015.

Mitchell, W.J.T. "Introduction." *Picture Theory*. Chicago: The University of

Chicago Press. (1994): 1-8.

Mitchell, W.J.T. "The Pictorial Turn" *Picture Theory*. Chicago: The

University of Chicago Press. (1994): 11-34.

Moretti, Franco. *Graphs, Maps, and Trees: Abstract Models for Literary History*.

London: Verso. 2005. Retrieved from:

https://litlab.stanford.edu/LiteraryLabPamphlet2.pdf on September 17th, 2013.

Moretti, Franco. "Network Theory, Plot Analysis." *Literary Lab* 2 (2011).

Oakes, Timothy. "Place and the Paradox of Modernity." *Annals of the Association of*

American Geographers 87.3 (1997): 509-531.

Ortony, A.; Turner, T. J. "What's basic about basic emotions?" *Psychological Review*

97.3 (1990): 315-331.

Presner, Todd; Shepard, David; Kawano, Yoh. *HyperCities: Thick Mapping in the*

Digital Humanities. Cambridge: Harvard University Press. 2014.

Shehade, Lamia Rustum. *Women and War in Lebanon*. Florida: University Press of

    Florida. 1999.

Westphal, Bertrand. *Geocriticism: Real and Fictional Spaces*. London: Palgrave

    McMillan. 2011.