

Supporting
Literary
Analysis Using
Automatically
Generated
Social
Network
Graphs

Jocelyn M.
Bayer

Introduction
and
Background

Method

Discussion

Conclusions

Supporting Literary Analysis Using Automatically Generated Social Network Graphs

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Outline

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- Introduction and Background
- Method - How Graphs Are Constructed
- Discussion - How Social Network Graphs Support Literary Analysis
- Conclusions

What Is Literary Analysis?

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- Detailed examination of a literary text in order to make an argument about some feature of the text.

What Is Literary Analysis?

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- Detailed examination of a literary text in order to make an argument about some feature of the text.
- Involves:
 - Reading text from beginning to end
 - Notation of trends within the text
 - Close Reading

What is Close Reading?

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- Reading that focuses on particular passages within a text
 - Often each passage is about a page or less
- Paying close attention to:
 - Diction
 - Denotation
 - Connotation

What is Close Reading?

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- Reading that focuses on particular passages within a text
 - Often each passage is about a page or less
- Paying close attention to:
 - Diction
 - Denotation
 - Connotation
 - Repetitions and Patterns
 - Sentence Structure
 - Symbolism
 - Setting
 - Etc...

Example of Close Reading Annotations

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CHAPTER TWELVE

"Why don't we go down and visit Hagrid?"
"No... you go..."
"I know what you're thinking about, Harry, that mirror. Don't go back tonight."
"Why not?" *— good question, Harry*
"I dunno, I've just got a bad feeling about it— and anyway, you've had too many close shaves already. Filch, Snape, and Mrs. Norris are wandering around. So what if they can't see you? What if they walk into you? What if you knock something over?"
"You sound like Hermione."
"I'm serious, Harry, don't go."
But Harry only had one thought in his head, which was to get back in front of the mirror, and Ron wasn't going to stop him.

*Ron said
the Mirror
was bad
but he
didn't
stop him*

*It's like
a drug*

That third night he found his way more quickly than before. He was walking so fast he knew he was making more noise than was wise, but he didn't meet anyone.

And there were his mother and father smiling at him again, and one of his grandfathers nodding happily. Harry sank down to sit on the floor in front of the mirror. There was nothing to stop him from staying here all night with his family. Nothing at all.

Except —
"So — back again, Harry?"
Harry felt as though his insides had turned to ice. He looked behind him. Sitting on one of the desks by the wall was none other than Albus Dumbledore. Harry must have walked straight past him, so desperate to get to the mirror he hadn't noticed him.

"I — I didn't see you, sir."

*addition
with Harry
to stop him*

*Harry
is
driven
mad*

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*∴ happiness is not obtained
by seeking to fulfil one's strongest
desires*

THE MIRROR OF ERISED

"Strange how nearsighted being invisible can make you," said Dumbledore, and Harry was relieved to see that he was smiling.
"So," said Dumbledore, slipping off the desk to sit on the floor with Harry, "you, like hundreds before you, have discovered the delights of the Mirror of Erised."
"I didn't know it was called that, sir."
"But I expect you've realized by now what it does?"
"It — well — it shows me my family —"
"And it showed your friend Ron himself as head boy?"
"How did you know —?"
"I don't need a cloak to become invisible," said Dumbledore gently. "Now, can you think what the Mirror of Erised shows us all?" — i.e., what it does in general

Does he mean that it leads to Hogwarts?

Harry shook his head.
"Let me explain. The happiest man on earth would be able to use the Mirror of Erised like a normal mirror, that is, he would look into it and see himself exactly as he is. Does that help?"

*An
invisible
person
can be
discovered
here*

Harry thought. Then he said slowly, "It shows us what we want... whatever we want..."

Yes and no," said Dumbledore quietly. "It shows us nothing more or less than the (deepest) most desperate desire of our hearts. You, who have never known your family, see them standing around you. Ronald Weasley, who has always been overshadowed by his brothers, sees himself standing alone, the best of all of them. How ever, this mirror will give us neither knowledge or truth. Men have wasted away before it, entranced by what they have seen, or been driven mad, not knowing if what it shows is real or even possible.

*Harry
is
driven
mad*

*He
has
the
powerful
desire
to
know
his
family*

"The Mirror will be moved to a new home tomorrow. Harry,

*change of
direction!*

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*of?
But it's so
pleasant*

*Harry's desire overrules
his good sense, his
caring for others, etc.*

Pitfalls of Close Reading

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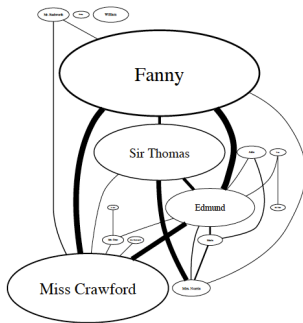
Discussion

Conclusions

- Concentrates on specific examples in a text
 - Analyzing a few instances of a trend, and missing the big picture by doing so.
- Hard to apply to overarching aspects of the text. Makes it difficult to make claims about:
 - Characters and Community Structure
 - Plot
 - Genre

How Do Literary Social Networks Address Pitfalls

- Literary social networks are built using characters and their interactions with each other



Mansfield Park by Jane Austen

How Do Literary Social Networks Address Pitfalls

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- Characters and Community Structure
 - Creating a visualization of a social network shows the importance of characters and the manner in which their community is structured.
- Plot
 - Because character interaction tends to be what drives plot, visualization of character interactions for an entire text or sections help trace plot and what characters affect plot.
- Genre
 - The importance of certain characters and which characters interact is a significant factor in determining genre

Preprocessing

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- Use tagger to find all mentions of characters
 - Example: Stanford Named Entity Recognizer (NER)
- Use matching algorithm to find all co-referents that respond to each individual character
 - Co-referents = different names for a single character
 - Example: Harry Potter and The Boy Who Lived

General Algorithm

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- Each individual character is node
- Undirected edges are the interactions between characters
- Edges are weighted by frequency and duration of interactions
- Isolated nodes are pruned

Construction of Literary Social Network

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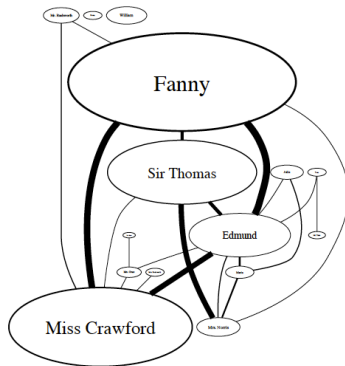
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Characters connected by weighted interactions shared between them

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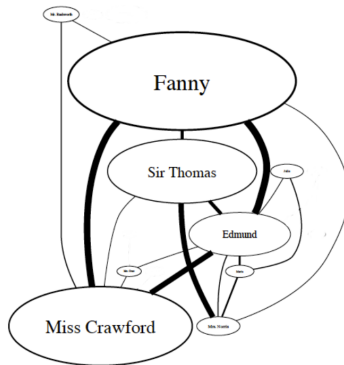
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Characters not essential to the shape of the network are pruned

Constructed Literary Social Networks

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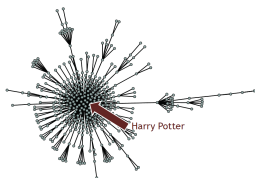
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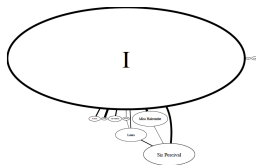
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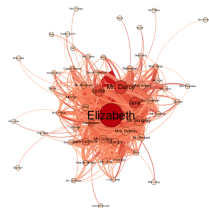
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Harry Potter Novels



The Woman in White



Pride and Prejudice

Different Approaches - Conversational vs Co-occurrence

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- There are two methods of characterizing what in a text is an interaction
 - Conversations
 - Co-occurrence

Different Approaches - Conversational

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- In this approach, conversations between characters are the interactions that are used to create edges between character nodes
- Using conversation is best suited to dialogue heavy texts, those that rely heavily on characters speaking to each in order to move the plot forward
- However, not all texts rely heavily on dialogue or have dialogue marked in a non-uniform way.

Different Approaches - Co-occurrence

- In this approach, an interaction occurs when two characters are mentioned in the story within a certain window of text
 - Ex. Two characters have to be within 15 words of each other to be considered interacting.
- Characters do not have to be directly in conversation, just have to be in same scene together.
- Better for more action-based texts

Different Approaches - Static vs Dynamic Network

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- Static networks are generated using interactions from the entire text
- Dynamic networks are separate networks, where each is generated from interactions in a distinct section of the text

Different Approaches - Static vs Dynamic Network

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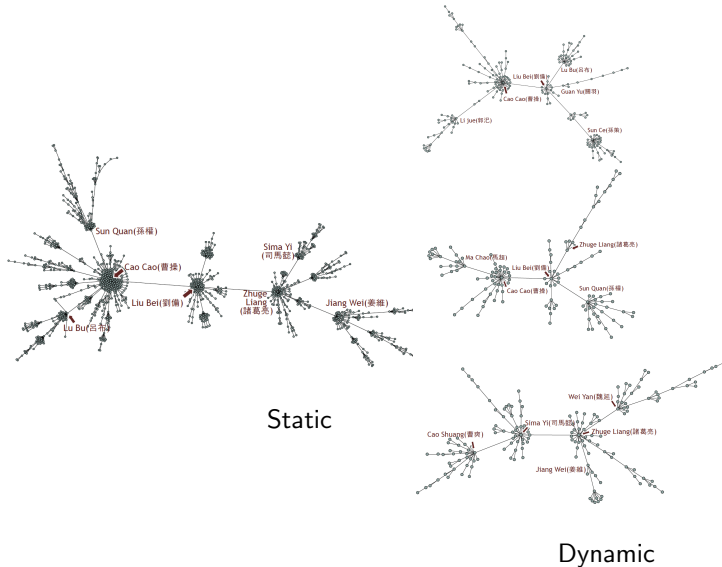
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Insights from Analysis of LSNA

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- Once a literary social network has been generated, social network analysis metrics can be used to draw conclusions about the text
- Conclusions can be drawn about:
 - Characters and Community Structure
 - Plot
 - Genre

Characters and Community Structure

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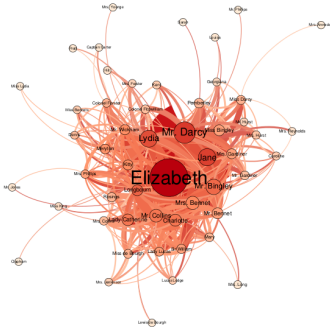
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- Common social network analysis metrics to make claims about the relationships between characters in the text
 - Centrality
 - Graph Density
 - Clustering co-efficient

Characters and Community Structure

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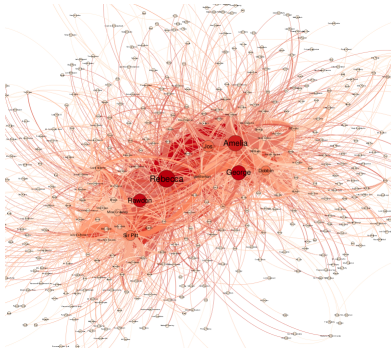
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- Community Structure uses many of the same metrics used in making claims about characters and their relationships
 - Cohesion is also often used

Plot Structure

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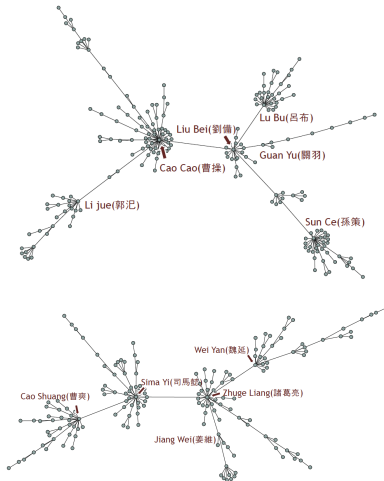
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- Centrality, especially over time, is often used to make claims about plot
 - In these networks, the node with the highest centrality changes over time. This suggests that the plot focuses on different main characters as it progresses

Genre

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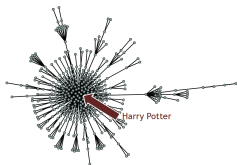
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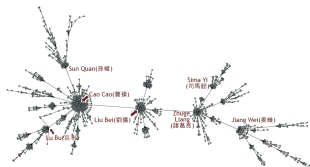
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Heroic Novel



Epic Novel

- Centrality and Cohesiveness are often helpful metrics when theorizing about genre using social networks.
 - However, genre is one of the more difficult areas to quantify.
 - The visual representation can help distinguish very different genres, such as a heroic novel from an epic.

Other Benefits from Literary Social Networks

- The automatic generation of the literary network allows literary analysts to have a general idea of how a novel is structured without using too much man power.
 - Computer produces a relationship network in the fraction of the time a human could.
- Literary social networks can illuminate areas of interest that a literary analysts can investigate further
- The automatic generation also allows trends to be found in large bodies of literature, such as the body of work of an author or a literary period
 - Especially helpful for testing hypotheses of literary theorists

Use in Literary Theory

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- Theorists such as Mikhail Bakhtin and Franco Moretti have made claims about how characters and community structure
- However, in the past it was very difficult to test these theories on the entire body of literature, such as the 19th-century novels that Bakhtin and Moretti were theorizing about.
- Literary Social Network Analysis gives literary scholars a tool to test if the claims that literary theorists such as Bakhtin and Moretti made actually have evidence to back up their veracity.

Future of Literary Social Networks

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- Expansion from the 19th-century novel, the focus of most major papers on the subject of literary social networks
- Improve graph creation to be more specific, such as interactions being directed rather than undirected
- Improvement of predictive capabilities to match descriptive capabilities

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Questions?

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