



The Anna Karenina Paradox

Is the title misleading? An NLP analysis

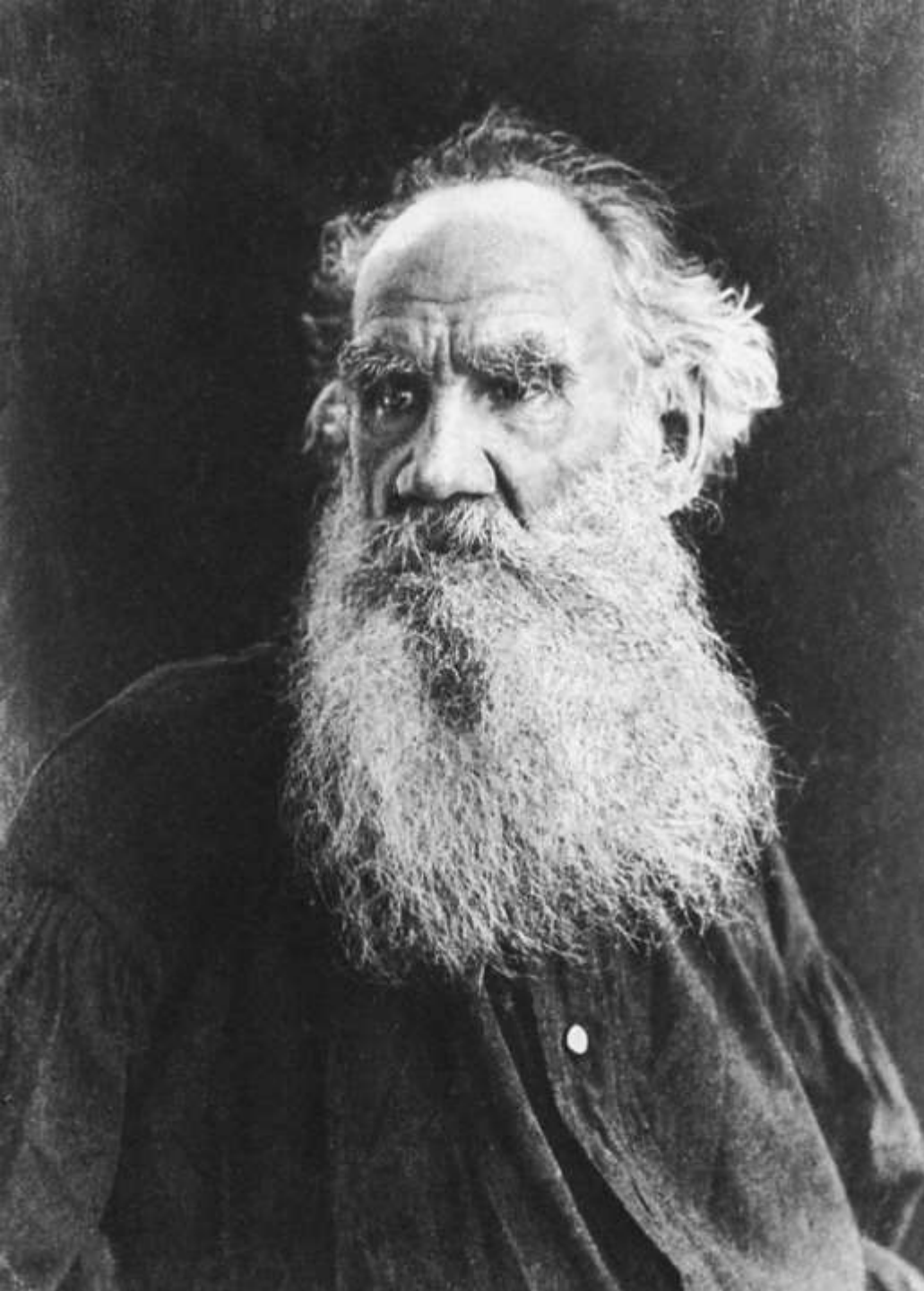
JAKHONGIR ERKINOV (100001943)
JORANAS CIGAS (100001693)
DAVED TAWDROS(100002565)
CHRISWIN BAIJU (100001868)

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AGENDA

- Introduction
- Context: The Anna vs Levin problem
- Our Approach
- Volume Analysis (Quantity)
- Influence analysis (Quality)
- Final Verdict



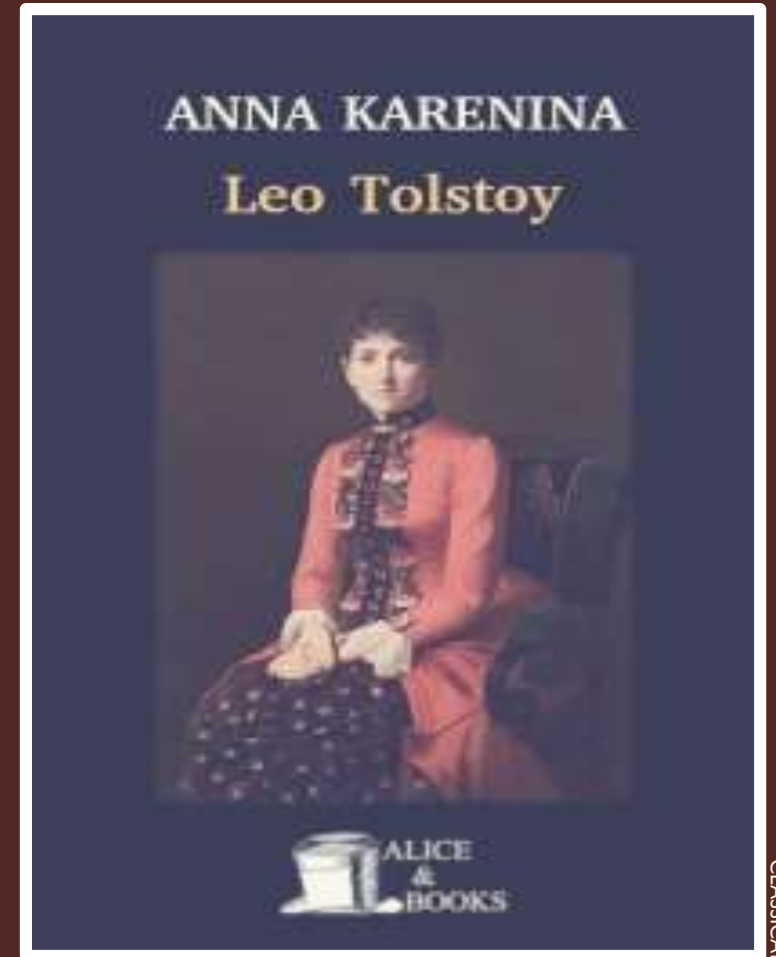


LEO TOLSTOY

- Russian author (1828–1910)
- Wrote epic realist novels
- Known for psychological depth + huge casts

CONTEXT: THE ANNA VS LEVIN PROBLEM

- The Expectation: Title suggests Anna is the sole protagonist.
- The Reality: Konstantin Levin appears just as often.
- The Twist: Levin is Tolstoy's semi-autobiographical self-portrait.
- Research Question: Does the data support the title?



OUR APPROACH: NLP & MAPPING

Name	Variations Mapped
Levin	Konstantin, Kostya
Anna	Arkadyevna, Karenina

- **The tool:** Python Natural Language Processing (NLP) pipeline.
- **The Challenge:** Russian names are complex and inconsistent.
- **The solution:** We built a dictionary to map them..
- **Metrics:** Volume (Counts) vs. Influence (Network).

```
# ANNA
    "Anna": "Anna", "Karenina":
"Anna", "Arkadyevna": "Anna",
    "Anna Arkadyevna": "Anna",
"Anna Karenina": "Anna",
# VRONSKY
    "Vronsky": "Vronsky", "Count
Vronsky": "Vronsky", "Alexey
Kirillovitch": "Vronsky",
# LEVIN
    "Levin": "Levin",
"Konstantin": "Levin",
"Konstantin Levin": "Levin",
    "Dmitrievitch": "Levin",
```



THE EVIDENCE FOR LEVIN

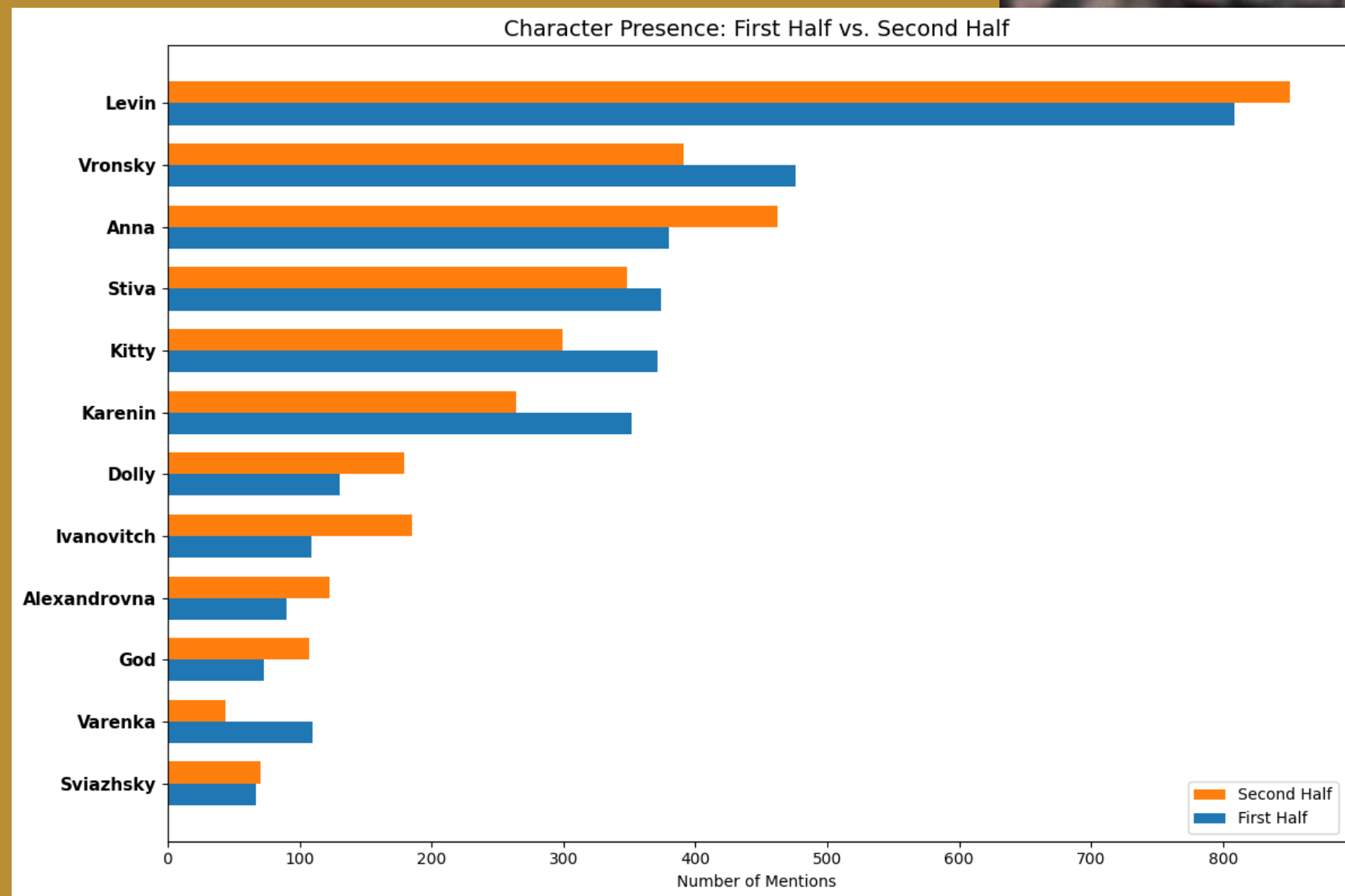
- *Quantity Analysis (Volume)*
-

1ST METRIC

TOTAL MENTIONS

- **Bullet points:**
- Levin ~1,600 mentions
- Anna ~1,100 mentions
- Levin appears significantly more often

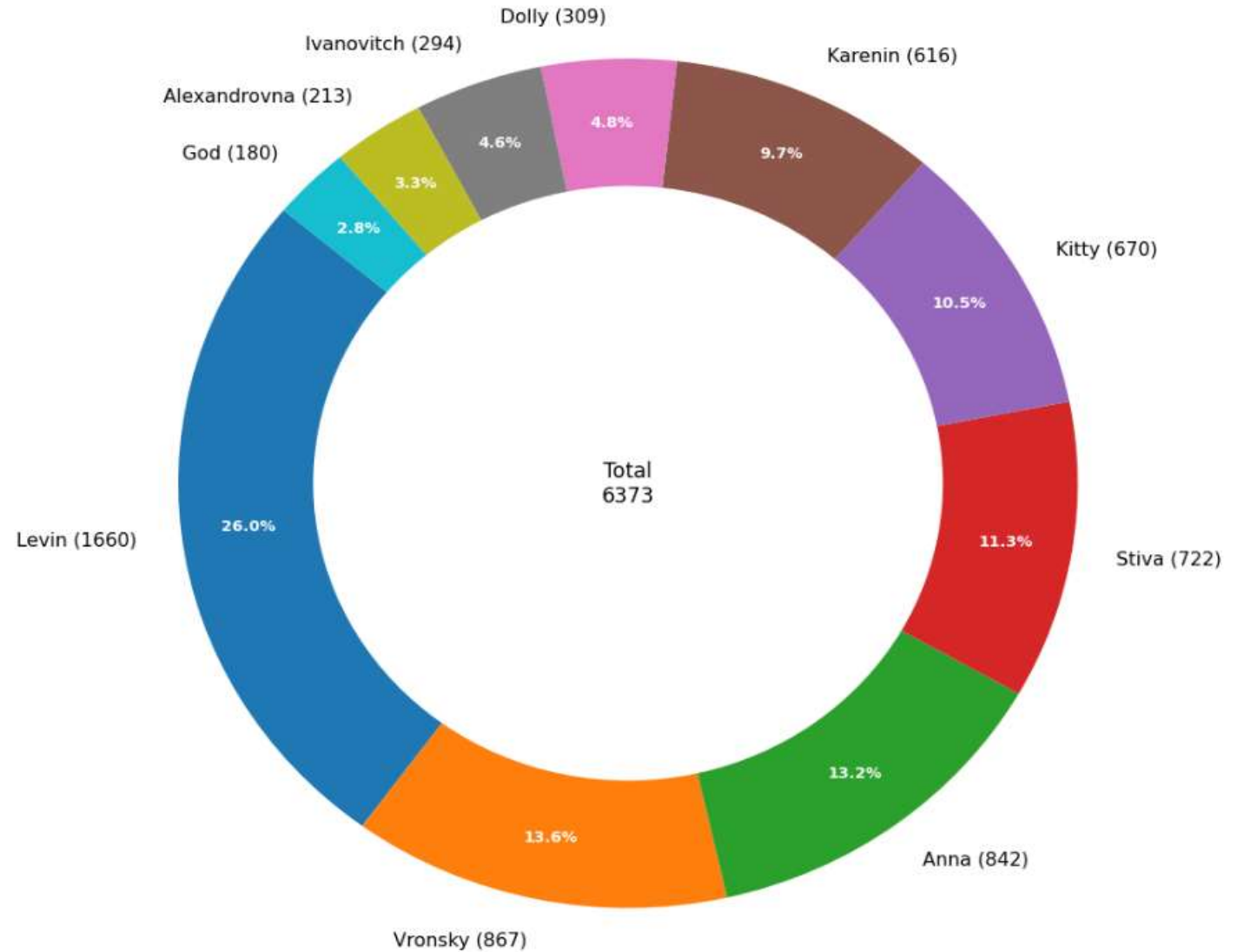
Tools: pandas, NLTK/spaCy,
regex, matplotlib



•Share of Mentions (%) by Character

- “Total mentions: 6373”
- Levin has the largest share (26%)
- Anna is 13%

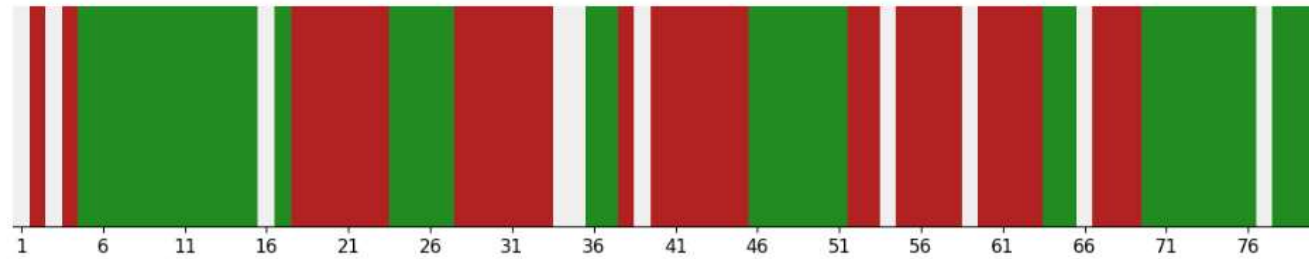
“Data processed with Python”
using pandas, NLTK/spaCy, regex,
matplotlib’



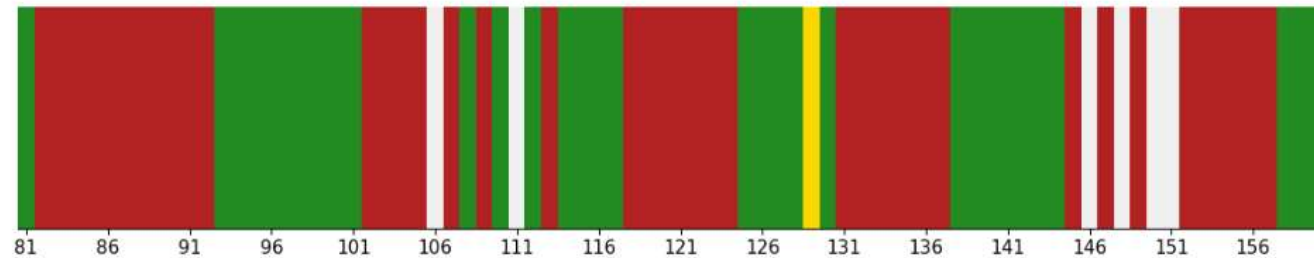
FOCUS TIMELINE

Anna Karenina: Narrative Focus Timeline

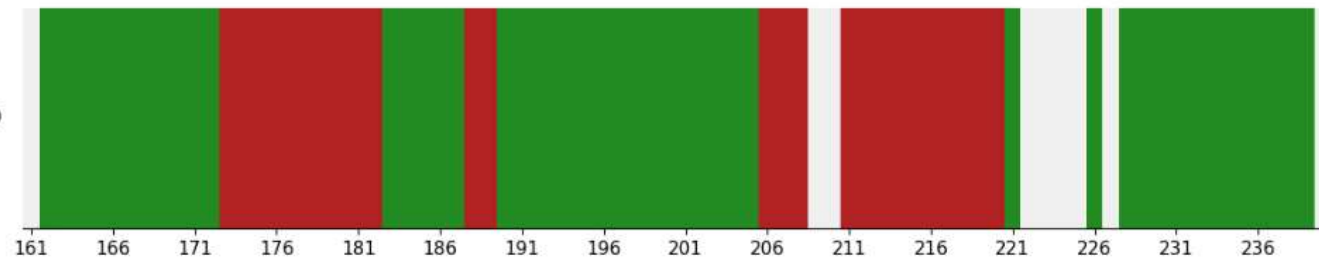
Ch. 1-80



Ch. 81-160



Ch. 161-239



■ Anna ■ Levin ■ Tie ■ None

Anna-dominated chapters: 100
Levin-dominated chapters: 114
Tie chapters: 1
No-focus chapters: 24

Bullet points:

- Legend:
- Red = Anna
- Green = Levin
- Yellow = Tie
- White = None

- Tools: numpy, pandas, pathlib, re, matplotlib



THE EVIDENCE FOR ANNA

- *Influence analysis (Quality)*

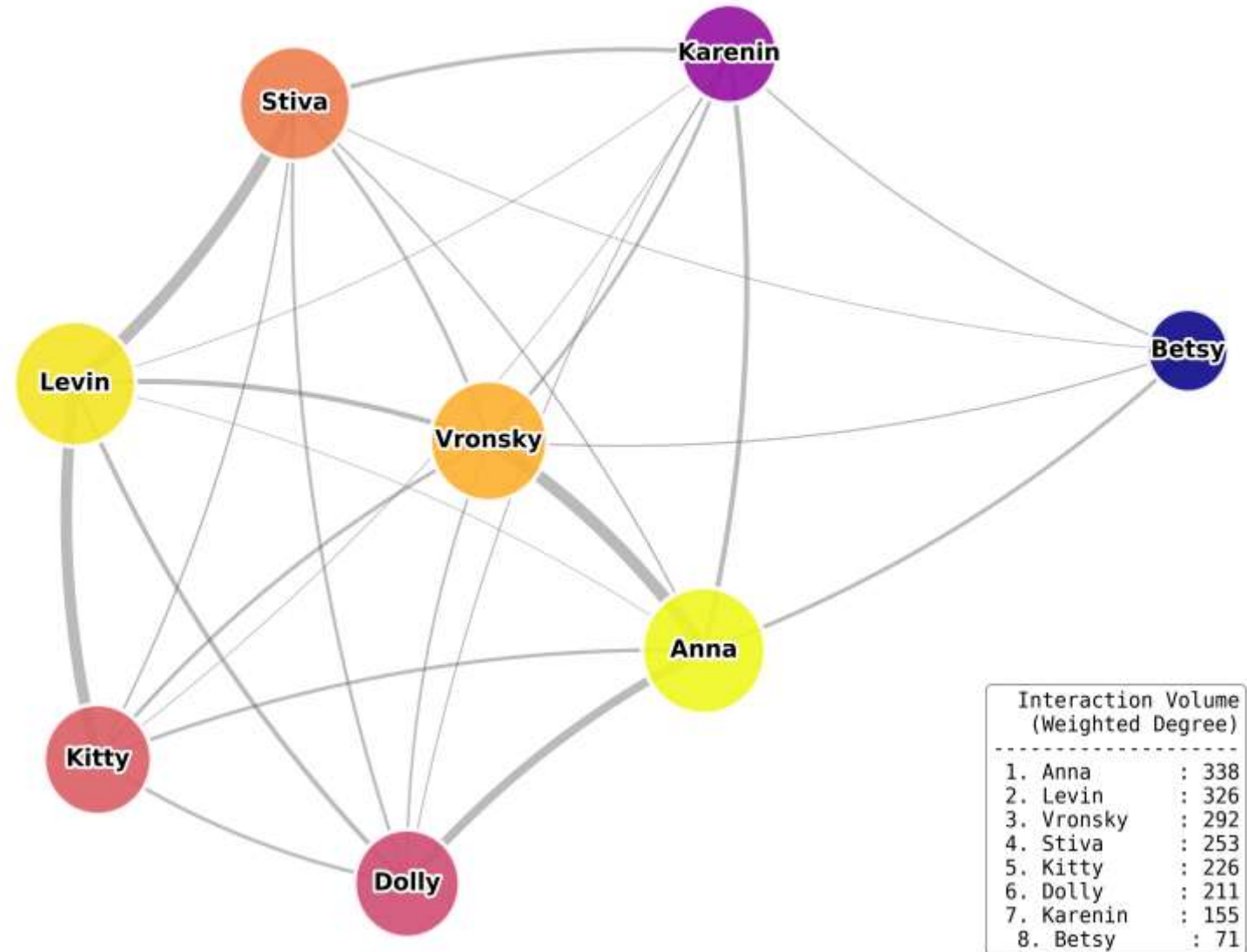
2ND METRIC

THE NETWORK PARADOX

- **The Metric:** We measured **Interaction Volume** (Weighted Degree).
- **The Surprise:** Levin (326 interactions) is statistically almost as active as Anna (338). He is a heavyweight.
- **The Hub:** Anna is the **Structural Center**. She connects the disparate worlds (Politics, Society, Family). Without her, the network breaks.

Tools: itertools, networkx, nltk, pandas, IPython, matplotlib

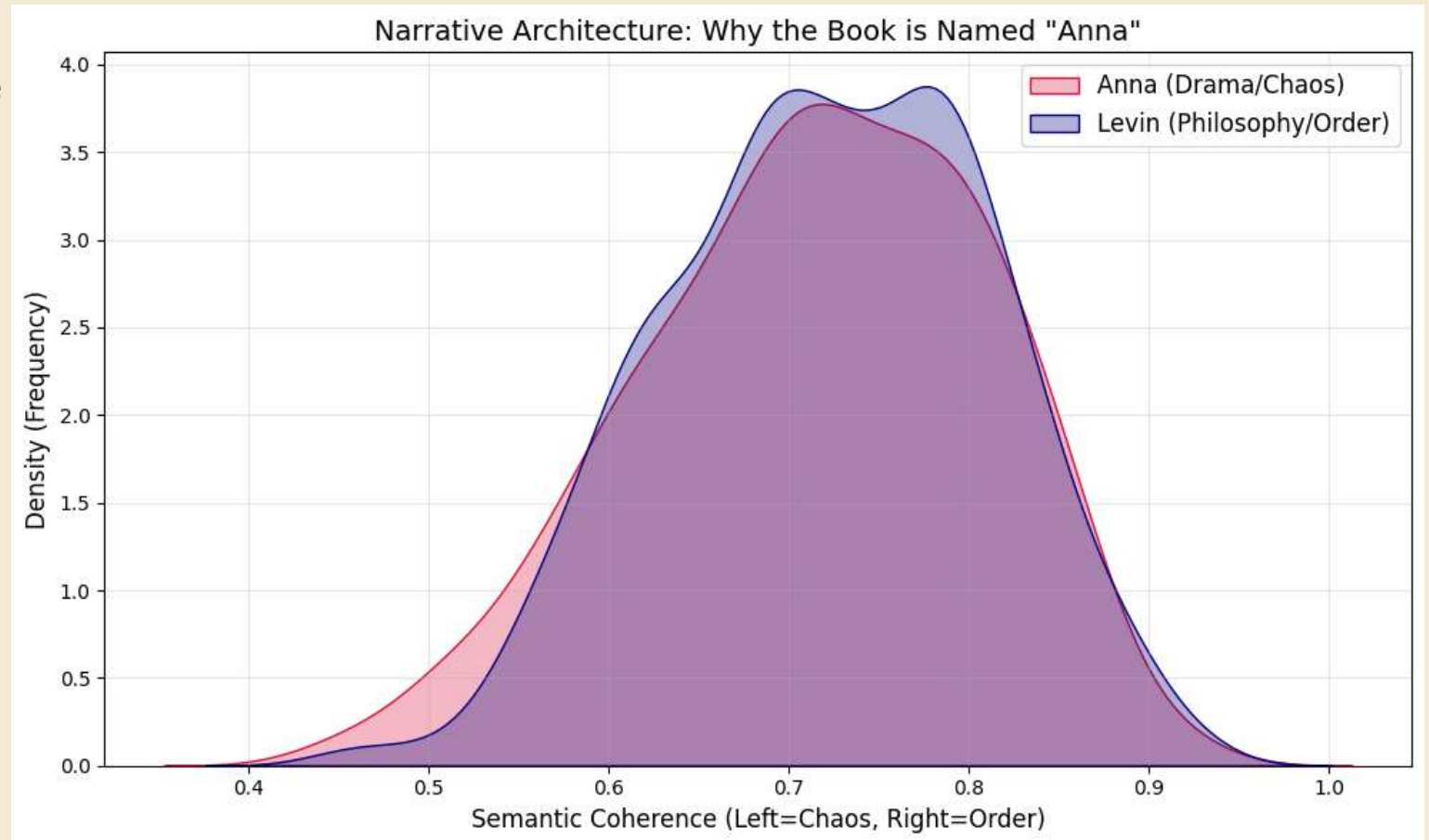
Character Interaction Network: Anna Karenina



Paragraph Semantic Coherence

- **The Metric:** We measured **Semantic Coherence** to determine if the narrative voice was "stable" or "chaotic."
- **The Data:** Levin (**0.730**) scores higher than Anna (**0.719**). The difference is statistically significant.
- **The Insight:** Anna represents **Entropy and Drama** (lower coherence). Levin represents **Order and Philosophy**. The novel needs Anna's chaos to drive the plot.

Tools: datetime, matplotlib, numpy, pandas, regex, seaborn, sentence_transformers, sys, PyTorch, transformers



A woman in a dark coat and fur hat stands in a city street, looking down. The background shows buildings and a streetcar.

FINAL VERDICT

WHAT DO WE UNDERSTAND SO FAR?

FINAL VERDICT

The Case for Levin (Quantity):

- **Winner:** Total Mentions & Focus Timeline.
- **Role:** He dominates the **Volume** of the text. He represents the novel's *Expanse* (Philosophy, Agriculture, Russia).

The Case for Anna (Quality):

- **Winner:** Paragraph Semantic Coherence & Network Centrality.
- **Role:** She dominates the **Structure** of the text. She represents the novel's *Focus* (Drama, Society, Connection).

Conclusion:

- **The Title is Accurate.**
- While Levin provides the *voice*, Anna provides the *gravity*. She is the structural hub that connects the novel's disparate worlds; without her, the network collapses.

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