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The Session Will Begin Shortly

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LLMs for Qualitative and Mixed-Methods Social Network Analysis

Session 1: Motivation and Qualitative SNA Foundations

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instats Seminar

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Outline

A short introduction to Qualitative SNA and LLMs

Foundations of Qualitative and Mixed-Methods SNA

The promise and perils of using LLMs in Qualitative SNA

- ▶ The Convergence: Large-scale data meets advanced computational methods.
- ▶ The Qualitative Gap: Quantitative SNA often misses the rich meaning in social ties.
- ▶ The LLM Opportunity: A chance to bridge the gap and analyze qualitative dimensions at scale.

The Challenge

Traditional qualitative methods are deep but not wide. They are limited to small networks due to time and labor constraints.

▶ Manual coding is slow.

▶ In-depth interviews are resource-intensive.

▶ Ethnographic observation is long-term.

Beyond Nodes and Edges

Networks are not just static structures; they are dynamic systems of meaning, interpretation, and practice.

► Relationships are constructed through interaction.

► The meaning of a tie is context-dependent.

► Networks are shaped by culture and narrative.

Examples

A "like" on social media can mean:

- ▶ Agreement
- ▶ Social support
- ▶ Simple acknowledgment
- ▶ A strategic move

Qualitative methods are needed to uncover this interpretive layer.

Extending Qualitative Inquiry

LLMs can process vast amounts of unstructured text, allowing us to apply qualitative insights to large-scale data.

This enables us to:

- ▶ Analyze thousands of documents, interviews, or posts.
- ▶ Identify patterns that are invisible at a small scale.
- ▶ Systematically code large corpora with human-developed schemes.

Assistance Tasks

- ▶ Coding assistance
- ▶ Entity and relationship extraction
- ▶ Sentiment analysis
- ▶ Topic modeling

Analytical Support

- ▶ Anomaly detection
- ▶ Pattern recognition
- ▶ Generating summaries
- ▶ Comparative analysis

Critical Limitations

▶ **Lack of True Understanding:** LLMs are pattern matchers, not thinkers. They don't understand social context.

▶ **Hallucination:** They can generate plausible but false information.

▶ **Bias Reproduction:** They are trained on biased data and can amplify existing societal biases.

LLMs as Collaborators, *Not* Analysts

The Human is in the Driver's Seat
Researchers must guide the process, validate the outputs, and provide the critical interpretation. LLMs are powerful tools, but they are not a substitute for human intellect and ethical judgment.

- **Narratives:** People make sense of their network position through stories. These stories are crucial data.
- **Roles:** Social roles (e.g., mentor, broker, gatekeeper) are defined by the patterns of relationships.
- **Relational Identities:** Our sense of self is shaped by our connections to others.

The Meaning-Measurement Distinction

A Critical Point

Network measures (like centrality or density) are not objective facts. They are interpretive constructs based on the researcher's definition of a "tie." A central challenge in SNA is bridging the gap between rich qualitative meanings and standardized quantitative measures.

- ▶ What counts as a tie?
- ▶ How are different types of ties weighted?
- ▶ How are boundaries of the network defined?
- ▶ How can we translate qualitative insights into quantitative variables without losing nuance?
- ▶ How can we ensure that our measures are meaningful in the context being studied?

These choices are theoretical and must be justified.

Visualizations are Arguments

Network visualizations are not neutral representations of data. They are interpretive devices that make an argument about what is important in a network.

- The choice of layout algorithm can dramatically change the appearance of a network.
- The use of color, size, and shape to represent attributes reflects interpretive choices.

A Theoretical Act

Defining the boundaries of a network is a theoretical and interpretive act, not a simple empirical one.

- ▶ Who is included in the network and who is excluded?
- ▶ What types of ties are considered relevant?
- ▶ These choices should be driven by the research question and theoretical framework.

Combining Strengths

Mixed-methods research systematically combines qualitative and quantitative approaches to create a more comprehensive understanding.

The goal is not just to use both, but to integrate them so that each informs the other.

- **Sequential Design:** QUAL $\rightarrow$ quan or QUAN $\rightarrow$ qual. One phase informs the next.
- **Parallel Design:** QUAL + QUAN. Both are conducted concurrently and their results are compared.
- **Embedded Design:** One method is nested within the other (e.g., a qualitative case study within a larger quantitative survey).

A particularly powerful design for mixed-methods SNA:

1. Start with qualitative work to develop initial understanding and a coding scheme.

2. Use quantitative methods (or LLMs) to apply this scheme to a larger dataset.

3. Return to qualitative analysis to interpret the quantitative findings in depth.

Systematic Comparison

Involves the systematic comparison of relational configurations across different cases (e.g., organizations, communities, or time periods).

- Helps to identify common patterns and sources of variation.
- Can be used to develop and test theories about network dynamics.

Key Dimensions

- **Interpretive Validity:** Do the findings resonate with participants' experiences?
- **Relational Validity:** Have the relational dynamics been accurately captured?
- **Integrative Validity:** Do the qualitative and quantitative findings cohere and enrich each other?

Qualitative network research is an iterative process

- Initial interpretation of data.
- Validation of interpretations with participants and other data sources.
- Refinement of interpretations based on feedback and new insights.

The Researcher as Instrument

In qualitative research, the researcher is the primary analytical instrument. This requires reflexivity:

- Being aware of one's own biases and assumptions.
- Critically examining how one's position shapes the research.
- Understanding how the tools we use (including LLMs) influence our findings.

- **Member Validation:** Presenting findings to research participants for feedback. This is crucial for ensuring interpretive validity.
- **Reflexivity:** Critically reflecting on how the researcher's own position and choices shape the research.

The Challenge of Scale

► The very richness that makes qualitative SNA powerful also makes it difficult to scale. up to large networks.

► This is where LLMs can be particularly useful.

The Bottleneck

► It is hard to maintain interpretive depth when dealing with thousands of actors or documents.

► This is precisely where LLMs can help, but we must be vigilant about not losing the nuance in the process and not to sacrifice depth for breadth.

The future of the field lies in creating collaborative workflows that leverage the respective strengths of humans and machines.

Human Strengths: Contextual understanding, ethical judgment, theoretical insight.

Machine Strengths: Speed, scale, pattern recognition in large datasets.

- ▶ We motivated the need for integrating LLMs into qualitative SNA.
- ▶ We reviewed the foundations of qualitative and mixed-methods network analysis.
- ▶ We introduced the promise and perils of using LLMs.

Next Session

We will dive deeper into the specifics of qualitative and mixed-methods SNA designs.

Thank you!

Questions?

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