Patrick Gerard

+1-513-518-3424 | pgerard@isi.edu | patrickgerard.co

Linkedin | Github | Scholar | Twitter (X)

Los Angeles, CA - 90019, United States

Research Objective

I work at the intersection of natural language processing, machine learning, and network science. I focus on developing scalable methods to model discourse dynamics and information diffusion across fragmented media ecosystems.

Skills

- **Proficient Languages:** Python, R, C, C++, Java, TensorFlow, PyTorch, Huggingface
- **Research Interests:** Network Science, Large Language Models, Unsupervised Learning, Graph Neural Networks, Knowledge Representation

Education

- **University of Southern California** — *August 2023 — (Expected) May 2027*
  PhD Computer Science — Los Angeles, CA
  ◦ Advisors: Kristina Lerman, Emilio Ferrara
- **University of Notre Dame** — *August 2019 — May 2023*
  BS Computer Science — Notre Dame, IN
  ◦ Magna Cum Laude; GPA: 3.98/4.00

Publications and Patents

C=Conference, P=Patent, S=In Submission

[C.1] **Modeling Information Narrative Evolution on Telegram During the Russia-Ukraine War**
Patrick Gerard, Svitlana Volkova, Louis Penafiel, Kristina Lerman, Tim Weninger
In *19th International AAAI Conference on Web and Social Media (ICWSM)*, June 2025.
- Developed a dynamic, real-time clustering framework for tracking narrative emergence, evolution, and mutation at scale in high-velocity social data streams.
- Uncovered structural dynamics within pro-Russian and pro-Ukrainian narratives, demonstrating distinct temporal adaptation patterns and thematic divergence, highlighting fundamental differences in community perceptions.

[C.2] **Fear and Loathing on the Frontline: Decoding the Language of Othering by Russia-Ukraine War Bloggers**
Patrick Gerard, Tim Weninger, Kristina Lerman
In *19th International AAAI Conference on Web and Social Media (ICWSM)*, June 2025.
- Developed a sociologically informed computational framework leveraging LLMs to detect "othering" rhetoric; introduced a novel rapid domain-adaptation method enabling effective transfer to culturally distant contexts without retraining.
- Analyzed correlations between othering language and increased audience attention and network centrality, highlighting how distinct rhetorical framings aligned with greater prominence, especially during moments of heightened tension.

[C.3] **Hierarchical Spatio-Temporal Graph Neural Networks for Pandemic Forecasting**
Yihong Ma, Patrick Gerard, Yijun Tian, Zhichun Guo, Nitesh V Chawla
In *31st ACM International Conference on Information & Knowledge Management (CIKM*, October 2022.
- Co-developed HiSTGNN, a hierarchical spatio-temporal GNN that integrates region-level graph reasoning and temporal attention to forecast COVID-19 trajectories.
- Curated and leveraged a large-scale U.S. mobility dataset spanning 66 weekly dynamic graphs with 3K+ nodes and 500K+ edges per snapshot, achieving state-of-the-art performance across forecasting horizons.

[C.4] **Truth Social Dataset**
Patrick Gerard, Nicholas Botzer, Tim Weninger
In *17th International AAAI Conference on Web and Social Media (ICWSM)*, June 2023.
- Led the first large-scale data collection and analysis of Truth Social, curating a dataset of over 823K posts and 454K users despite the absence of a public API at the time.
- Analyzed content, network structure, and platform dynamics, revealing dominant actors, narrative coordination, and cross-platform link ecosystems fueling alt-right information spread.
- Invited to discuss findings in a CNBC interview on Truth Social's ecosystem and alt-tech dynamics, based on expertise and work in this paper.

[P.1] **Systems and Methods for Information Narrative Detection, Evolution and Analysis**
Patent filed.

- Co-developed core methodology for dynamic narrative detection and tracking, later formalized into a patent for scalable narrative analysis systems.

[S.1] **Bridging the Narrative Divide: Cross-Platform Discourse Networks in Fragmented Ecosystems**
Patrick Gerard, Hans WA Hanley, Luca Luceri, Emilio Ferrara
Under Review at *20th International AAAI Conference on Web and Social Media (ICWSM)*, June 2026.

- Introduced a platform-agnostic, discourse-centered user-network construction method, achieving state-of-the-art performance in intra- and inter-platform user-modeling tasks while requiring significantly less data than existing network-construction methods.
- Uncovered "bridge users," a structurally distinct but previously invisible group who disproportionately drove nearly 70% of narrative migrations between fragmented platforms (Truth Social and X), offering new insight into cross-platform information diffusion.

[S.2] **Do LLMs Learn to Reason or Memorize? Testing Epistemic Framework Transfer via Knowledge Deletion**
Patrick Gerard, Svitlana Volkova, Emilio Ferrara
Under Review at *NeurIPS 2025 Workshop: From Artificial to Epistemic Intelligence*, December 2025.

- Designed a framework using targeted knowledge deletion to test whether LLMs internalize reasoning patterns or rely on surface recall, showing that models preserve and transfer epistemic framing even without underlying factual knowledge.

[S.3] **Unfiltered Conversations: A Dataset of 2024 U.S. Presidential Election Discourse on Truth Social**
Kashish Shah, Patrick Gerard, Luca Luceri, Emilio Ferrara
Under Review.

- Co-developed a large-scale dataset of political discourse on Truth Social ($\tilde{1}$.5M posts), extending prior ICWSM work by incorporating election-related activity and metadata through a continuously updating pipeline.
- Led infrastructure support and longitudinal data maintenance; later collaborated with *Der Spiegel* to support investigative analysis and design a system for archiving real-time Truth Social data.

[S.4] **Illusions of Intimacy: Emotional Attachment and Emerging Psychological Risks in Human-AI Relationships**
Minh Duc Chu, Patrick Gerard, Kshitij Pawar, Charles Bickham, Kristina Lerman
Under Review.

- Identified distinct patterns of emotional dependence, vulnerability, and identity shaping in user-AI relationships through large-scale analysis of Reddit companion bot interactions.
- Helped design and implement unsupervised framework for extracting attachment trajectories and surfacing early signs of psychological vulnerability in user-companion interactions.

Professional Experience

- **Aptima, Inc.** *August 2023 — August 2024; May 2025 — Present*
  Research Intern – AI/ML Remote
  - Led development of novel temporal narrative clustering methodology for analyzing information dynamics across social platforms. Applied computational social science methods to study Russian and Ukrainian war blogger discourse, uncovering key narrative evolution patterns. **First-authored paper accepted at AAAI ICWSM 2025**.
  - Co-inventor on filed patent "Systems and Methods for Information Narrative Detection, Evolution and Analysis"; contributed to unsupervised methodology for tracking narrative emergence and mutation across platforms.
  - Leading research on epistemic framework transfer in community-aligned LLMs using targeted knowledge deletion to test whether models genuinely internalize reasoning patterns vs. surface-level mimicry. Developed methodology to isolate systematic reasoning from memorized associations. **First-authored paper currently under review.**
  - Developed density-guided community alignment research developing annotation-free methodology that learns community preferences by modeling response manifolds and density distributions in embedding space. Achieved 70%+ expert preference improvements across 10+ diverse communities while reducing annotation costs by 90% compared to traditional RLHF. **First-authored paper to be submitted to ACL Rolling Review, January 2025.**

- **Protagonist Technology** *May 2024 — August 2024*
  Research Intern – NLP Remote
  - Led LLM-guided event extraction model development achieving 20%+ Macro-F_1 score improvement over previous models with 30% fewer training data points through transfer learning techniques. Models deployed across company domains without retraining, showing robust cross-domain generalization for multiple client applications.
  - Developed novel LLM-based data augmentation methodology creating custom metric system for monitoring data distribution quality. Achieved 35%+ improvement in downstream model performance compared to organic-only training and 20%+ improvement over baseline synthetic datasets. Methodology now implemented company-wide across domains, particularly in low-resource environment.

Invited Talks and Posters

[1] **Crossing the Narrative Divide: Mapping Cross Platform Discourse to Reveal Hidden Pathways of Narrative Migration**
Meta Computational Social Science Group, July, 2025. New York, NY.

[2] **Narratives Without Borders: Mapping Cross Platform Discourse to Reveal Hidden Pathways of Narrative Migration**
Stanford University, Stanford Security. June, 2025. Stanford, CA.

[3] **Modeling Narrative Evolution**
19th International AAAI Conference on Web and Social Media (ICWSM). June, 2025. Copenhagen, Denmark.

[4] **Fear and Loathing on the Frontline: Decoding the Language of Othering**
19th International AAAI Conference on Web and Social Media (ICWSM). June, 2025. Copenhagen, Denmark.

[5] **Predicting and Detoxifying Cross-Platform Narrative Transmission**
19th International AAAI Conference on Web and Social Media (ICWSM). June, 2025. Copenhagen, Denmark.

[6] **Discursive Reality and the Allure of Otherism: Lessons from the Russo-Ukrainian War**
Stanford University, Stanford Empirical Security Research Group. August, 2024. Stanford, CA.

[7] **Understanding and Modeling Othering Discourse On Diverse Platforms**
University of Southern California, Cloudwalkers Conference. March, 2025. Los Angeles, CA.

[8] **Modeling Otherism in Conflict Discourse**
University of Southern California. May, 2025. Los Angeles, CA.

[9] **How Former President Trump Could Profit From Truth Social**
CNBC. June, 2024. Stanford, CA.

TAing and Service

- **USC CSCI 401: Design and Construction of Large Software Systems** *Fall 2024*
  Teaching Assistant Los Angeles, CA
  - Managed and mentored 6 student project teams delivering industry-partnered software solutions, acting as liaison between students and external stakeholders.
  - Led weekly sprint planning, progress reviews, and Agile retrospectives; ensured milestone deliverables aligned with stakeholder expectations.
  - Advised on project design and execution to support students in applying software engineering methodologies in real-world scenarios.
- **USC CSCI 401: Design and Construction of Large Software Systems** *Fall 2025*
  Teaching Assistant Los Angeles, CA
  - Managed and mentored 5 student project teams delivering industry-partnered software solutions, acting as liaison between students and external stakeholders.
  - Led weekly sprint planning, progress reviews, and Agile retrospectives; ensured milestone deliverables aligned with stakeholder expectations.
  - Advised on project design and execution to support students in applying software engineering methodologies in real-world scenarios.
- **Share a Meal** *Fall 2023 — Present*
  Team Lead & Graduate Ambassador Los Angeles, CA
  - Lead volunteer teams in distributing food and water directly to unhoused individuals on Skid Row through on-foot outreach.
  - Recruit and mentor new student volunteers to foster sustained engagement in weekly street-level service.
  - Coordinate routes and logistics to ensure aid is delivered directly on foot, prioritizing outreach over stationary distribution.
- **Notre Dame Computer Science for Good** *Fall 2019 — Spring 2023*
  Executive Board Member; Team Leader Notre Dame, IN
  - Led club operation restructuring and governance; developed long-term strategic plans to expand community-driven impact.
  - Worked with school administration to integrate the organization into an official university course, increasing membership by over 60%.
- **Notre Dame First-Gen & Low-Income Student Mentorship Program** *Fall 2020 — Spring 2023*
  Mentor Notre Dame, IN
  - Supported incoming first-generation and low-income students with academic guidance, campus resource navigation, and mentorship during their transition to college.

Mentorship and Volunteering

- **Reviewer**. 18th International AAAI Conference on Web and Social Media (ICWSM 2024)
- **Reviewer**. 19th International AAAI Conference on Web and Social Media (ICWSM 2025)
- **Reviewer**. 20th International AAAI Conference on Web and Social Media (ICWSM 2026)
- **Mentor**. Viterbi Graduate Mentorship Program (Fall 2024 — Present)
- **Mentor**. REU Program at the Information Sciences Institute (Summer 2025)
- **Mentor**. Minds Matter: Mentor students from low-income families for college success. (Fall 2024 — Present)

Honors and Awards

- **Magna Cum Laude (2023)**
  Top 15% of graduating class.
- **Faculty Choice Senior Award (2023)**
  awarded to two graduating seniors for exceptional academic achievement and personal character.
- **Tau Beta Pi: Engineering Honor Society (2022)**
  Oldest Engineering Honor Society in the United States.
- **iTREDS Scholar (2021)**
  Lucy Family Institute's flagship program for ethical, community-informed data science research and leadership.
- **National Merit Scholar (2019)**
  Selected from over 1.5 million entrants for exceptional academic achievement and PSAT/NMSQT performance.

References

1. **Emilio Ferrara**
   Professor and Associate Department Chair: Thomas Lord Department of Computer Science
   University of Southern California
   Email: emiliofe@usc.edu
   Phone: (310) 448-8661

2. **Kristina Lerman**
   Senior Principal Scientist
   Information Sciences Institute, University of Southern California
   Email: lerman@isi.edu
   Phone: (310) 448-8714

3. **Tim Weninger**
   Associate Professor and Director of Graduate Studies: Department of Computer Science
   University of Notre Dame
   Email: tweninge@nd.edu
   Phone: (574) 631-6770