Priyanka Gautam

Ph.D. Student at Kansas State University, Kansas, USA
Kansas, United States Portfolio
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Priyanka Gautam, a Ph.D. student at Kansas State University, her research focuses on graph-theoretic frameworks for enhancing resilience and developing adaptive strategies for dynamic networks. Her expertise in machine learning and data visualization transforms complex data into strategic insights, driving effective business solutions.

Professional Experience

- **Data Science Analyst — Accenture Applied Intelligence, Gurugram, India** (2021 - 2022)
  - Engineered an automated tool to optimize workforce management by analyzing job roles and hiring patterns. This initiative projected a 50% increase in task automation and streamlined budgeting for workforce expansion over the next five years based on market trends.
  - Enhanced the accuracy of job classification models to 90%, applying intelligent augmentation techniques. This improvement in model performance significantly boosted hiring prediction capabilities.
  - Employed Python, NLP, machine learning, and Power BI for developing advanced analytics and workflow planning solutions, enhancing data-driven strategic decisions.
- **Data Science Consultant — Eclerx Service Ltd., Mumbai, India** (2019 - 2021)
  - Developed automated tools for extracting and classifying loan documents, enhancing the model's accuracy by 94% by integrating advanced image processing filters and adapting extraction strategies to handle various document types.
  - Revolutionized resume processing by developing a Flask-based API using a hybrid NLP model (NER + Spacy), which improved parsing accuracy to 92% and reduced human resource requirements by 50% in recruitment processes.
  - Designed and implemented an API for personal image classification into distinct categories using YOLOv3, improving system performance uptu 99% security and personnel identification tasks.
  - Built an ETL pipeline to streamline data extraction from data lakes and ensure compatibility with Hadoop clusters, facilitating real-time pricing predictions and enhancing operational efficiencies.

Research Experience

Graduate Research Graduate — Kansas State University, Kansas, USA (2022 - Current)
My research focuses on influence maximization and critical node analysis within complex dynamic networks, employing causal and graph-theoretic approaches. It explores the interplay between infrastructure resilience and social equity and developing adaptive strategies that not only mitigate disruptions in both social and physical network infrastructures but also amplify influence marketing within social platforms.

- **Graph-Theoretic Models for Critical Infrastructure Robustness & Resilience:**
  - Developed a comprehensive model for evaluating the robustness of interconnected infrastructure systems, encompassing sectors such as power, water, transport, and emergency services.
  - Achieved node classification accuracy of 97.24% and link classification accuracy of 99.01% in a network of over 1,300 nodes serving a coastal community of 500,000 residents.
  - Published two research papers to validate the theoretical concepts underpinning our models.
- **Synthetic Hetero-functional System Development:** (Manuscript in Progress)
  - Engineered a heterogeneous functional graph framework to simulate and analyze multi-infrastructure dependencies and their impacts on society.
  - This model significantly advances traditional isolated system studies by facilitating complex dependency analyses across diverse infrastructure sectors.
- **Influence Maximization in Dynamic Networks:**
  - Implemented a GNN-LSTM model integration for dynamic influence maximization, effectively adapting to both structural and temporal changes.

  - Enhanced prediction accuracy for potential seed nodes by over 85%, thereby reducing computational overhead and improving the efficiency of influence strategies in various applications, including marketing and public health campaigns.

- **Change Point Detection in Dynamic Network Structures:** (Work in Progress)
  - Developing algorithms to detect significant structural changes in dynamic networks, aiming to proactively address and mitigate potential disruptions.
  - Focused on analyzing network behavior to identify critical change points, crucial for optimizing the timing of influence maximization algorithms to enhance infrastructure system robustness.

Education

2022- Current	**Ph.D. in Electrical & Computer Engineering**, Kansas State University, USA (GPA: 3.9/4) [Expected Graduate -December 2025]
2017 - 2019	**Masters in Computer Science & Engineering**, IIT Gandhinagar, India (CGPA: 7.6/10)
2012 - 2016	**B.Tech in Information Technology**, AKTU University, India (75%)

Technical Skills

- **Programming:** Python, C, MATLAB, Julia, R, JavaScript, SQL, CSS, HTML
- **Libraries/Tools:** Pycharm, Pytorch, Tensorflow, Jupyter, Spyder, GCP, Dataiku, Gurobi, Git, PowerBI
- **Languages:** English (fluent), Hindi (native), Punjabi (intermediate)

Courses Completed

Master's Program: Computer vision, Pattern Recognition Machine Learning, Artificial Intelligence, 3D Computer Vision, Artificial Intelligence, Algorithm, Syste Design.
Ph.D. Studies: Probability & Random Process, Deep Learning, Maths & Networks, Scalability for Data Science, Convex Optimization, Causal Inference & Machine Learning, Network Theory, Computer Engineering, Detection & Estimation theory.

Certifications

- **Machine Learning Specialist** (2020), Issued by LinkedIn Learning - [Certificate]
- **Dataiku Core Designer** (2020), Issued by Dataiku - [Certificate]

Publications

1. P. Gautam, A. Sreejith, and B. Natarajan, "A Transductive Graph Neural Network learning for Grid Resilience Analysis," 2023 IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (SmartGridComm), Glasgow, United Kingdom, 2023, pp. 1-6, doi: 10.1109/SmartGridComm57358.2023.10333912. [Link]

2. P. Gautam and B. Natarajan, "GNN-based Criticality Analysis in Interconnected Infrastructure Networks," 2024 IEEE Green Technologies Conference (GreenTech), Springdale, AR, USA, 2024, pp. 213-217, doi: 10.1109/GreenTech58819.2024.10520547. [Link]

3. Gautam, P., Natarajan, B., Munikoti, S., Ferdous, S. M., Halappanavar, M., "GNN-Based Candidate Node Predictor for Influence Maximization in Temporal Graphs." In *Proceedings of the AAAI Workshop 2025.* (Accepted)

Research Interests

Graph Theory, Machine Learning, Graph neural networks, complex networks, Influence Maximization, Causal Inference, Dynamic Network Optimization, Infrastructure Resilience, Social Network Analytics, Graph neural networks, complex networks