Gyaneshwar Agrahari

Ph.D. Candidate in Mathematics

Department of Mathematics, Louisiana State University
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Research Interests

Structural and Extremal Graph Theory, Matroid Theory, Network Science, Graph Neural Networks, Bioinformatics, Geospatial Analysis

Education

Ph.D. in Mathematics, Louisiana State University 2022 – Present
Advisor: Zhiyu Wang GPA-4.0
Expected Graduation: May 2027
Thesis title: *Counting Subgraphs in Planar Graphs with Higher Connectivity*

B.S. in Mathematics, B.S. in Physics, Youngstown State University 2018 – 2022
Graduated with Summa Cum Laude, Honors GPA-3.9

Coursework

Graph Minors, Graph Induced Subgraphs, Spectral Graph Theory, Probabilistic Methods in Graphs, Ramsey Theory, Matroid Theory, Tutte Polynomials, Convex Optimization, Numerical Linear Algebra, Complex Analysis, Real Analysis, Topology, Galois Theory

Publications & Preprints

1. G. Agrahari and D. Froncek, *On Some Classes of Cycles-Related -Harmonious Graphs*, *Utilitas Mathematica*, vol. 120, pp. 75–91, 2024, doi:10.61091/um120-07

2. G. Agrahari, K. Bist, M. Pandey, J. Kapita, Z. James, J. Knox, S. Ramirez, S. Heymsfield, and N Drenska, *Predicting Biometrics Supervised and Semi-Supervised Algorithms on Anthropometric Measurements:*, Under review.

3. G. Agrahari and Z. Wang, *On the number of $K_{1,t}$ and $K_{2,t}$ in 4 or 5-connected planar triangulations*, In preparation.

4. X. Liu, G. Agrahari, Z. Wang, *On the number of short cycles in 5-connected planar triangulations*. In preparation.

GA Experience

Instructor, Differential Calculus, LSU Spring 25
Designed syllabus, lesson plans, tests, study guides, and collaborative assignments. Developed simulations to help student visualize the concepts. Performed all administrative tasks including grading and recitations.

Teaching Assistant,(Linear Algebra, Advanced Calculus), LSU Spring 24,25
Provided detailed feedback to students on their weekly assignments and managed the gradebook

Instructor, College Algebra, LSU Fall 23, 24
Designed weekly lesson plans. Performed administrative tasks- announcements, managing gradebook, and attendance.

Lab Manager, Math Tutoring Lab, LSU Fall 23, 24
Supervised other lab tutors. Oversaw adherence to professional conduct among students

Project Leadership Experience

ML Algorithms for Predicting Biometrics Spring, Summer 24

- In collaboration with Pennington Biomedical Research Center, led a team of nine undergraduates and five graduates in predicting biometrics like lean mass and bone mineral density achieving 90%+ accuracy.
- Organized workshops on on Numpy, deep dearning, and p-Laplacian methods for undergraduates. Designed and implemented a GitHub workflow for efficient collaboration and seamless code integration

Coding Theory Fall 23

- Led a team of two graduates and two undergraduates in investigating error-correcting codes arising from combinatorial objects such as projective planes, blocks designs, and Latin squares.
- Investigated the one-to-one correspondance between cyclic linear codes and quotient rings of $x^n - 1$. Wrote programs in Python to check the properties of the linear codes

Honors & Awards

- SIAM Travel Award, SIAM Mathematics of Data Science Conference 2024
- Certificate of Teaching Excellence, Louisana State University 2023
- Meritorious Honor by COMAP in Math Modeling Competition 2019, 2022
- Frank M Clark Physics Award, Youngstown State University 2021

Contributed talks

- Predicting ALM, BFP and BMD using Semi-superivsed Learning, AMS Spring Southeastern Sectional Meeting, March 2025
- Graph Construction in Geospatial Analysis of EV charging Stations, SIAM conference on Mathematics of Data Science, October 2024
- On Some Classes of Cycles-related Harmonious Graphs, Math for All Conference New Orleans April 2024
- On Some Classes of Cycles-related Harmonious Graphs, Southeastern International Conference on Combinatorics, Graph Theory & Computing, March 2024

- Colored Percolation in Three Dimensions, Eastern Great Lakes APS Meeting April 2022
- Multiplicative Harmonious Labeling, Southeastern International Conference on Combinatorics, Graph Theory & Computing, March 2022

Leadership & Service

- Vice-President, SIAM LSU Chapter — January 2025–Present
- Co-organizer, LSU Interdepartmental AI Seminar — Fall 2024–Present
- Session Co-organizer,Graph Learning and Network Analytics: Framework, Information Flow and Applications, SIAM conference on Mathematics of Data Science — October 2024
- Book Reviewer, Math for Data Science, Springer Publication — June 2024

Internships

Session Assistant, Center For Talented Youth, Johns Hopkins University, Summer 2022

- Prepared evaluation reports on 23 high-school students across two sessions on their day-to-day progress and class behavior Organized math-focused evening sessions featuring fun, hands-on activities to reinforce key concepts.
- Advised students on crafting clear, structured, and professional solutions. Supervised the students on their final presentations on advanced topics in math logic and combinatorics.

Data Intern, Zoning Department, Government of Youngstown City Summer 2021

- Updated the zoning map using GIS as per the new regulations of the city. Studied the zoning applications to check the requirements before the approval of the zoning officer

Skills

- **Mathematical Software:** MATLAB, Mathematica, SageMath, RStudio, ArcGIS
- **Programming Languages:** Python, C++, LaTeX, R
- **Python Packages**- NetworkX, TensorFlow, PyTorch, SkLeanr, , LangChain, spaCy, TopX