

Education

- 2012–20 **PhD (Engg.)**, *Computer Science and Automation (CSA), Indian Institute of Science (IISc), Bangalore, India.*
Thesis title: *Hypergraph Network Models: Learning, Prediction, & Representation in the Presence of Higher-Order Relations*
- Solved problems involving “higher-order relations” in network science through “hypergraphs”.
 - *Hypergraphs and Link Prediction (LP)*: Questions answered: How hypergraphs affect LP in derived-networks? ◦ How to readjust evaluation criteria for LP? ◦ Transformed LP scores to hypergraphs ◦ Carefully prepared LP data ◦ Performed extensive LP experiments
 - *Higher-order Link Prediction (HLP)*: Established intractability of HLP ◦ Showed that Negative Sampling hugely impacts HLP ◦ Proposed benchmark algorithms ◦ Hypothesized & statistically tested: cliques form hyperedges ◦ Fused hypothesis into objective: C3MM model ◦ Introduced sub-higher-order & proposed sub-optimal heuristic ◦ Deep attention HLP: SHONeNs
 - *Bipartite Higher-order Link Prediction (BHLP)*: Introduced higher-order bipartiteness for the first time ◦ Formulated powerset matching ◦ Rigorously connected them ◦ Segregated cross-attention params ◦ Built a deep model: CATSETMAT ◦ Solved BHLP via CATSETMAT
- 2010–12 **Master of Science (Engg.) – Computer Science**, *CSA, IISc, Bangalore, India.*
Thesis title: *Sentiment-driven Topic Analysis of Song Lyrics*
- Automatically assigned “sentiment topics” to songs based on their lyrics using “topic models”.
 - Mined textual data ◦ Crawled & merged multiple corpora ◦ Handled synonymous/polysemous words ◦ Latent Dirichlet Allocation ◦ WordNet ◦ SentiWordNet
- 2006–10 **Bachelor of Engineering – Electrical & Electronics**, *CGPA 8.72/10.*
Manipal Institute of Technology, Manipal, Karnataka, India
- 2002–05 **Class X & XII**, *Central Board of Secondary Education, 72.8% & 77.2%.*
Nirmal Deepmala School, Rishikesh, Uttarakhand, India

Research Areas/Interests

- Primary Machine/Deep Learning Theory/Applications ◦ Network Science ◦ Higher-order Relations ◦ Hypergraph Networks ◦ Network Embedding ◦ Natural Language Processing ◦ Computer Vision ◦ Explainable AI
- Secondary Online Advertising ◦ Recommendation Systems ◦ Information Retrieval ◦ Statistical Learning Theory ◦ Reinforcement Learning ◦ Stochastic Algorithms ◦ Machine Learning in Life Sciences ◦ Computational Neuroscience

Technical and Academic Skills

- Languages & Technologies C ◦ C++ ◦ Python ◦ GoLang ◦ MATLAB ◦ R ◦ Java ◦ Pandas ◦ NumPy ◦ SkLearn ◦ NLTK ◦ Tensorflow ◦ Keras ◦ PyTorch ◦ Git ◦ Spark ◦ Jupyter ◦ MATLAB Coder ◦ Unix ◦ AWS ◦ OpenCV ◦ TensorflowLite
- Mathematical proficiency Linear Algebra ◦ Optimization ◦ Probability & Statistics ◦ Graphs & Hypergraphs ◦ Real Analysis ◦ Discrete Mathematics & Number Theory ◦ Calculus ◦ Mathematical Logic

Work Experience

- 2020–present Data Scientist, ~6 months, *Factors.AI, Slashbit Technologies Pvt. Ltd., Bangalore, India.*
- Designing and developing products for automated marketing analytics.
 - Extracting intelligent marketing insights from large datasets via multivariate data mining.
- 2020 (part-time) R&D Consultant & Developer, ~8 months, *114 AI Innovation, New Delhi, India.*
- Space-tech based startup; I design and develop mathematical models for path prediction.
 - Satellite-manoeuve detection and intent extraction thereof with geometric models on TLE data.
- 2018–19 Senior Data Scientist, 1.5 years, *MiQ Digital India, Bangalore, India.*
- Design and production of ad-tech based products and solutions, both internal and external
 - Process/analyze ad-tech data build quick-PoCs; data ingestion and processing.
- 2016–17 Research Intern, 1 year, *Wipro Technologies, Bangalore, India.*
- Automating IT Service Management Systems (under Dr. Anurag Srivastava)
- 2010 Project Intern, 0.5 years, *CAIR, Defence Research & Development Organization (DRDO), Bangalore, India.*
- Topic Detection and Clustering of Multiple Documents (under Dr. Dipti Deodhare)

Teaching/Training Experience

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| Teaching | Linear Algebra (2017), | NPTEL, Ministry of HRD, Govt. of India. |
| Assistance | Discrete Structures (2014), | CSA, IISc, Bangalore, India. |
| Teaching | Design and Analysis of Algorithms (2013), | Wipro Bangalore & VIT Vellore, India. |
| Industrial Training | Machine/Deep Learning in Software (2020), Deep Learning for Web (2019), Machine Learning for Communication Networks (2019), Advanced Algorithms & Programming (2017), Data Structures & Algorithms (2016), Data Clustering Techniques (2018), Mathematics in Data Science (2019), Foundations of Deep Learning (2019), Statistical Data Analysis (2014) | Softwaves Consultancy Bangalore Pvt. Ltd., Bangalore, India. |

List of Publications

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| Published | - G. Sharma, P. Patil, and M. N. Murty, <i>C3MM: Clique-Closure based Hyperlink Prediction</i> , Int. Joint Conf. on Artificial Intelligence, 2020, Japan. |
| " | - P. Patil, G. Sharma, and M. N. Murty, <i>Negative Sampling for Hyperlink Prediction in Networks</i> , Pacific-Asia Conf. on Knowledge Discovery and Data Mining, 2020, Singapore. |
| " | - G. Sharma and M. N. Murty, <i>Mining Sentiments from Songs using Latent Dirichlet Allocation</i> , Intelligent Data Analysis, 2011, Portugal. |
| " | - D. Deodhare, G. Sharma, A. Srivastava, A. Sharma., <i>Semantically Driven Soft-clustering of Documents using Lexical Chains</i> , Int. Conf. on Natural Language Processing, 2010, India. |
| Preprints/Under review | - G. Sharma, P. Gupta, and M. N. Murty, <i>Love tHy Neighbor: Remeasuring Local Structural Node Similarity in Hypergraph-derived Networks</i> . |
| " | - G. Sharma, P. Patil, and M. N. Murty, <i>SHONeNs: Sub-higher-order Neural Networks for Hyperedges</i> . |
| " | - G. Sharma, A. Challa, P. Gupta, and M. N. Murty, <i>Higher Order Relations Skew Link Prediction in Graphs</i> . |
| " | - G. Sharma, S. Singh, V. S. Devi, and M. N. Murty, <i>The CAT SET on the MAT: Cross Attention for Set Matching in Bipartite Hypergraphs</i> . |

Graduate-level Courses attended

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| 2010–2018 | Linear Algebra • Optimization • Real Analysis • Probability & Statistics • Information Retrieval • Probabilistic Graphical Models • Cognition & Machine Intelligence • Natural Language Understanding • Topics in Pattern Recognition • Discrete Structures • Information Theory • Automated Verification • Foundations of Data Science |
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Miscellaneous

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| Achievements | Best Newcomer, 2019, | MiQ, Bangalore, India. |
| | Scholarship for Research, 2010–17, | Min. of Human Resource Devt., Govt. of India. |
| Initiatives | Learn Deep Learn, Reading Group, 2019, | MiQ, Bangalore, India. |
| | Mathematics Discussion Club, Discussion Group, 2011–12, | IISc, Bangalore, India. |
| Volunteer | CSA Summer School & Web Team, 2013–14, | " |
| | CSA Dept. Curriculum Committee (Student Member), 2011–12, | " |
| Talks | Matrix Factorization Techniques, 2015, | CSA Summer School, |
| | Careers after Engineering, 2014, | Manipal Institute of Technology, Manipal, India. |
| | Mathematics for Computer Science, 2013, | CSA, IISc, Bangalore, India. |
| Hobbies | Programming, Movies, Documentaries, Poetry, Mentoring, Science Reading. | |

References

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| Academia | Dr. M. Narasimha Murty, Professor, IISc, Bangalore, India, | ✉ mnm@iisc.ac.in . |
| | Dr. Dilip P. Patil, Professor, IISc, Bangalore, India, | ✉ patil@iisc.ac.in . |
| | Dr. C. E. Veni Madhavan, Professor (Retired), IISc, Bangalore, India, | ✉ cevm@iisc.ac.in . |
| | Dr. Anurag Srivastava, COO, SID, IISc, Bangalore, India, | ✉ anurags@iisc.ac.in . |
| Industry | Mr. Prabhu Prakash Ganesh, CTO, MiQ, Bangalore, India, | ✉ prabhu@miqdigital.com . |
| | Dr. Anshuman Gupta, VP Data Science, MiQ, Bangalore, India, | ✉ anshuman@miqdigital.com . |