

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 Python ◦ Pandas ◦ NumPy ◦ SkLearn ◦ NLTK ◦ Tensorflow ◦ Keras ◦ PyTorch ◦ Git ◦ R ◦ Spark ◦ Jupyter C/C++ ◦ Java ◦ MATLAB ◦ Unix ◦ AWS ◦ OpenCV ◦ TensorflowLite ◦ PyCharm ◦ Google DV360 API
- Mathematical proficiency Linear Algebra ◦ Optimization ◦ Probability & Statistics ◦ Graphs & Hypergraphs ◦ Real Analysis ◦ Discrete Mathematics & Number Theory ◦ Calculus ◦ Mathematical Logic

Industry Experience

- 2020–present R&D Consultant & Developer, ~1 month, *114 AI Innovation, New Delhi, India.*
(part-time) ◦ 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

- 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

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

Graduate-level Courses attended

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

Miscellaneous

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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 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.

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 Dr. Anshuman Gupta, VP Data Science, MiQ, Bangalore, India, ✉ anshuman@miqdigital.com.
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*While contacting the references, please prefer to use their email ids mentioned in [this document](#), since they have been verified.