Varun Gangal

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RESEARCH INTERESTS

Natural Language Processing, Social Network Analysis, Artificial Intelligence

EDUCATION

- **Indian Institute of Technology, Madras (IIT-M)** — Chennai, India
  B.Tech/M.Tech. in Computer Science and Engineering; **CGPA**: 9.27/10 — Aug. 2011 – May. 2016
  - Major: **Computer Science and Engineering**; Minor: **English Studies/Literature**
  - Key Electives: *Data Mining, Natural Language Processing, Machine Learning, Reinforcement Learning, Memory Based Reasoning in AI, Searching & Indexing in HD Datasets, Knowledge Representation & Reasoning, Distributed Algorithms, Ontologies, Graph Theory, Probability & Stochastic Processes*
  - Core Courses: *Computer Networks, Database Systems, Operating Systems, Automata Theory, Language Translators, Discrete Mathematics, Data Structures & Algorithms, Computer Organization*
  - **GRE**: 337/340 (**Quant**: 170/170 **Verbal**: 167/170 **Analytical Writing**: 5.5/6)
  - **TOEFL**: 118/120 (**Reading**: 30/30 **Writing**: 30/30 **Listening**: 30/30 **Speaking**: 28/30)
- **T.P Bhatia College of Science** — Mumbai, India
  Class XII - Maharashtra Higher Secondary Certificate Board; **Grade**: 90.67 % — May 2011
- **Ryan International School, Malad** — Mumbai, India
  Class X - Indian Certificate of Secondary Education Board; **Grade**: 96.00 % — May 2009

AWARDS & ACHIEVEMENTS

- IIT JEE, 2011: All India Rank of 623 from amongst $\cong$ 400000 students
- XRCI Research Innovation Challenge 2015: Member of one among 8 teams[1] from India invited with funding to participate in the finals of Xerox Research Innovation Challenge, co-located with XRCI Open, 2015.
- NIPS 2015, Montreal: Funded through a Joint Science Project between IIT-M and IBM Research, India to attend the conference and present the NIPS Networks Workshop paper which I co-authored.

PUBLICATIONS

- "Trust And Distrust Across Coalitions: Shapley Value Centrality Measures For Signed Networks" [2][PDF]
  Authors: Varun Gangal, Abhishek Narwekar, Balaraman Ravindran, Ramasuri Narayanam
  Accepted for **AAAI Student Abstract 2016**
- "Trust And Distrust Across Coalitions: Shapley Value Centrality Measures For Signed Networks" [PDF]
  Authors: Varun Gangal, Abhishek Narwekar, Balaraman Ravindran, Ramasuri Narayanam
  Accepted for **NIPS 2015 Workshop on Networks In the Social And Information Sciences**
- "HEMI: Hyperedge Majority Influence Maximization" [PDF]
  Authors: Varun Gangal, Balaraman Ravindran, Ramasuri Narayanam
  Accepted for **The Second IJCAI Workshop on Social Influence Analysis (SocInf 2016), New York**

RESEARCH PROJECTS

- **Shapley Value Centrality Measures For Signed Networks** — IIT Madras & IBM Research
  Mentors : Dr. Balaraman Ravindran , Dr. Ramasuri Narayanam — May 2015 – Present
  - Proposed Shapley Value based centrality measures for signed social networks. Also demonstrated that they lead to improved precision for the troll detection task. [STUDENT ABSTRACT] [LONG VERSION]
- **HEMI: Hyperedge Majority Influence Maximization** — IIT Madras & IBM Research
  Mentors : Dr. Balaraman Ravindran , Dr. Ramasuri Narayanam — February 2016 – April 2016

[1] Our team won the first round from IITM
[2] Short (2 page) version

- Extended the IC diffusion model to hypergraphs.
- Presented HEMI - a variant of influence maximization where one seeks to maximize the number of hyperedges with a majority of their incident nodes influenced.
- Proved that HEMI is not submodular. [ARXIV VERSION]

- **A Novel Regularization Scheme to Emulate Dropouts** IIT Madras
  Collaborator : Aravind Srinivas July 2015 – Present
  - Studied properties of dropouts in neural networks, in terms of their weight distributions. Aimed to construct an explicitly regularized loss function to produce a similar class of weight distributions. [EXTENDED ABSTRACT] [APPENDIX] [CODE]

- **Learning In An Ultrasmall World** IIT Madras
  Mentor : Dr. Balaraman Ravindran Jan 2015 – May 2015
  - Proposed an option construction scheme for lattice-like MDPs in reinforcement learning, inspired by the scale free property seen in social networks , reducing their diameter to $O(\ln \ln N)$. [REPORT]

- **Learning Generalizable Tensor Based Models of Meaning** IIT Madras
  Mentor : Dr. Sutanu Chakraborti Jan 2015 - May 2015
  - Studied tensor based models of meaning. Identified the need to address the added sparsity and proposed a Wordnet similarity based transfer learning scheme to overcome the same. [REPORT] [CODE]

- **Betweenness Centrality - Incremental and Faster** IIT Madras
  Mentor : Dr. Meghana Nasre Jan – May 2014
  - Implemented the Brandes algorithm for betweenness centrality, along with the proposed incremental BC algorithm, in C++. Acknowledged for contribution to the paper "Betweenness Centrality: Incremental and Faster", accepted at MFCS 2014. [CODE] [PDF]

- **Graph Similarity Search in Large Uncertain Graph Databases** IIT Madras
  Mentor : Dr. Sayan Ranu Aug – Nov 2014
  - Extended the hierarchical ClosureTree indexing structure to index uncertain graphs. Proposed five novel approaches to compute similarity to an uncertain graph. [REPORT] [CODE]

- **Building Ad Customer Profile Using ML (CUPRUM)** Bing Ads, Microsoft Bangalore
  Mentor : Prashant Rajoria May – July 2014
  - Worked on building models of various aspects of Bing advertisters such as spamminess, malware and serveability using supervised machine learning methods, based on features from their ad pages.

TEACHING EXPERIENCE

- **Teaching Assistant** **IIT Madras**
  CS5011 – Machine Learning, Prof. Balaraman Ravindran Aug – Dec 2015
  - Was involved in taking lectures, designing and evaluating assignments as well as examinations for the graduate level elective, which had over a hundred participants.

- **Teaching Assistant** **IIT Madras**
  Introduction To Machine Learning MOOC – NPTEL, Prof. Balaraman Ravindran Jan – Ongoing 2016
  - MOOC variant of the Introduction to ML course at IIT-Madras, hosted on NPTEL, a Govt. Of India MHRD supported MOOC platform.

- **Teaching Assistant** **IIT Madras**
  CS6700 – Reinforcement Learning, Prof. Balaraman Ravindran Jan – Ongoing 2016

TECHNICAL SKILLS

- **Programming Languages:** Java, Python, Matlab, C++, C
- **Tools & Libraries :** Hadoop, Spark, Theano, NetworkX, Python-igraph, Scikit-Learn, Django

CO CURRICULAR ACTIVITIES

- **Hackathons**
  - Yahoo HackU! 2013 - Part of the team which won the Budding Hackers award at the hackathon, for an application which predicted the influence of a Twitter handle. [DEMO] [CODE] [PRESENTATION]
- **Reporting & Writing**
  - Correspondent For T5E [3], 2012-2013 & 2014-2015
  - Co-Author, Immerse[4] 2015 - Authored an article on Evolutionary Game Theory. [ARTICLE]
- **Social Initiatives**
  - NSS [5] Project Representative, Wikipedia Translation to Marathi - Part of a team of 3 representatives co-guiding a team of 10 volunteers for the translation of 60 educational Wikipedia articles on science, mathematics and history from English to Marathi, my native language.

[3] IIT Madras news body
[4] IIT-M research magazine
[5] National Service Scheme, IIT Madras.