Anirban Laha

8th Floor, Block-G2, Manyata Embassy Business Park, Nagawara, Bangalore-560045, India.

(+91) 9480005065, 9686908073 | anirbanlaha@gmail.com | anirbanl.github.io | anirbanlaha | anirbanlaha

Research Interests

Machine Learning, Deep Learning, Natural Language Processing, Natural Language Generation, Graphical Models.

Education

Indian Institute of Science (IISc), Bangalore — *Bangalore, India*

MS - Research in Computer Science and Automation — *Jul. 2011 - Aug. 2013*

- *Courses*: Machine Learning, Data Mining, Probability, Linear Algebra, Optimization, Game Theory.
- *Thesis Topic*: "Machine Learning and Rank Aggregation Methods for Gene Prioritization from Heterogeneous Data Sources". Link.
- *Advisor*: Dr. Shivani Agarwal.

Jadavpur University, Kolkata — *Kolkata, India*

BE in Computer Science and Engineering - 9.05/10 — *Jul. 2006 - Apr. 2010*

- *Final Year Project*: "Solving the Single-Source Shortest Path Problem for Dynamic Graphs".

Work Experience

IBM Research AI — *Bangalore, India*

Research Software Engineer — *November 2015 - PRESENT*

- *Research Projects*:
  1. **Natural Language Generation (NLG)** - Applications of seq2seq methods for structured data summarization and query-based abstractive summarization; Sparse attention models for enhancing interpretability through explicit controls.
  2. **IBM Project Debater** - Led the deep learning based efforts. Sequence classification used for claim and evidence detection in argument mining; Punctuation and Case prediction for unformatted ASR output produced from human debate recordings.
  3. **Machine Learning for Creativity** - Story generation from incoherent descriptions; ML Framework for evaluating creativity.

Microsoft IDC (AdCenter) — *Bangalore, India*

Applied Scientist — *Aug. 2013 - Nov. 2015*

- *Project*: Experimentation of new Click Prediction models for Ads Optimization in Microsoft Bing Ads for US and INTL Markets.
- *Domain*: Machine Learning, Information Retrieval, Ranking, Map-Reduce.

Amazon.com — *Chennai, India*

Software Development Engineer — *May. 2010 - Jul. 2011*

- *Project*: Development of automated real-time scalable Pricing System for Amazon Kindle eBooks for markets like US, UK and DE.

Selected Research Publications

1. Laha A., Chemmengath S.A., Agrawal P., Khapra M., Sankaranarayanan K., Ramaswamy H.G. (2018). *On Controllable Sparse Alternatives to Softmax*. In **Neural Information Processing Systems (NeurIPS/NIPS), 2018**.
2. Nema P., Khapra M., Laha A., Ravindran B. (2017). *Diversity driven Attention Model for Query-based Abstractive Summarization*. In **Association for Computational Linguistics (ACL) 2017**.
3. Pahuja V.[†], Laha A.[†], Mirkin S., Raykar V., Kotlerman L., Lev G. (2017). *Joint Learning of Correlated Sequence Labelling Tasks Using Bidirectional Recurrent Neural Networks*. In **INTERSPEECH 2017**. [†]Equal Contribution.
4. Laha A. and Raykar V. (2016). *An Empirical Evaluation of various Deep Learning Architectures for Bi-Sequence Classification Tasks*. In **International Conference on Computational Linguistics (COLING) 2016**.
5. Nema P., Shetty S., Jain P., Laha A., Sankaranarayanan K. and Khapra M. (2018). *Generating Descriptions from Structured Data Using a Bifocal Attention Mechanism and Gated Orthogonalization*. In **NAACL-HLT, 2018**.
6. Jain P., Laha A., Sankaranarayanan K., Nema P., Khapra M. and Shetty S. (2018). *A Mixed Hierarchical Attention based Encoder-Decoder Approach for Standard Table Summarization*. In **NAACL-HLT** (Short), **2018**.

Highlights

- **PC member** of NAACL-HLT 2019, ACL 2018 and COLING 2018 and **Reviewer** for AAAI 2019, NIPS 2018, NIPS 2017, and VLDB 2017.
- IBM Research - India **Distinguished Paper Award** for the year 2017 (paper published at ACL 2017).
- Part of IBM Project Debater team which received news coverage for a **live machine vs human debate** (NYT | Forbes | The Guardian).
- **RANK 1** in the research interviews of IISc, Bangalore (2011) - Link. | **All-India Rank 82** in GATE CS 2010 (out of 107086 - 99.92 percentile).
- **RANKED in Top-3** during BE in Computer Science department of Jadavpur University, Kolkata (2010).
- Awarded the prestigious **Jagadish Bose National Science Talent Search** Senior Scholarship in 2006.

Invited Talks and Tutorials

- [*07 Mar, 2018*] **Generating Natural Language Descriptions from Structured Data**. Venue: IBM Research-IISc Workshop on Knowledge and Learning on March 07, 2018 organised at IISc. Details: Link.
- [*20 Jan, 2018*] **Tutorial on Natural Language Processing and Generation**. Venue: Technical Talk on the broader theme of 'Cognitive Analytics and NLP' as part of the annual science and cultural fest at IISc, Bangalore.

Other Publications/Patents

- Laha A., Jain P., Mishra A., Sankaranarayanan K. (2018). *Scalable Micro-planned Generation of Discourse from Structured Data*. In **arXiv**.
- Surya S., Mishra A., Laha A., Jain P., Sankaranarayanan K. (2018). *Unsupervised Neural Text Simplification*. In **arXiv**.
- Shrivastava D., Chemmengath S.A., Laha A., Sankaranarayanan K. (2017). *A Machine Learning Approach for Evaluating Creative Artifacts*. In **SIGKDD Workshop on Machine Learning for Creativity (ML4Creativity), 2017**.
- Jain P., Agrawal P., Mishra A., Sukhwani M., Laha A., Sankaranarayanan K. (2017). *Story Generation from Sequence of Independent Short Descriptions*. In **SIGKDD Workshop on Machine Learning for Creativity (ML4Creativity), 2017**.
- Laha A., Dey P., Bandyopadhyay S., Mukherjee S., Vallam R.D., Garg D., Ray R., Narahari Y. (2012). *Prediction Markets: Connections with Proper Scoring Rules*. **Technical Report**.
- Mukherjee S., Roy B., Laha A. (2010). *An Efficient Cryptographic Hash Algorithm (BSA)*. In **National Workshop on Cryptology, 2010**.
- **Inventor of FOUR patents** filed by IBM at the US Patents and Trademarks Office (USPTO).

Selected Research Projects

- **Controllable Sparse Alternatives to Softmax**: We study techniques for converting a real vector to a probability distribution. We propose a unified framework which leads to understanding of existing approaches incl. softmax. Our framework also enables providing explicit controls to vary sparsity of the output distribution. Additionally, our proposed convex loss functions enable achievement of greater sparsity for multi-label classification task. We also show encouraging results for sparse attention in NLG tasks. NIPS '18 Paper.
- **Structured Data to Text Generation**: This can be categorized into two paradigms - (a) Supervised End-to-end attention based seq2seq approaches for summarization of tabular data (NAACL '18 Paper 1, Paper 2), and (b) Unsupervised coherent description generation from tabular data, in a way that is scalable and adaptable to newer domains and does not require parallel data arXiv.
- **Query-based Abstractive Summarization**: In this work, we propose a model for the query-based summarization task based on the encode-attend-decode paradigm with two key additions (i) a query attention model (in addition to document attention model) which learns to focus on different portions of the query at different time steps (instead of using a static representation for the query) and (ii) a new diversity based attention model which aims to alleviate the problem of repeating phrases in the summary. ACL '17 Paper.
- **Sequence classification used for claim and evidence detection in argument mining**: We empirically evaluated multiple RNN and CNN architectures for bi-sequence classification and applied them for context-based claim and evidence detection. COLING '16 Paper.
- **Punctuation and Case prediction for ASR output**: Automatic Speech Recognition (ASR) engines are good at recognizing words from human speech; however, the output from ASR needs to be formatted with punctuation and case to be useful for downstream NLP tasks. In this work, we employed a multi-task approach to simultaneously produce punctuation and casing labels for a stream of words. This solution enabled mining of claims and evidences from human debate recordings. INTERSPEECH '17 Paper.
- **Story generation from incoherent descriptions** : We proposed the new task of generating a coherent story from disconnected text snippets. For this, we implement an RNN based encoder-decoder solution to produce comprehensive coherent story. Paper.
- **ML Framework for evaluating creativity**: We identified important metrics for measuring creativity and proposed a regression-based learning framework for evaluating these metrics and combining them to produce a creativity score for an artifact. Paper.
- **Gene Prioritization from Heterogeneous Data Sources**: In this work, we use graph-based learning-to-rank methods to learn a ranking of genes from each individual data source represented as a graph, and then apply rank aggregation methods to aggregate these rankings into a single ranking over the genes. | *Advisor*: Dr. Shivani Agarwal. MS Thesis.
- **Investigation of the incentive compatible scoring rules for prediction markets**: We applied Prediction Markets in IISc Prediction League (to predict winners of DLF Indian Premier League 2012), an IISc-wide web application based on open-source Zocalo framework | *Advisor:* Prof. Y. Narahari. Project Report.

Organizational Activities

- **PC member** of SIGKDD Workshop on Machine Learning for Creativity (ML4Creativity), 2017.
- **Co-organizer** of TagMe 2014, a nation-wide Machine Learning Contest (organized by IISc Bangalore and Microsoft).
- **Lead Organizer** of TwitMiner 2013, a nation-wide Machine Learning Contest (organized by IISc Bangalore and Amazon.com).

References

1. Dr. **Karthik Sankaranarayanan** (Senior Researcher and Research Manager, IBM Research - India), kartsank@in.ibm.com.
2. Dr. **Mitesh M. Khapra** (Assistant Professor, CSE, Indian Institute of Technology (IIT), Madras), miteshk@cse.iitm.ac.in.
3. Dr. **Vikas C. Raykar** (Senior Researcher, IBM Research - India), viraykar@in.ibm.com.
4. Dr. **Shivani Agarwal** (Rachleff Family Associate Professor, University of Pennsylvania), ashivani@seas.upenn.edu.
5. Prof. **Y. Narahari** (Professor, CSA, Indian Institute of Science (IISc), Bangalore), hari@csa.iisc.ernet.in.