Abhinav Maurya

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Research Interests

Artificial Intelligence, Machine Learning, Data Science, Computational Social Science, Technology Policy

Education

Carnegie Mellon University, Pittsburgh

Dual Ph.D. (Machine Learning, Public Policy) — *June 2018–July 2019 (expected)*

M.S. (Machine Learning) — *Dec 2018*

Ph.D. (Information Systems) — *Aug 2013–June 2018 (transferred)*

- ◇ **Thesis:** Essays on Machine Learning and the Future of Work
- ◇ **Relevant Courses:** Introduction to Machine Learning, Statistical Machine Learning, Topics in Deep Learning, Probabilistic Graphical Models, Convex Optimization, Computer Vision
- ◇ **Teaching Assistant:** Introduction to Machine Learning, Machine Learning for Large Datasets

IIT Bombay, Mumbai

M.Tech. (Computer Science and Engineering) — *Aug 2010–July 2012*

- ◇ **Thesis:** Machine Learning Algorithms for Traffic State Classification in WirelessAcrossRoad
- ◇ **Relevant Courses:** Artificial Intelligence, Advanced Machine Learning, Topics in Machine Learning, Advanced Computer Networks, Seminar in Data Center Systems
- ◇ **Teaching Assistant:** Introduction to Machine Learning, Advanced Machine Learning

University of Mumbai (VJTI), Mumbai

B.Tech. (Computer Science and Engineering) — *Aug 2004–May 2008*

- ◇ **Relevant Courses:** Intelligent Systems, Advanced Databases, Distributed Computing

Professional Experience

Microsoft Corporation, Redmond

Software Development Engineer — *Oct 2012 – Aug 2013*

- ◇ **Project:** Microsoft Bing's 2013 infrastructure refresh in the core search and relevance team.

Research Publications

- ◇ Bayesian Multi-View Models for Member-Job Matching and Personalized Skill Recommendations. Abhinav Maurya, Rahul Telang. *IEEE International Conference on Big Data 2017 (acceptance rate: 17.8%, awarded student travel grant). 2017 INFORMS Social Media Section's Best Paper Award Runner-up.*
- ◇ Bayesian Optimization for Predicting Rare Internal Failures in Manufacturing Processes. Abhinav Maurya. *IEEE International Conference on Big Data 2016 (acceptance rate:* 18.7%*). Winner of IEEE BigData 2016 travel grant sponsored by Robert Bosch Gmbh.*
- ◇ Contrastive Structured Anomaly Detection for Gaussian Graphical Models. Abhinav Maurya, Mark Cheung. *ICML 2016 Workshop on Anomaly Detection. IEEE/ACM ASONAM 2018.*
- ◇ A Lens into Employee Peer Reviews via Sentiment-Aspect Modeling. Abhinav Maurya, Leman Akoglu, Ramayya Krishnan, Daniel Bay. *IEEE/ACM ASONAM 2018.*
- ◇ Semantic Scan: Detecting Subtle, Spatially Localized Events in Text Streams. Abhinav Maurya, Kenton Murray, Yandong Liu, Chris Dyer, William W. Cohen, Daniel B. Neill. *Technical Report: [arXiv:1602.04393]. Winner of seventh Yelp dataset challenge.*
- ◇ Road-RFSense: A Practical RF-Sensing Based Road Trafc Estimation System for Developing Regions. Rijurekha Sen, Abhinav Maurya, Bhaskaran Raman, Amarjeet Singh, Rupesh Mehta, Ramakrishnan Kalyanaraman. *ACM Transactions on Sensor Networks, 2014.*
- ◇ Kyun Queue: A Sensor Network System to monitor Road Traffic Queues. Rijurekha Sen, Abhinav

Maurya, Bhaskaran Raman, Rupesh Mehta, Ramakrishnan Kalyanaraman, Nagamanoj Vankadhara, Swaroop Roy, Prashima Sharma. *ACM Conference on Embedded Networked Sensor Systems, 2012 (acceptance rate:* 18.7%*).*

Working Papers

- ◇ Optimal Transport Embeddings for Understanding Jobs, Skills, and their Relationships in the Labor Market. Abhinav Maurya.
- ◇ Spike-and-Slab Hierarchical Dirichlet Process: A Sparse Nonparametric Admixture Model for Discovering Interdisciplinary Members and Jobs. Abhinav Maurya.
- ◇ Understanding Human-AI Work Synergies using a Randomized Field Study. Abhinav Maurya, Sunder Kekre, Rahul Telang. *AAAI HCOMP 2018 Doctoral Consortium.*
- ◇ Gender Disparities in Tech: Evidence and Insights from Employee Performance Evaluations and Peer Reviews. Abhinav Maurya, Alexandra Chouldechova, Rahul Telang.

Selected Presentations

- ◇ Understanding Job-Skill Relationships using Big Data and Neural Networks. *Bloomberg Data for Good Exchange 2018.*
- ◇ Bayesian Multi-View Models for Member-Job Matching and Personalized Skill Recommendations. *Institute of Labor Economics (IZA) 2018 Workshop on Matching Workers and Jobs Online.*
- ◇ Making Personalized Skill Recommendations using Bayesian Member-Job Matching. *Invited presentation at INFORMS 2016 session on Data Analytics and Machine Learning. Poster presented at Amazon Graduate Research Symposium 2017, CMU Innovation with Impact Exhibition 2017, and the International Society for Business and Industrial Statistics (ISBIS) Annual Meeting 2017.*

Honours, Awards and Service

- ◇ Invited talk at MIT Sloan School of Management (2019).
- ◇ Invited public policy seminar at Burning Glass Technologies, a job market analytics firm (2019).
- ◇ Awarded the LinkedIn economic graph challenge grant in 2015 ($25,000).
- ◇ Winner of Yelp's seventh dataset challenge in 2015 ($5,000).
- ◇ Tepper-sponsored Dempo fellowship for research on the future of digital work in 2017-2018 ($18,000).
- ◇ Awarded a travel grant by Robert Bosch Gmbh for attending IEEE BigData 2016 ($2,000).
- ◇ CMU's Social Innovation Fellowship 2017.
- ◇ Awarded a computing resources grant by Microsoft Azure for Research.
- ◇ INFORMS 2016 Service Science Cluster Best Paper Award Runner-up.
- ◇ INFORMS 2017 Social Media Section's Best Paper Award Runner-up.
- ◇ Invited presentation at the INFORMS 2016 session on Data Analytics and Machine Learning.
- ◇ All India Rank 46 (99.95 percentile) in Graduate Aptitude Test in Engineering for Computer Science (GATE-CS) 2010.
- ◇ JRD Tata Scholarship for academic excellence awarded in years 2006, 2007, and 2008.
- ◇ Reviewer for ACM RecSys (2018), ACM SIGKDD (2018), ACM ToSN (2015), ASONAM (2018), EJOR (2018), EMNLP (2018), HICSS (2018), ICIS (2017), etc.

Skill Set

Python, R, C, C++, Java, Scala

Understanding Human-AI Work Collaboration using a Randomized Field Study

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Rahul Telang[1,3] RTELANG@ANDREW.CMU.EDU
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[2]*Machine Learning Department, School of Computer Science*
[3]*Tepper School of Business*
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Abstract

With increasing adoption of artificial intelligence technologies, there is a growing interest in understanding effective strategies for human-AI collaboration in the workplace. In this paper, we investigate whether human workers carrying out natural language data annotation tasks can perform better if aided with data-driven annotation recommendations from an ensemble of machine learning models. Our randomized experimental study uses a common natural language processing task called named entity tagging. Annotators in the treatment group are provided highlighted named entity suggestions in the text they are annotating, whereas those in the control group are not. The treatment group significantly outperforms the control group on evaluation metrics such as precision, recall, and throughput, indicating that humans are successfully able to incorporate AI suggestions in completing their work. The treatment group evaluation metrics also outperformed those of the ensemble machine learning model providing the suggestions. A careful analysis revealed that AI suggestions were more accurate than human annotations (control group) in the regime of shorter named entities, whereas humans performed better than automated suggestions in the regime of longer named entities. The treatment group effectively accepted the AI suggestions in the former regime and corrected AI mistakes in the latter regime, thereby surpassing the performance of either AI or human alone.

Keywords: Future of Work; Artificial Intelligence; Intelligent Augmentation; Human-AI Collaboration; Natural Language Processing; Data Annotation Services