RISHABH MISRA

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Extensive engineering experience in shipping low-latency massive-scale ML models to production. Published and refereed publications at top ML conferences like ICML, KDD, ACL, & WSDM, and co-author of the book Sculpting Data for ML. Experienced in research and engineering aspects of Recommender Systems, NLP & Deep Learning domains.

Education

University of California, San Diego — *La Jolla, CA*

Master of Science - Computer Science (Artificial Intelligence specialization), GPA: 3.93/4.0 — *June 2018*

Thapar University — *Patiala, India*

Bachelor of Technology - Computer Engineering, GPA: 9.88/10.0, Rank 1, Gold Medalist. — *July 2015*

Experience

Attentive Mobile — *San Francisco, CA*

Lead Machine Learning Engineer — *2023 - Present*

- ML Tech Lead of foundational team driving 0 to 1 Deep Learning-based personalization efforts for Conversational Commerce (marketing relevant products through text/email).
  - Bringing in state-of-the-art Deep Learning optimization techniques to develop Two-tower based personalization model from scratch that helps 8,000+ leading brands boost their sales and loyalty.
  - Technical leadership in defining long-term technical strategy for personalization, positioned to drive key business outcomes and working cross-functionally to support product success.
  - Driving large-scale data-driven analyses, model architecture and optimization iterations, model validation, and model deployment in a scalable manner to hundreds of millions of end users.
- Technologies: Python, PyTorch, Ray, Metaflow, Argo, Kubernetes, AWS Technologies, Snowflake

Twitter — *San Francisco, CA*

Senior Machine Learning Engineer — *2019 - 2023*

- One of the founding engineers of the Reply Feed Ranking team that applies ML and NLP to drive meaningful conversations across Twitter. Also shared time working on Twitter's Home Feed Ranking to personalize user experience and recommend relevant tweets.
  - Shipped graph embeddings (based on Heterogeneous Information Network) and text embeddings (based on fine-tuned BERT), among other sophisticated features to encode users' preferences and author's affinity. Drove >30% gains in key engagement metrics over tenure.
  - Built Deep Learning models to predict various engagements to promote more engaging content and personalize user experience. Drove the progression from shallow models to deep models to multi-task learning architecture.
  - Architected a low-latency Early Ranking system using ML signals to scale the ranking service to systematically handle the ranking of tens of millions of candidates per second. This led to a 20% gain in p9999 latency while improving product health metrics by 5% overall.
  - Drove modernization of training and deployment stack by architecting KubeFlow pipelines to train next-generation native Tensorflow models. Utilized GCP technologies like DataFlow and BigQuery to improve end-to-end model training duration by 10x.
  - Built roadmaps guided by data-backed analyses & shipped measurement frameworks to quantify key product metrics improvements.
- Technologies: Python, Java, Scala, Tensorflow, Airflow, Kubeflow, BigQuery, DataFlow, Google Cloud Platform (GCP), Scalding.

Amazon — *Seattle, WA*

Software Development Engineer — *2018 - 2019*

- Worked in Amazon Global that enables customers to buy products internationally based on export eligibility.
  - Improved the infrastructure scalability by designing solutions using Native AWS technologies.
  - Conducted experiments to improve the eligibility prediction of products using Machine Learning models.
  - Assisted courses taught in Amazon's Machine Learning University.
- Technologies: AWS Technologies, Java, Python, Jupyter Notebook.

McAuley Lab at UC San Diego — *La Jolla, CA*

Graduate Researcher — *2017 - 2018*

- Worked under the guidance of Prof. Julian McAuley towards several novel user behavior modeling and NLP problems.
  - Product size recommendation: Proposed a framework based on Latent Factor Model and Metric Learning to predict fit of different catalog sizes of clothing products. Contributed a public dataset and improved upon an algorithm developed by Amazon by 18%.
  - Fine-Grained Spoiler Detection: Developed a Hierarchical RNN architecture to detect spoiler sentences in review corpora we collected as part of this work. Attention mechanism in the architecture reveals interesting spoiler cues. We beat strong baselines by 3%.
  - Addressing Marketing Bias in Product Recommendations: Developed a framework to address potential marketing bias that significantly improves the recommendation fairness across different market segments, with a negligible loss (or better) recommendation accuracy.

Amazon *Seattle, WA*

Software Development Engineering Intern *2017*

- Worked in the DataForge team that provides a platform for smartly scheduling Big Data operational workloads within SLAs.
  - Designed support for primary key constraint and batch inserts/updates, using append-only table and multi-version concurrency control concepts, while ensuring consistent reads in Hive.
  - Support for transactional operations in Hive.
  - Support for compaction (carefully discarding old data) without blocking other operations.
- Technologies: Java, Hive, DynamoDB.

Arcesium (A D.E. Shaw Company) *Hyderabad, India*

Software Engineer *2015 - 2016*

- I worked in the Arcesium/Tech division's "Straight Through Processing" team. Some of my important responsibilities include:
  - Adding support for self-sanitization, self-recovery and fault tolerance in the new infrastructure built using JAVA.
  - Adding a self-aware triggering mechanism for Blotters, greatly minimizing data completeness issues.
  - Profiling and optimizing (around 40%) code (using concurrency) and database (using index and partitions).
- Technologies: Java, Spring, MyBatis, SQL Server.

Research Publications

650+ citations as of May 2024 on Google Scholar.

- **Keeping it Low-Key: Modern-day approaches to Privacy-Preserving Machine Learning**: Book Chapter by Jigyasa Grover* and Rishabh Misra*, published in Springer book "Data Protection in a Post-Pandemic Society - Law Regulations, Best Practices and Recent Solutions", ISBN 978-3-031-34006-2. Jul. 2023. *equal contribution
- **Sarcasm Detection using News Headlines Dataset**: Rishabh Misra, Prahal Arora, in Proceedings of journal AI Open, Volume 4, 2023, ISSN 2666-6510, https://doi.org/10.1016/j.aiopen.2023.01.001, Feb. 2023.
- **Do not fake it till you make it! - Synopsis of trending fake news detection methodologies**: Book Chapter by Rishabh Misra and Jigyasa Grover, published in book "Deep Learning for Social Media Data Analytics" of Springer book series "Studies in Big Data", ISBN: 978-3-031-10868-6 Sep. 2022.
- **Sculpting Data for ML: The first act of Machine Learning**: Book by Jigyasa Grover* and Rishabh Misra*, Jan. 2021. Independently published. ISBN-13: 979-8585463570. *equal contribution
- **Addressing Marketing Bias in Product Recommendations**: Mengting Wan, Jianmo Ni, Rishabh Misra, Julian McAuley, in Proceedings of 2020 ACM Conference on Web Search and Data Mining (WSDM'20), Houston, TX, USA, Feb. 2020.
- **Fine-Grained Spoiler Detection from Large-Scale Review Corpora**: Mengting Wan, Rishabh Misra, Ndapa Nakashole, Julian McAuley, in Proceedings of 57th Association for Computational Linguistics 2019 (ACL'19), Florence, Italy, Jul. 2019.
- **Hotel recommendation system**: Aditi A Mavalankar*, Ajitesh Gupta*, Chetan Gandotra*, Rishabh Misra*, arXiv preprint arXiv:1908.07498 (2019). *equal contribution
- **Decomposing Fit Semantics for Product Size Recommendation in Metric Spaces**: Rishabh Misra, Mengting Wan, Julian McAuley, in Proceedings of 2018 ACM Conference on Recommender Systems (RecSys'18), Vancouver, Canada, Oct. 2018.
- **Scalable Variational Bayesian Factorization Machine**: Avijit Saha, Rishabh Misra, Ayan Acharya, and Balaraman Ravindran, preprint 2017.
- **Scalable Bayesian Matrix Factorization**: Avijit Saha*, Rishabh Misra*, Balaraman Ravindran, In Proceedings of 6th International Workshop on Mining Ubiquitous and Social Environments (MUSE), co-located with the ECML PKDD 2015. *equal contribution

Dataset Publications

120k+ downloads on Kaggle; Used in DeepLearning.AI's "Natural Language Processing in TensorFlow" course on Coursera & Youtube (taken by 300k+ people to date). Featured in best selling book AI and Machine Learning for Coders.

- **Politifact Fact Check Dataset**: Misra, Rishabh, DOI: 10.13140/RG.2.2.29923.22566 (2022).
- **IMDB Spoiler Dataset**: Misra, Rishabh, DOI: 10.13140/RG.2.2.11584.15362 (2019).
- **News Headlines Dataset**: Misra, Rishabh, DOI: 10.13140/RG.2.2.16182.40004 (2018).
- **News Category Dataset**: Misra, Rishabh, DOI: 10.13140/RG.2.2.20331.18729 (2018).
- **Clothing Fit Dataset for Size Recommendation**: Misra, Rishabh, DOI: 10.1145/3240323.3240398 (2018).

Research Committees

Invited Program Committee Member at some of the leading research conferences

- TheWebConf 2024, CIKM 2023, TheWebConf 2023, ICML 2022, SIGKDD 2022, SIGIR {2023, 2022}, ICDM 2022, RecSys 2022, ECML-PKDD 2022, ICWSM {2023, 2022}, TORS 2022.

Other Notable Achievements

Blogs	*Machine Learning blogs on Towards Data Science online publication have been seen by 135k+ people. Additionally, content on personal website has been viewed 85k+ times by people from 169 countries.*
Media Coverage	*Spoiler Detection research featured in TechCrunch, Gizmodo, Times of India, NBC, Geek.com, TechXplore, and UC News. which have up to ∼ 148M monthly readership.*
Expert Commentary	*Various news media outlets published my thoughts on the impact of AI on various domains: Rise of AI bots, Future of AI in acting, AI tools for art generation, Workings of DALL-E, AI changing Art Industry, and so on.*
Patents	*Two US patents from work at Twitter, with application numbers 63/267,780 and 63/362,556, are under review.*
Scholarships/Awards	*Python Software Foundation Grant (2x), Merit scholarships throughout 4 years of undergraduate education, University Medal, Summer Fellowship from Indian Institute of Technology, Madras, Yuuvis SF Hackathon Winner.*
Conference Talks	*Coalesce, PyCon US, RVA Tech Data Summit, Re-Work Enterprise AI Summit, All Things Open (+ book signing), LeadDev Live, ML Conference, ACM Conference on Recommender Systems, This Week in ML & AI*