Sanaz Bahargam

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Expertise

◇ Natural language processing, Large Language Models, Deep Learning, Machine Learning, Representation Learning, Personalization, Ranking, Generative AI for NLP

Work Experience

◇ **Amazon Lab126, Alexa (NLP team)** — *Sunnyvale, CA*
Tech Lead Manager, L6, Applied Scientist — *2021 - Present*

- Worked as a Tech lead on cross-functional NLP projects to improve Alexa's performance, measure the impact of initiatives on customer satisfaction, and enable new capabilities (e.g. multi-turn conversations, long interactive dialogues and transaction-based dialogues) within Alexa
- Delivered improvements to a wide range of metrics including accuracy (15% increase), latency (30% decrease), training time (>50% decrease), and user satisfaction metrics
- Migrated NLU models to generative models (using transfer-learning to enable few-shot learning), resulting in 15% increase in e2e accuracy, reduce training time and GPU cost by 8x, and enabled new skills such as food-ordering and ticket reservation
- Worked on creating automatic metrics (e.g. accuracy of intent/slots, quality of dialog, user satisfaction) for Alexa dialogs
- Worked with a team of engineers, product managers, and leadership to define the long-term team's vision, roadmap and strategy
- Set the technical & process direction for the team based on business goals and fostered partnership with stakeholders and XFNs
- Identified potential high-value applications of Transformer-based Models, Transfer Learning, and Multi-Task Learning and built NLP models to reduce customer friction and reduce time needed to onboard developers
- Mentored and managed engineers, provided technical guidance, planned career growth and promotions

◇ **Twitter** — *San Francisco, CA*
Machine Learning Engineer, L6, Teach Lead — *2017 - 2021*

- Worked as a Tech Lead to improve Search, Trend and Explore (5M increase in Trends' DAU)
- Developed different ranking loss methods instead of point-wise techniques for Search and Trends result pages, achieved 10% increase in click-through rate and 2% decrease in Tweets' reports
- Redesigned the Trend service (through multiple A/B testings) to extend Trends from 20 to >60 countries
- Launched embedding-based models for related searches and Trends recommendation
- Initiated the representation-learning task force for Search, Trends and Events ranking and recommendation
- Developed generative summarization (encoder-decoder model) to summarize Tweets of the same Trend
- Developed and owned metrics/pipelines to measure Explore and Trends products safety (abuse, spam)
- Worked with human computation team (designed experiments/guidelines) to evaluate the Trends' safety

◇ ***Stevens Institute of Technology*** — Hoboken, NJ
Researcher and Data Science Instructor — *May 2016 - Sept. 2016*

- Analysis of User Behavior in Online Forums
- Studying who is dedicated to his career? A case study of career development in LinkedIn
- Taught data science course with python including fundamental ML and advanced neural networks

◇ ***128 Technology (acquired by Juniper Networks)*** — Burlington, MA
Data Science Intern — *May 2015 - Sept. 2015*

- Worked on using machine learning for traffic modeling and traffic congestion avoidance

◇ ***Data Mining and Machine Learning Group, Boston University*** — Boston, MA
Research Assistant — *2011 - 2017*

Worked on machine learning research projects including: constrained tensor/matrix factorization, combinatorial optimization, constrained clustering problems, neural networks

◇ ***Parse CO*** — Iran
Software Engineer — *May 2010 - Aug. 2011*
Software Engineer Intern — *June 2009 - Oct. 2009*

Skills

◇ Strong knowledge of NLP, DL, ML, Transfer Learning, LLM, Personalization, Recommendation, Ranking

- DL Frameworks: PyTorch, Transformer-based models, Hugging Face, PyTorch Lightning, TensorFlow
- Programming: Python, Scala, SQL others: GCP, BigQuery, Hadoop, MapReduce, Java, C/C++, Matlab, R

Education

- **Boston University** — Boston, MA
  Ph.D. in Computer Science — *2011 - 2017*
  Thesis: *Machine Learning Approaches to Educational Applications*
  Selected Course Work: Machine Learning, NLP, Data Mining, Data Science Tools, Statistical Thinking for Data Science, Analysis of Algorithms, Complexity, Randomized Algorithm
- **Shariaty University** — Tehran, Iran
  B.Sc. in Computer Science — *2006 - 2010*

Speaking Engagements

- **Deep Learning in Industry** - University of Colorado Boulder, 2022
- **Machine Learning for Search and Recommendation** - Debug Summit 2021
- **Alexa Conversations** - NLP Summit 2021
- **Machine Learning for Recommendations and Ranking** - Saint Louis University, 2021
- **Task-based Dialog Systems** - Global Artificial Intelligence Conference, 2020
- **Trend/Event Detection and Recommendation @Twitter** - Lyft meetup 2020

Services

- **PC member:** WIT 2021, NAACL 2019, ICML 2019, TKDE 2018, WiML2017
- **External Reviewer:** KDD 2019, ICDE 2018, KDD-2017, WWW-2017, WSDM-2017, TKDE 2017, ICDM-2016, CIKM-2016, WWW-2016, INFORMS Journal on Computing (IJOC)-2016
- **Interactive Grounded Language Understanding competition @ NeurIPS, Mentor and Judge** *2022*
- **Girls Who Code, Organizer and Speaker** — Twitter, *2018, 2019*
- **Inclusion and Diversity committee member** — Twitter, *2018-2021*
- **Organizer for CS Open Houses and Student Ambassador** — Boston University, *2013-2017*

Selected Publications

- Pre-training Strategies for Enhanced Cross-Domain Generalization in Task-Oriented Dialog Systems. *Under submission*
- ***S. Bahargam***, *B. Golshan, T. Lappas, E. Terzi.*
  A team formation algorithm for faultline minimization. *Expert Systems w Applications 2019*
- ***S. Bahargam***, *T. Lappas, E. Terzi.*
  Guided Team-Partitioning Problem: Definition, Complexity & algorithms. *EDM 2019.*
- ***S. Bahargam***, *E Papalexakis.*
  Constrained Coupled Matrix-Tensor Factorization and its Application in Pattern and Topic Detection. *IEEE/ACM International ASONAM 2018*
- ***S. Bahargam***, *E Papalexakis.*
  A Constrained Coupled Matrix-Tensor Factorization for Learning Time-evolving and Emerging Topics. *arXiv*
- ***S. Bahargam***, *E Papalexakis.*
  Discovering Time-Evolving Topics of Varying Levels of Difficulty via Constrained Coupled Matrix-Tensor Factorization. *IC2S2 2018*
- ***S. Bahargam***, *D. Erdos, A. Bestavros, E. Terzi.*
  Team Formation for Scheduling Educational Material in Massive Online Classes. *arXiv*
- ***S. Bahargam***, *T. Lappas.*
  Profiling the Different Types of Data Scientists: Which One is Right for You? *Poster in Winter Conference on Business Intelligence 2016*
- ***S. Bahargam***, *D. Erdos, A. Bestavros, E. Terzi.*
  Personalized Education; Solving a Group Formation and Scheduling Problem for Educational Content. *EDM 2015*
- *R. Skowyra,* ***S. Bahargam****, A. Bestavros.*
  Software-Defined IDS for Securing Embedded Mobile Devices. *IEEE HPEC 2013*
- *S. Mirzaei,* ***S. Bahargam****, R. Skowyra, A. Kfoury, A. Bestavros.*
  Using Alloy to Formally Model and Reason About an OpenFlow Network Switch. *Technical Report 2013*
- *A. Lapets, R. Skowyra, C. Bassem,* ***S. Bahargam****, A. Bestavros, A. Kfoury.*
  Towards Accessible Integrated Formal Reasoning Environments for Protocol Design. *Technical Report 2012*