SHIKHAR SHARMA

Principal Software Development Engineer, Microsoft

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SUMMARY STATEMENT

As an engineer with over a decade of deep learning expertise, I've spearheaded machine learning teams towards the successful completion of groundbreaking projects. My forte lies in developing innovative tools that harness machine learning and artificial intelligence to boost inspiration, productivity, and capabilities. I possess a keen interest in the application of large-scale neural network architectures, particularly those enhanced by memory and attention mechanisms. During the course of my career, I have also had the opportunity to lead a team of exceptional machine learning engineers and supervise a number of outstanding interns.

EDUCATION

| University of Toronto M.Sc. in Computer Science with the Deep Learning and Machine Learning group Thesis title: Action Recognition and Video Description using Visual Attention Thesis supervisor: Prof. Ruslan Salakhutdinov | 2014 - 2016 GPA: 3.83/4 |
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| Indian Institute of Technology (IIT), Kanpur B.Tech. in Computer Science Thesis title: Speech Recognition using Deep Belief Networks and Hidden Markov Me Thesis supervisor: Prof. Harish Karnick | 2010 - 2014 GPA: 9.3/10 odels |

EXPERIENCE

Maluuba

Research Scientist

| Microsoft | Toronto, Ontario, Canada |
|---------------------|--------------------------|
| Principal SDE | 2024 - Present |
| Senior Research SDE | 2019 - 2024 |
| Research SDE II | 2017 - 2019 |

[Bing Multimedia] I built the first LLM-based offline evaluation metric for Bing's Image Feed. I was then made Tech Lead for the Ranking team consisting of 6 ML engineers. Under my leadership, we migrated the ranking stack from traditional ML models to deep learning based ones. We deployed and maintained rankers for both the Image Feed and Related Content products, commanding a Daily Active User (DAU) of millions of users.

[**Turing**] I worked across several Microsoft products leveraging AI. The highlight was my work on Sydney a.k.a. Microsoft Copilot's defensive classifier, making it capable of handling conversational context leading to a 10% increase in conversation length, 27% drop in offensiveness, 50% drop in compute requirement. I also worked on long-horizon projects such as high-quality image synthesis for user search queries.

[Weather Forecasting] I was one of the early deep learning advisors and contributors to the precipitation nowcasting product which is now deployed at Microsoft Weather in North America and Europe and boasts millions of users.

[Microsoft Research] My research focused on image synthesis using captions, conversations, and spatial layouts. I expanded my prior dialogue research to multi-modal dialogue systems. My research agenda at MSR led to several publications at top conferences. Part of my time was devoted to integrating state-of-the-art research into Microsoft products among which the most prominent partnership was with Microsoft Support on their query understanding system.

Montreal, Quebec, Canada 2016 - 2017

At Maluuba I worked with the dialogue group on task-oriented dialogue systems. My work resulted in 2 patents

and 4 publications. Part of my work focused on improving natural language generation using recurrent neural networks and utilizing unsupervised metrics for their evaluation. The Maluuba/nlg-eval GitHub repository for which I was the main contributor boasts 1300+ stars and 200+ forks. I also worked on the collection and release of the Frames dataset, which was the largest multi-frame task-oriented dialogue dataset at the time. Subsequently, I worked on end-to-end trainable models for it. Maluuba was acquired by Microsoft in 2017.

University of Toronto

Graduate Research Assistant

Working together with Prof. Ruslan Salakhutdinov and Jamie Ryan Kiros, my masters thesis focused on softattention based recurrent neural networks for action recognition and video description generation. Publications arising from this work have received 900+ citations in total.

Cornell University

Research Intern

I worked with Prof. Ashutosh Saxena and Ashesh Jain on learning preferences over trajectories on robots such as the Baxter. Our approach required a non-expert user for training and the preferences we learned were governed by objects and human interactions in the environment. Our work was featured on <u>TechCrunch</u>, Cornell CS News, NBC, KurzweilAI and several other news websites garnering over 140 000 YouTube views.

TECHNICAL SKILLS

Programming LanguagesPythonMachine Learning SkillsPrompt Engineering, Large Language Model-based PipelinesMachine Learning FrameworksPyTorch, PyTorch LightningMachine Learning OpsMicrosoft Azure, Azure ML, TensorBoard, Docker

INTERNS SUPERVISED

- Meryem M'hamdi. Ph.D. Candidate at University of Southern California.
- Tristan Sylvain. Ph.D. Candidate at Université de Montréal.
- Nouha Dziri. Ph.D. Candidate at University of Alberta.
- Alaaeldin El-Nouby. M.Sc. Candidate at University of Guelph.
- Dat Tien Nguyen. Ph.D. Candidate at University of Amsterdam.
- Eugene Vorontsov. Ph.D. Candidate at Polytechnique Montréal.

REFERENCES

• Ruslan Salakhutdinov, Professor, Carnegie Mellon University

• Andrew McNamara, Director of Engineering, Microsoft

rsalakhu@cs.cmu.edu andrew.mcnamara@microsoft.com

PATENTS

- Simultaneous dialogue state management using frame tracking. Justin Harris, Layla El Asri, Fine Emery, Rahul Mehrotra, Hannes Schulz, <u>Shikhar Sharma</u>, Jeremie Zumer. U.S. Patent No. US 10,431,202 B2. Granted: October 01, 2019. Expires: June 20, 2037.
- Natural language generation in a spoken dialogue system. <u>Shikhar Sharma</u>, Jing He, Kaheer Suleman, Philip Bachman, Hannes Schulz. U.S. Patent No. US 10,242,667 B2. Granted: March 26, 2019. Expires: June 02, 2037.

Ithaca, New York, USA 2013

Toronto, Ontario, Canada 2014 - 2016

ing preferences over

Theses

- <u>Shikhar Sharma</u>. 2016. "Action Recognition and Video Description using Visual Attention." Masters Thesis, University of Toronto

Conference, Journal, and Workshop papers

- Jonathan Weyn, Lakshmi Madhuri Bharatula, Chun-Min Chan, Matthew Dixon, Haiyu Dong, Volv Grebennikov, Panashe Kanengoni, Najeeb Kazmi, Sylwester Klocek, Jay Lin, Pete Luferenko, Zhongjian Lv, <u>Shikhar</u> <u>Sharma</u>, Manimaran Sivasamy Sivamurugan, Nan Xia, Siqi Xiang. 2021. "Operational precipitation nowcasting with convolutional LSTMs at Microsoft Weather." American Geophysical Union (<u>AGU</u>) Fall Meeting
- Sylwester Klocek, Haiyu Dong, Matthew Dixon, Panashe Kanengoni, Najeeb Kazmi, Pete Luferenko, Zhongjian Lv, <u>Shikhar Sharma</u>, Jonathan Weyn, Siqi Xiang. 2021. "MS-nowcasting: Operational Precipitation Nowcasting with Convolutional LSTMs at Microsoft Weather." Neural Information Processing Systems (<u>NeurIPS</u>): Workshop on Tackling Climate Change with Machine Learning
- Tristan Sylvain, Pengchuan Zhang, Yoshua Bengio, R Devon Hjelm, <u>Shikhar Sharma</u>. 2020. "Object-Centric Image Generation from Layouts." Association for the Advancement of Artificial Intelligence (<u>AAAI</u>) Conference on Artificial Intelligence
- Sungjin Lee, Hannes Schulz, Adam Atkinson, Jianfeng Gao, Kaheer Suleman, Layla El Asri, Mahmoud Adada, Minlie Huang, <u>Shikhar Sharma</u>, Wendy Tay, Xiujun Li. 2019. "Multi-Domain Task-Completion Dialog Challenge." Dialog System Technology Challenges 8 (<u>DSTC8</u>)
- Alaaeldin El-Nouby, <u>Shikhar Sharma</u>, Hannes Schulz, Devon Hjelm, Layla El Asri, Samira Ebrahimi Kahou, Yoshua Bengio, Graham W. Taylor. 2019. "Tell, Draw, and Repeat: Generating and Modifying Images Based on Continual Linguistic Instruction." International Conference on Computer Vision (<u>ICCV</u>)
- Mehdi Fatemi, <u>Shikhar Sharma</u>, Harm van Seijen, Samira Ebrahimi Kahou. 2019. "Dead-ends and Secure Exploration in Reinforcement Learning." International Conference on Machine Learning (<u>ICML</u>)
- Dat Tien Nguyen, <u>Shikhar Sharma</u>, Hannes Schulz, Layla El Asri. 2019. "From FiLM to Video: Multi-turn Question Answering with Multi-modal Context." Association for the Advancement of Artificial Intelligence (<u>AAAI</u>): Dialog System Technology Challenge (DSTC) Workshop
- Alaaeldin El-Nouby, <u>Shikhar Sharma</u>, Hannes Schulz, Devon Hjelm, Layla El Asri, Samira Ebrahimi Kahou, Yoshua Bengio, Graham W. Taylor. 2018. "Keep Drawing It: Iterative language-based image generation and editing." Neural Information Processing Systems (<u>NIPS</u>): Visually Grounded Interaction and Language (ViGIL) Workshop
- <u>Shikhar Sharma</u>, Dendi Suhubdy, Vincent Michalski, Samira Ebrahimi Kahou, Yoshua Bengio. 2018. "Chat-Painter: Improving Text to Image Generation using Dialogue." International Conference on Learning Representations (<u>ICLR</u>) Workshop
- Hannes Schulz[†], Jeremie Zumer[†], Layla El Asri, <u>Shikhar Sharma</u>. 2017. "A Frame Tracking Model for Memory-Enhanced Dialogue Systems." Proceedings of the 2nd Workshop on Representation Learning for NLP (RepL4NLP)
- Layla El Asri[†], Hannes Schulz[†], <u>Shikhar Sharma</u>[†], Jeremie Zumer[†], Justin Harris, Emery Fine, Rahul Mehrotra, Kaheer Suleman. 2017. "Frames: A Corpus for Adding Memory to Goal-Oriented Dialogue Systems." Proceedings of the 18th Annual SIGdial Meeting on Discourse and Dialogue (<u>SIGDIAL</u>)
- <u>Shikhar Sharma</u>, Jing He, Kaheer Suleman, Hannes Schulz, Philip Bachman. 2017. "Natural Language Generation in Dialogue using Lexicalized and Delexicalized Data." International Conference on Learning Representations (<u>ICLR</u>) Workshop
- <u>Shikhar Sharma</u>, Ryan Kiros, Ruslan Salakhutdinov. 2016. "Action Recognition using Visual Attention." International Conference on Learning Representations (<u>ICLR</u>) Workshop

- Ashesh Jain, <u>Shikhar Sharma</u>, Ashutosh Saxena. 2016. "Beyond geometric path planning: Learning contextdriven trajectory preferences via sub-optimal feedback." Robotics Research: The 16th International Symposium (<u>ISRR</u>). Springer International Publishing, 319-338
- <u>Shikhar Sharma</u>, Ryan Kiros, Ruslan Salakhutdinov. 2015. "Action Recognition using Visual Attention." Neural Information Processing Systems (<u>NIPS</u>): Time Series Workshop
- Ashesh Jain, <u>Shikhar Sharma</u>, Thorsten Joachims, Ashutosh Saxena. 2015. "Learning preferences for manipulation tasks from online coactive feedback." The International Journal of Robotics Research (<u>IJRR</u>), 34, 1296-1313

Preprints

- <u>Shikhar Sharma</u>, Layla El Asri, Hannes Schulz, Jeremie Zumer. 2017. "Relevance of Unsupervised Metrics in Task-Oriented Dialogue for Evaluating Natural Language Generation." <u>arXiv</u>:1706.09799 [cs.CL]

AWARDS AND SCHOLASTIC ACHIEVEMENTS

- 2022 Microsoft 5-year Service Award
- 2014 Department Entrance Scholarship (CS) of CAD\$10,000 at University of Toronto for 2014-2016
- 2013 Selected for the prestigious Cornell IIT-Internship Program, 2013
- **2012** IIT Kanpur Academic Excellence Award for 2011-12 for distinctive academic achievements
- 2011 O.P. Jindal Engg. and Mgmt. Scholarship for excellence in academics and leadership
- 2011 IIT Kanpur Academic Excellence Award for 2010-11 for distinctive academic achievements
- 2010 Awarded the CBSE Merit Scholarship for Professional Studies AIEEE for 2010-2014
- **2010** All India Rank 434 in IIT-Joint Entrance Examination (amongst 0.48 million candidates)