

Srijay Deshpande, PhD

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Summary

I am a dedicated machine learning scientist with a proven track record of over 5 years in machine learning, deep learning, and computer vision, focusing on pioneering advancements in this field. During my tenure at the University of Warwick, I spearheaded the development of computer-vision based solutions in the domain of computational pathology and implemented cutting-edge Generative AI algorithms for tissue image generation. The results of this work were published in top-tier conferences and journals. As a Data Scientist at Microsoft, I collaborated with the Bing Ads team to improve the information retrieval performance of sponsored search by developing novel NLP techniques. My internship at Amazon further strengthened my software development skills. I am adept at learning quickly, adapting to changing circumstances, and working both independently and collaboratively.

Research Experience

Machine Learning Postdoctoral Research Fellow
University of Warwick, UK

April 2023 - Current
Python, Tensorflow, Pytorch

- Working on the development of biomedical informatics solutions using computer vision techniques for the understanding and diagnosis of cancer. The research involves systematic analysis of tumors, their genomic profiling, and multi-modal data comprising of tissue samples with spatial transcriptomic profiles, protein expressions, vibrational spectroscopy and whole slide image data. Submitted the research paper based on this work to the ISMB-2024 conference.
- Collaborated with University of Manchester, University of Exeter, University of Aberdeen and Ruhr University, Bochum for these projects

PhD in Computer Vision
University of Warwick, UK

September 2019 - August 2023
Python, Tensorflow, Pytorch

- Developed Generative Adversarial Network and Diffusion based deep neural frameworks to generate high-fidelity histology images and thereby improve the prediction performance of downstream tasks like cancer detection by 4.03%, cellular composition prediction by 6.10%, and gland segmentation by 4.44%, in computational pathology (CPath), especially when available data is limited.
- Showed the Generative AI framework called SAFRON can generate, to the best of our knowledge, the largest-sized synthetic histology images to date (**up to 11K×8K pixels**).
- Built deep learning pipelines based on ResNet and Inception frameworks to process the information-rich multi-gigapixel digitized whole-slide pathology images for the tasks of tumor segmentation and HER2 status prediction in CPath
- Worked in the team for developing TIAToolBox, a toolbox for the end-to-end deployment of AI algorithms in CPath

Professional Experience

Data Scientist
Microsoft India

July 2017 - Sept 2019
CNN, Tensorflow, C#, Python

- Implemented neural models like CLSM and FastText to improve the performance of sponsored search on the Bing platform and deployed the models in UK, IN, and AU markets, which resulted in improved click-through rate and revenue per mile measures
- Designed novel NLP-based information retrieval model for ad hoc Ads Retrieval which improved the quality of the retrieved ads and also played a vital role in upgrading the infrastructure of the Bing Ads retrieval system
- The work got selected for presentation in the AMPere-2019 (internal Microsoft conference held in Seattle)
- Developed back-end APIs using .NET framework for the Small and medium businesses team under Office 365

Software Developer Intern
Amazon India

May 2014 - July 2014
Ruby, Ruby on Rails, C++

- Developed a web tool titled "Bulk Download Tool for CreditNotes" using Ruby on Rails to collect a large number of documents (credit notes) from storage

- The tool takes a list of document Ids as input and fetches the corresponding documents, compresses them, and returns the compressed document for downloading, in real-time

Additional Selected Projects

ChatBot using Sequence-To-Sequence Deep Network **Oct 2017 - Jan 2018**
Microsoft India *Python, Tensorflow, C#*

- Designed and implemented a ChatBot for an Office 365 phone system capable of engaging in natural conversations through the utilization of a deep LSTM encoder-decoder neural network
- Trained the ChatBot on the Cornell movie dialogue corpus and obtained a decent perplexity score

Magic Paint (Neural Style Transfer based App) **Feb 2018 - Aug 2018**
Android Application *Java, Android, Tensorflow*

- Developed an android application which takes image as a input and convert it into a painting using one of the available styles of world famous painters
- The model used in the application is deep feed-forward neural generative model which is trained using the properties of convolution feature maps of inception model (google's convolution neural network for object recognition)

Technical Skills

- **Core Competencies:** Machine Learning, Deep Learning, Computer Vision, Natural Language Processing, Sequence Learning, Generative AI, Biomedical Informatics, Multi-modal Modelling, Medical Image Analysis, Algorithms, Information Retrieval, Competitive Programming, Computational Pathology
- **Languages:** Python, C, C++, C#, Java, Bash, Ruby, SQL
- **Framework and Tools:** Keras, Tensorflow, Pytorch, .NET, Docker, Ruby on Rails

Education

University of Warwick, UK **Sept 2019 - Sept 2023**
PhD in Computer Science *Tensorflow, Python*

- Thesis: "Generative AI for Computational Pathology"

Indian Institute of Technology, Bombay **July 2015 - July 2017**
Masters in Computer Science *Tensorflow, Python*

- Thesis: "Improving Non-Compositionality Detection and Noun Compounds Relational Classification using Deep Learning"
- Grade Points: 9.52/10

Visvesvaraya National Institute of Technology, Nagpur **July 2011 - July 2015**
Bachelors in Computer Science *Tensorflow, Python*

- Thesis: "Query Optimization using Predictive View Sets"
- Grade Points: 8.8/10

Major Publications

- **Deshpande, S.**, Minhas, F., & Rajpoot, N. (2024). Ouroboros: Transmuting Protein Expression Perturbations to Cancer Histology Imaging with Generative-Predictive Modeling - Submitted for publication in international conference on Intelligent Systems for Molecular Biology (ISMB).
- **Deshpande, S.**, Minhas, F., & Rajpoot, N. (2024). Synthesis of Annotated Colorectal Cancer Tissue Images from Gland Layout - Accepted for publication in SPIE Medical Imaging Conference.
- **Deshpande, S.**, Dawood, M., Minhas, F., & Rajpoot, N. (2024). SynCLay: Interactive synthesis of histology images from bespoke cellular layouts. Medical Image Analysis, 91, 102995.
- **Deshpande, S.**, Minhas, F., Graham, S., & Rajpoot, N. (2022). SAFRON: Stitching across the frontier network for generating colorectal cancer histology images. Medical image analysis, 77, 102337.

- **Deshpande, S.**, Kovacheva, V., Minhas, F., & Rajpoot, N. (2022). Generative models for synthesis of colorectal cancer histology images. In Biomedical Image Synthesis and Simulation (pp. 491–516). Elsevier.
- **Deshpande, S.**, Minhas, F., & Rajpoot, N. (2020, September). Train small, generate big: Synthesis of colorectal cancer histology images. In International Workshop on Simulation and Synthesis in Medical Imaging (pp. 164–173). Cham: Springer International Publishing.
- Pocock, J., Graham, S., Vu, Q. D., Jahanifar, M., **Deshpande, S.**, Hadjigeorgiou, G., Shephard, A., Bashir, R. M. S., Bilal, M., Lu, W., Epstein, D., Minhas, F., Rajpoot, N. M., & Raza, S. E. A. (2022). TIAToolbox as an end-to-end library for advanced tissue image analytics. In Nature Communications Medicine (Vol. 2, Issue 1). Springer Science and Business Media LLC
- Thakare, A., **Deshpande, S.**, Kshirsagar, A., & Deshpande, P. (2019). Mining Query Plans for Finding Candidate Queries and Sub-Queries for Materialized Views in BI Systems Without Cube Generation. Computing & Informatics, 38(2).
- Bhushan, A., Bellur, U., Sharma, K., **Deshpande, S.**, & Sarda, N.L. (2017). Mining Swarm Patterns in Sliding Windows over Moving Object Data Streams. Proceedings of the 25th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems

Invited Talks & Presentations

- Oral presentation at the SPIE Medical Imaging Conference, San Diego, USA (2024)
- Presented at the 19th European Congress on Digital Pathology, Budapest, Hungary (2023)
- Delivered a talk at the 18th European Congress on Digital Pathology, Berlin, Germany (2022)
- Invited as a keynote speaker at International Virtual Conference on Cancer Science & Oncology (2022)
- Oral presentation at the British Machine Vision Association (BMVA), Manchester, UK (2022)
- Selected among 5 participants from the University of Warwick for 10th Global Young Scientists Summit (GYSS), Singapore (2022)
- Presented at Medical Imaging meets NeurIPS Workshop (MedNeurIPS) (2021)
- Presented at the SASHIMI Workshop, MICCAI Conference (2020)

Honors & Awards

- Nominated and selected among 5 participants from the University of Warwick and selected to participate in a small group discussion session with 2019 Nobel Prize Winner in Physics, Prof. Didier Queloz at the Global Young Scientists Summit (GYSS) 2022, Singapore
- Secured a **runner up position** in the Hackathon held during the PathLake MasterClasses in London by showing top performance in the mutation prediction of type M3 in the cell lung cancer histopathology images. The program "PathLAKE Masterclass: Data Science for Computational Pathology" was held by the Department of Computer Science, University of Warwick in January 2020
- Recipient of **CDT Research Scholarship** from 2019 to 2023.
- Secured **All India Rank 12** among **115K candidates** in GATE-2015
- Ranked in **top 5** among 100+ students in the MTech (masters) at IIT-Bombay
- Qualified for **ACM-ICPC Finals**, the competitive coding contest, and represented NIT-Nagpur at the onsite round
- Secured **All India Rank 3005** in **AIEEE-2011** out of more than **1.1 million** students all over country
- Awarded as **Best AURAA** (Academic Unit Representative for Academic Affairs) at IIT Bombay