Piyush Singh

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Education

International Institute of Information Technology Hyderabad — Hyderabad, India
M.S. in Computer Science and Engineering; ***CGPA: 9.0/10.0*** — *Dec 2020 – Present*

Indian Institute of Technology Kharagpur — Kharagpur, India
Dual Degree in Civil Engineering; ***CGPA: 7.4/10.0*** — *Aug 2012 – May 2017*

Experience

IIIT Hyderabad — Hyderabad, India
Research Student & Teaching Assistant — *Nov 2019 – Present*

- Applying machine learning techniques in medical imaging domain, specifically histopathology; in the areas of representation learning, interpretability and active learning.
- Used deep learning to explain histological similarities among cancers in terms of classifier cross-performance and similarities at feature level, salient region level and nuclear geometry level
- Proposed novel deep learning based sampling technique for active learning using joint training of a Siamese network and a classifier. The proposed method achieves high performance using just 5% of dataset on both classification and retrieval tasks
- Worked as Teaching Assistant (TA) for courses (i) Statistical Methods in AI and (ii) Optimization Methods. As TA, prepared in-class quizzes, questions for exams and graded papers

Quantiphi — Mumbai, India
Machine Learning Engineer — *Apr 2018 – Oct 2019*

- Anomaly detection system for a large petroleum mining facility based on real-time sensor data to flag potential maintenance issues with minimum delay
- Implemented dense and LSTM autoencoders and deployed using Google Cloud tools and services
- Automated system using containerization with Docker and orchestration using Kubernetes and Airflow

Oyo Rooms — Gurgaon, India
Business Analyst — *May 2017 – Feb 2018*

- Implemented business logic to allow booking on app without forcing app users for pre-payment based on users' cancellation history and estimated demand for the booked dates
- Wrote a web-crawling library to fetch and compare prices of same hotels on OYO vs competitor websites in near real-time. This was used as an upper limit for the pricing strategy for the hotel

Publications

Exploring histological similarities across cancers from a deep learning perspective
Frontiers in Oncology, Volume 12/2022
Piyush Singh, Ashish Menon, C. V. Jawahar, P. K. Vinod
[pdf] | [slides] | [code] | [poster]

Interactive learning for assisting whole slide image annotation
Asian Conference on Pattern Recognition, ACPR 2021
Ashish Menon, **Piyush Singh**, C. V. Jawahar, P. K. Vinod
[pdf] | [slides] | [code]

Projects

Wikipedia Search Engine | code

- Built search engine on wikipedia 75GB dump by chunking, creating inverted index files and merging them
- Ranked result documents for query using TF-IDF. Search runs in <5s on typical PC.

Revisiting Classical ML | code

- Implemented several classical ML algorithms and released the implementations as a python library
- Tested each model on suitable datasets and tasks and showed results with different parameters

Deep learning generalization | code

- Explaining generalizability of deep neural nets through experiments on model/dataset configuration
- Experimented on impact of augmentation, weight decay, dropout, batchnorm and data corruption

Panorama generator | code

- Calculated homography between scenes from same camera center using RANSAC through DLT technique
- Implemented image back projection and stitching to generate single panorama image of complete scene

Viola-Jones Face Detector | code

- Implemented complete pipeline of Viola Jones object detection framework from scratch
- Implemented integral image, feature extraction, adaboost and cascading classifier

Personal Mini Cloud & Image Gallery | code | site | app

- Quickly share files from command line without any installation with just one POST request
- An application that lets you quickly create an image gallery from your server's command line
- Made tools for myself initially and later released them publicly

Breaking Neural Nets | code

- Implemented fast gradient sign method and one pixel attack; white box attacks to fool neural nets
- Implemented adversarial training loss function which makes the model robust to these attacks

Skills

Programming: Python, C/C++, Java, JavaScript, MySQL
Tools/Technologies: Git, Docker, Kubernetes, Airflow, LaTeX
Libraries: PyTorch, TensorFlow, Scikit-learn, OpenCV, Numpy, SciPy, Pandas, Matplotlib

Contributions

Open source contributions

- Contributed to popular open source repository Torchvision | contribs
- Contributed to open source repositories specific to my medical imaging research domain | contribs

Community work

- Helped in the organization of events such as summer school as part of CVIT research group
- Participated in and helped to popularize blood donation camps during college