

# Piyush Singh

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🌐 piyush01123 📄 piyush01123 📁 Portfolio 📄 Google Scholar

## EDUCATION

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### International Institute of Information Technology Hyderabad

*M.S. in Computer Science and Engineering; CGPA: 9.0/10.0*

Hyderabad, India

*Dec 2020 – Present*

### Indian Institute of Technology Kharagpur

*Dual Degree in Civil Engineering; CGPA: 7.4/10.0*

Kharagpur, India

*Aug 2012 – May 2017*

## EXPERIENCE

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### IIIT Hyderabad

*Research Student & Teaching Assistant*

Hyderabad, India

*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

*Machine Learning Engineer*

Mumbai, India

*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

*Business Analyst*

Gurgaon, India

*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

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### 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

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### 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.

### 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

### Revisiting Classical ML | [code](#)

- Implemented KNN, regression, naive Bayes, clustering, decision tree, SVM, boosting and HMM
- 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
- Wrote these tools for myself initially as I needed them during my work but could not find existing tool

## SKILLS

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**Programming:** Python, C/C++, Java, JavaScript, MySQL

**Tools/Technologies:** Git, Docker, Kubernetes, Airflow, L<sup>A</sup>T<sub>E</sub>X

**Libraries:** PyTorch, TensorFlow, Scikit-learn, OpenCV, Numpy, SciPy, Pandas, Matplotlib

## CONTRIBUTIONS

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### 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