

# Pulkit Mishra

[pulkitmishra007@gmail.com](mailto:pulkitmishra007@gmail.com) | +91 7860564879

GitHub: [PulkitMishra](#)

Website: [pulkitmishra.github.io](https://pulkitmishra.github.io)

LinkedIn: [pulkit-mishra](#)

Blog: [pulkitmishra](#)

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## WORK EXPERIENCE

### Jio AICoE - Software Development Engineer, Research ( July '21 to Present )

Python, Deep Learning, Computer Vision, Video Analytics, Pytorch, Django, FastAPI, Docker, Kubernetes

- Improved Jio's internal annotation tool, enabling several teams to do active learning at scale
- Devised an algorithm to generate data for Cricket Shot Action Detection from raw videos, wrote patent draft and prior art critique for the same. Trained models for cricket shot action classification and achieved 95.6% classification accuracy. Trained models to spatiotemporally localize cricket shots and achieved a video mAP score of 84.8 at 0.75 IoU threshold.
- Prepared a framework for multimodal self-supervised learning that leverages video, audio and text modalities which are naturally present in cricket videos to learn better representations.
- Took multiple models from notebooks to production by deploying them as REST APIs on Kubernetes cluster using Seldon, s2i, Docker, Helm Charts and set up CI CD pipelines on Azure
- Developed face verification service for Jio's HR team to automate their onboarding process
- Prepared proof of concept application to detect possible instances of cheating during exams.
- Prepared proof of concept application for real-time multi-person pose estimation, person tracking and human fall detection on edge devices.

### skit.ai - Machine Learning Research Assistant, Conversational AI ( May '21 to July '21 )

Python, Deep Learning, Audio Processing, Librosa, Keras, Coqui TTS, NeMo

- Explored use of Found Spontaneous Speech data in Conversational Setting to build a Text To Speech System and succeeded in synthesizing human-like, engaging and authentic speech
- Curated transcripts and helped open source [Emotional TTS](#) - first public TTS dataset for emotions in an Indian English Accent

### Major League Hacking - Open Source Fellow (Facebook - [Pysa](#))

Python, Web Security, Pysa, Flask

- Created sample Flask app and added examples to illustrate usage of Pysa to detect common vulnerabilities like SQL injections, Path Traversal, Cross Site Scripting, Remote Code Execution
- Extended Pysa's support for SQL injection and server side template injection detection

### Hike Messenger - Machine Learning Intern (Apr '20 to Nov '20)

Javascript, 3D Computer Vision, Tensorflow.js, Facemesh, BabylonJS

- Generated 3D Hikemoji from human head and made the virtual avatar replicate actions of the head in real time laying the groundwork for Hike's pivot to metaverse gaming
- Attached custom assets like hair and cap to the 3D Hikemoji and aligned their motion with human head

### Google Summer of Code - Student Developer (CCEXtractor - [Poor Man's Rekognition](#))

Python, Deep Learning, Computer Vision, TensorFlow, TensorFlow Serving, Django, Docker, Travis CI

- Trained and deployed models for scene text detection and recognition, object detection, scene classification, face detection and facial expression recognition in both images and videos
- Containerized the project using Docker, setup custom logger, made code PEP-8 compliant, wrote necessary unit tests and setup CI for the repository using Travis

## **Invigilo Technologies** - Computer Vision Intern (Jan '20 to Mar '20)

Python, Deep Learning, Computer Vision, Video Analytics, Pytorch

- Trained model for real time instance segmentation of barricades, excavator body and excavator arm in construction site videos to raise alert in case of security protocol violation. Achieved a mAP score of 91.2 at 0.75 IoU threshold running at 30 fps on a single Tesla K80 GPU
- Trained model for detecting presence of trenches and shorings in construction site images to ensure worker safety.

## **Machine Origin** - Deep Learning Intern (Sep '19 to Oct '19)

Python, Deep Learning, Computer Vision, Video Analytics, Audio Processing, TensorFlow, Keras

- Worked on detecting presence of Indian celebrities in videos
- Trained model for video genre classification
- Implemented module to detect instances of laughter from audio in videos

## **Superbolter** - Software Developer Intern (Jun '19 to Jul '19)

Python, Deep Learning, Computer Vision, Natural Language Processing, Keras, NLTK, Algorithmia

- Trained and deployed model to recommend room images on the basis of input text description
- Improved the web crawler by bypassing the crawl block of several websites

## **EDUCATION**

**Indian Institute of Information Technology, Kalyani** - West Bengal, India

**Bachelor of Technology (B. Tech.) - Computer Science and Engineering**

Graduated **July 2021**

Cumulative GPA: 9.41 | **Department Rank 2**

**Swaraj India Public School, Kanpur** - Uttar Pradesh, India

Class 12: 96.5%

Class 10: 95.6%

## **PROJECTS**

### **Virtual Tourist Guide for Government of Goa** - [Link](#)

Python, Deep Learning, Computer Vision, Keras, TensorFlow, FastAPI, Kubernetes, Flutter, Firebase

- Scraped data and trained model to classify monuments of Goa
- Deployed model as a FastAPI service and integrated its TFLite version in Flutter mobile app
- Added voice support to the Flutter mobile app using Google Assistant Actions

### **AI Powered Wearable to Assist Visually Impaired** - [Link](#)

Python, Deep Learning, Computer Vision, Video Analytics, Keras, TensorFlow, Alexa Skills, Raspberry Pi

- Implemented image captioning, object detection and face recognition of user's friends and relatives to give the visually impaired a brief summary of their surroundings

### **CI and Version Control for Machine Learning** - [Link](#)

Python, Machine Learning, Jenkins

- Developed a tool to help data scientists by providing data visualization, performance metrics and version controlling of machine learning models, datasets and experiment hyperparameters

### **Architecture Style Recognition**

Python, Deep Learning, Computer Vision, Keras, TensorFlow

- Scraped data and trained model to classify architectural styles of monuments of West Bengal

## **AI Powered Counselor for Detecting and Treating Depression - [Link](#)**

Python, Artificial Intelligence, Natural Language Processing, Audio Processing, Alexa Skills, NLTK

- Trained models to detect the possibility of depression by checking for abnormality in user's behaviour and by applying sentiment analysis on user's social media profile
- Added features to warn user's trusted contacts in case of emergency, suggest therapy recommendations and location based activities to improve the user's mood

## **Correction of Annotation Affected Words in Document Images**

Python, Deep Learning, Image Processing, Natural Language Processing, Keras, TensorFlow, NLTK

- Developed algorithm to remove annotations from document images for improving OCR input
- Added spelling correction and grammar correction in order to improve OCR output

## **E-Tendering on Blockchain - [Link](#)**

Python, Blockchain, BigchainDB, Inter Planetary File System

- Built a blockchain powered platform to automate and digitize tendering and make the bidding process secure and transparent

## **Smart and Secure Shopping System - [Link](#)**

Python, Internet of Things, Raspberry Pi, Android, Firebase

- Developed a smart shopping system to eliminate the need of a queue in shopping malls by securely automating the billing process while simultaneously helping in inventory management

## **Social Network for Literature Enthusiasts**

Python, Django, HTML, CSS, Javascript, PostgreSQL

- Built a web application for users to share and read poems, novel extracts and other literary pieces and engage with other people with similar taste in literature

## **SKILLS**

Python, C, C++, Java, Shell, SQL, TensorFlow, Keras, PyTorch, PyTorch Lightning, Numpy, OpenCV, Pandas, scikit-learn, Matplotlib, Seaborn, NLTK, HuggingFace, Deep Learning, Machine Learning, Computer Vision, Image Processing, Video Analytics, Audio Processing, Natural Language Processing, Artificial Neural Network, Convolutional Neural Network, Recurrent Neural Network, Transformer, Django, Flask, FastAPI, Tensorflow Serving, PyQt, Alexa Skills, Seldon, Docker, Kubernetes, Linux, Git

## **ACHIEVEMENTS**

- Google Summer of Code Mentor in 2021 and 2022
- Winner, Smart India Hackathon 2020
- Second Runner-Up, CodeUtsava 3.0, NIT Raipur Hackathon
- Best Hardware Hack, Hack-A-BIT, BIT Mesra Hackathon
- Vice President, Student Government Body IIIT Kalyani
- Founding Member, Institute Innovation Cell IIIT Kalyani
- Founding Member, Free and Open Source Club, IIIT Kalyani
- Creative Head, Udaan, Literary Club IIIT Kalyani
- School Captain, School Government Association, Swaraj India Public School
- Winner, Tech Talk Debate, Comfest
- Winner, Frank Anthony Memorial Debate
- Runners Up, ASISC Declamation Nationals
- Runners Up, ASISC Debate State Level
- Winner, Rotary Club Quiz Competition Nationals