

# Pulkit Mishra

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## WORK EXPERIENCE

### **Jio AICoE** - Software Development Engineer - Machine Learning ( July '21 to Present )

Python, C++, Deep Learning, Computer Vision, Video Analytics, PyTorch, PyTorch Lightning, Numpy, OpenCV, DeepStream, DL Streamer, Triton Server, Django, FastAPI, Seldon, MongoDB, Argo, Helm, Docker, Kubernetes

- Enhanced annotation tool with RBAC and workspaces, enabling several teams to do active learning at scale. Took ownership, integrated with other internal tools, prepared docs and automated annotation pipelines for all projects, resulting in swift orgwide adoption.
- Invented dataset generation algorithm for cricket shot action detection, drafted patent and prior art critique. Trained models for Mumbai Indians, achieving 95.6% accuracy in shot classification and 84.8 video mAP at 0.75 IoU for spatiotemporal localization.
- Created multimodal self-supervised learning framework leveraging video, audio and text to learn better representation. Incorporated various feature extractors, preprocessing and augmentation pipelines, and custom loss functions.
- Moved models from notebook to production as REST API on Kubernetes using Seldon, Docker, Helm Chart and Azure CI/CD. Wrapped these APIs as Flyte workflow for added functionality.
- Developed face verification service for HR to automate employee onboarding process.
- Created Argo workflow for HR to detect instances of cheating during exams.
- Built PoC using OpenVINO and DL Streamer for real-time multi-person pose estimation, tracking and activity detection on edge devices, achieving 45 FPS on single core.
- Led migration from Seldon to MLServer, greatly improving model throughputs across the team. Enhanced MLServer with GPU inference support, proxy variable settings, automated profiling and load testing with Scalene and Locust to facilitate transition.
- Spearheaded development and deployment of DeepStream apps at Jamnagar Refinery, addressing safety needs with person detection and PPE compliance. Converted models to engine files, developed C++ plugins, enabled dynamic addition and removal of streams and managed entire backend infra to efficiently run 16 streams per T4.
- Adapted EfficientGCN model trained on 3D NTU RGB+D data with 25 keypoints to work with 14 in 2D instead, maintaining near-identical accuracy.

## INTERNSHIPS

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

Python, Deep Learning, Audio Processing, Librosa, Keras, Pandas, 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

- Contributed to Facebook's static analysis tool, Pysa, by creating a Flask app and adding examples to illustrate usage of Pysa to detect common vulnerabilities such as SQL injections, path traversal, cross-site scripting, and remote code execution. Extended Pysa's support for detecting SQL injection and server-side template injection vulnerabilities.

### **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 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

- Trained models for detecting presence of Indian celebrities in videos, classifying video genre, and detecting instances of laughter from audio.

### **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

## **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

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- 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

### **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

## **SKILLS**

Python, C++, Shell, PyTorch, PyTorch Lightning, TensorFlow, Keras, 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, Graph Convolutional Neural Network, Django, Flask, FastAPI, MongoDB, SQL, Tensorflow Serving, Triton Server, ONNX, DeepStream, TensorRT, ONNX, DL Streamer, OpenVino, ML Server, MLOps, Seldon, Helm, Docker, Kubernetes, Argo, Flyte, PyQt, Alexa Skills, Linux, Git

## **ACHIEVEMENTS**

- Judge and Mentor at StatusCode0 Hackathon 2023
- 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