

Pulkit Mishra

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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 by implementing role-based access control and workspaces module, enabling several teams to do active learning at scale. Assumed ownership by integrating it with other internal tools, preparing documentation and writing scripts to automate setting up annotation pipelines for all active projects, resulting in quick adoption across teams.
- Devised a novel algorithm to generate data for cricket shot action detection from raw videos and wrote patent draft and prior art critique. Trained models for cricket shot action classification achieving 95.6% classification accuracy and for spatiotemporally localizing cricket shots achieving video mAP score of 84.8 at 0.75 IoU threshold which helped Mumbai Indians in record keeping and player analysis.
- Created a multimodal self-supervised learning framework that leverages video, audio, and text modalities to learn better representations, featuring various feature extractors, preprocessing and augmentation pipelines, and custom loss functions.
- Successfully moved multiple models from notebooks to production by deploying them as REST APIs on Kubernetes cluster using Seldon, s2i, Docker, Helm Charts, and Azure CI/CD. Wrapped deployed models as Flyte workflow for additional functionality.
- Developed face verification service for Jio's HR team to automate employee onboarding process.
- Created an Argo workflow for detecting possible instances of cheating during exams, currently in use by Jio's HR team.
- Built PoC using OpenVINO and DL Streamer for real-time multi-person pose estimation, person tracking and activity detection on edge devices, achieving 45 FPS on single core.
- Led the migration from Seldon to MLServer, significantly improving throughput of deployed models across the team. Enhanced MLServer by adding GPU inference support and proxy variable settings, created documentation, automated profiling and load testing with Scalene and Locust to facilitate the transition.

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

- 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

- 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

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

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