Kunal Kumar Sahoo

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Education

B.Tech in Computer Engineering, Pandit Deendayal Energy University 2021 – Present
CGPA: 9.77

Skills

- **Languages** : Python, Java, C/C++, MATLAB, Julia
- **Databases** : MySQL, MongoDB, Pinecone, FAISS
- **Libraries** : Tensorflow, PyTorch, OpenAI Gym, Numpy, Scikit-learn, Transformers, LangChain, Detectron2, AutoML, Optuna, ROS, PyBullet
- **Development** : Streamlit, Gradio, Flask, FastAPI
- **Utilities** : GNU/Linux, Git, AWS, Docker, GCP, Vertex AI, Firebase, Google Colab

Work Experience

Computer Vision Intern
PhysioAI.Care *Dec 23 - Feb 24*
- Used SOTA frameworks for pose estimation to build a custom model for real-time posture monitoring and analytics.
- Enhanced their physiotherapy platform APIs to reduce latency and computation load on servers.

CV/ML Consultant
Robosmic Pvt Ltd *Oct 23 - Dec 23*
- Developed light-weight CV algorithms involving image processing and DNNs.
- Pipelined these algorithms with ROS environment for path planning of systems.
- Deployed the solutions on Raspberry Pi and Nvidia Jetson NANO (single-board computers).

R&D Intern
Reliance Jio *Jun 23 - Aug 23*
- Worked on skeleton-fitting in 3D mesh and animate objects through skinning algorithms
- Reconstructed facial expressions on 3D mesh representations.
- Additionally worked on Implicit function representations and Point Cloud representations.

Summer Research Intern
IIT Kharagpur *May 23 - Jun 23*
- Used DNNs to predict the native language of people from their non-native language speech.
- Identified the contributing features in speech using SHAP (XAI) and Vocoder model (Mel2Wav).
- **Kunal Sahoo**, Debolina Pramanik, Puja Bharati, Sabyasachi Chandra, Shyamal Mandal, and Tanmay Bhowmik. Understanding the working of Deep Learning models in L1 identification from L2 speech. (*Accepted CIPR 2024*)

Student Researcher
Dept. of Computer Science Engineering, PDEU *Oct 22 - Present*
- Developing real-time posture monitoring system deployed on edge-devices with IoT integration.
- Biswa Acharya, Debabrata Swain, Tanish Patel, **Kunal Sahoo**, Manas Pradhan, and Dev Singh. PostureSense: A Comprehensive Study of Deep Learning and Machine Learning Approaches for Real Time Posture Detection and Correction. (*Submitted to IEEE Access*)

Projects

Automatic Road Segmentation and Obstacle Detection
Tensorflow, OpenCV *Presentation*
- Used VGG-Net to identify drivable area through semantic segmentation.
- Draw bounding box across obstacles on the road using Monocular3D algorithm.

Obstacle Avoidance System using CV
Tensorflow, OpenCV, ROS *Presentation*
- Used Semantic segmentation to identify road, Monocular Depth Vision to identify the obstacle proximity.
- Generate bird-eye view for the environment for navigation.

In-Painting App
Gradio, Torchvision, Transformers, Diffusers *Code*
- Developed a simple Gradio web-app to perform In-Painting on the selective segments of image.
- Used Meta's SAM and Stable Diffusion for prompt-based in-painting.

Talk2Code
PyTorch, LlamaIndex, CodeLlama
- Built a CLI chatbot for a freelance project to interact with existing ReactJS projects referring to ReactJS documentation.
- Used quantized Code-Llama and Tree-RAG to incorporate entity heirarchies of ReactJS components.

Oil Well Predictive Maintenance
TensorFlow, Flask, ReactJS *Code*
- Used past dataset for training a custom LSTM-model for predicting faults in oil wells.
- Replaced the standard Pandas DataFrame pipeline with a custom NumPy equivalent pipeline to enhance speed and memory management.

Courses and Certifications

- Advanced AI: Transformers for Computer Vision
- Applied AI: Building NLP Apps with HuggingFace Transformers
- Fundamentals of Deep Learning, NVIDIA DLI
- Google Cloud Computing Foundations: Data, ML and AI in Google Cloud

Achievements & Co-Curriculars

- Top Machine Learning Voice recognition by LinkedIn.
- Received grant of **Rs. 2.25 lakhs** for developing prototype of Autonomous Surveillance Vehicle by SSIP Govt. of Gujarat.
- Hackathon project shortlisted for Start-up Grant of **Rs. 2.5 lakhs** by Govt. of Gujarat.
- Won **Rs. 1.5 lakhs** in RoboFest 3.0 organized by Govt. of Gujarat.
- **Runner-Up** in EnCode Hackathon organized by IITG and Bosch.