

Ketan Vibhandik

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EXPERIENCE

Contijoch Research Laboratory

Graduate Student Researcher

La Jolla, California

Sept 2024 – Present

- **Cardiac motion correction:** Developing novel cardiac motion correction technique leveraging neural implicit learning to reduce motion artifacts in CT images, improving image quality and diagnostic accuracy in cardiac imaging.
- **Physics Informed Neural Networks:** Applied Physics-Informed Neural Networks (PINNs) to model complex, patient-specific motion fields, enabling accurate CT reconstructions without explicit motion estimation.

Siemens Healthineers

Research Software Engineer

Bangalore, India

July 2021 – Aug 2024

- **Research Prototype Development:** Collaborated with doctors & scientists to build prototypes for new imaging solutions for iterative 3D image reconstruction, statistical modelling, lesion and organ segmentation, and cardiac motion correction.
- **Machine Learning Solutions:** Designed deep learning solutions using U-Net and GAN architectures for MRI and SPECT/CT image data to perform organ segmentation, develop model observer and CT to SPECT mapping.
- **Performance Optimization:** Optimized computationally intensive medical imaging algorithms using parallel computation (Dask, CUDA, Cython, Numba), achieving a 10x performance boost by identifying parallelizable tasks and distributing them across cluster nodes and GPU cores.
- **Medical Database:** Engineered database management tool for processing medical image data using MongoDB, featuring metadata extraction, hash computation, optimized data retrieval, and asynchronous programming to enhance speed. Ensured secure data handling with privacy-preserving measures.

Zentron Labs

Research Intern

Bangalore, India

May 2020 – Aug 2020

- **Fruit Orientation Technique:** Designed technique to compute orientation of fruits using image segmentation and eigen-vector decomposition of image moment matrix.
- **Optical Fruit Grading Algorithm:** Developed an algorithm to detect axis of fruits using Mask R-CNN model with keypoint heads for optical fruit grading. Cleaned dataset of 500 images & achieved mean average precision (mAP) of 92.4% using variable layer-wise learning rates.

ACHIEVEMENTS

PATENT Nomination

Siemens Healthineers

- Innovated an image quality-adaptive thresholding algorithm for PET scans and automating lesion detection.
- Reducing test time from 7 days to 30 minutes, significantly optimizing diagnostic workflows and reconstruction quality.

NVIDIA AI Hackathon: link 📄

National Level

- Secured 2nd Runner-Up position among 500+ teams across India by designing a deep learning model for Indian language identification.
- Achieved > 85% accuracy using CNN-LSTM based models by feeding a raw waveforms along with spectrograms.

LIVER SURGERY Planning and Future Liver Remnant (FLR)

Siemens Healthineers

- Led development of a 4D SPECT/CT prototype, reducing FLR calculation time from 3 hours to 3 minutes while enhancing accuracy with of remnant liver function value by 7%.
- Optimized performance with threading and GPU utilization, enabling real-time interaction with scans.
- Collaborated with doctors and Siemens stakeholders to ensure clinical usability, improving preoperative decision-making.

EDUCATION

University of California San Diego (UCSD)

Master's in Electrical and Computer Engineering (AI and Robotics): Grade: 4/4

La Jolla, California

Sept. 2024 – Present

- **Courses:** Statistical Learning, GPU Programming, Medical Imaging, Computer Vision, computer architecture

Indian Institute of Technology (IIT), Tirupati

Bachelor of Technology - Electrical Engineering: CGPA: 8.7/10

Tirupati, India

Aug 2017 – June 2021

- **Courses:** Computer Vision, Machine Learning, Reinforcement Learning, Signal Processing, Data Structures and Algorithms, Probability and Stochastic Processes and Statistics, Linear Algebra

PROJECTS

Music Information Retrieval for Hindustani Classical Music: Engineered features related to Rasa (emotion), Taal (rhythm), Thaats (musical scale), and other details for a self-created labelled data set of 120 Hindustani Classical Ragas. Modeled them using deep Auto-Encoder and achieved classification accuracy of 89%.

Reinforcement Learning for Tic-Tac-Toe: Trained an agent to make the best move for every state in Tic-Tac-Toe using different RL algorithms (Q-Learning, Temporal Difference learning, Monte Carlo, Bellman Backup).

Neural Image Style Transfer: Generated new artistic images starting from random noise using PyTorch framework. Combined style from one image and content from another, creating an animated YouTube tutorial explaining the concept and demonstrating the results.

TECHNICAL SKILLS

Languages and Tools: Python, C, C++, MATLAB, Git, Qt, MongoDB, Linux

Libraries and Frameworks: PyTorch, TensorFlow, OpenCV, Scikit-image, SimpleITK, MeVisLab, NumPy, Matplotlib, Flask

Data Processing: CUDA, Numba, Dask, Librosa, Threads, Azure, Bash, Docker