

Vinay Ummadi

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EDUCATION

- **Indian Institute of Technology, Kharagpur** Kharagpur, India
Master of Technology - Medical Imaging & Informatics; GPA: 8.72 Aug 2021 - May 2023(Expected)
Courses: Computer Vision, Neural Networks & Applications, Digital Image Processing, Data Analytics, Bio Statistics, Pattern Recognition & Machine Intelligence in Medicine, Design & Analysis of Algorithms
- **Rajiv Gandhi University of Knowledge Technologies** RK Valley, India
Bachelor of Technology - Electronics and Communication; GPA: 8.9 Aug 2017 - Aug 2021
Additional: Student Head @ Robotics Lab of RKV

SKILLS SUMMARY

- **Languages** Python, SQL, Matlab
- **Frameworks** PyTorch, scikit-learn, OpenCV, Keras
- **Tools** Git, Bash, Docker
- **Platforms** Linux, Web, Arduino, Raspberry Pi, AWS, Azure, Heroku
- **Other Skills** Product Development, Leadership, Event Management

EXPERIENCE

- **Computer Vision & Medical Imaging Laboratory** IIT Kharagpur
Graduate Researcher Aug 2022 - Present
Continual Learning for Medical Image Segmentation : My current research focus is on developing and evaluating continual learning methods for medical image segmentation. Specifically working on a subset of replay learning algorithms multi site prostate segmentation.
Our sampling methods for replay learning outperform all other tailored CL methods by a 4% mean Dice score.
- **Lab for Video and Image Analysis** IIT Hyderabad
Research Intern Sep 2020 - May 2021
Modeling of Methane to Methanol conversion : This is a joint work between [Prof Sumohana](#) of Electrical Engineering and [Prof Subrahmanyam](#) of Chemistry. Our goal is to accurately model the conversion process of methane to methanol using limited data and only a few process parameters.
Experiments & Results : Thorough experiments have been done with traditional ML algorithms and modern 1D and 2D CNNs to accurately correlate Key Performance Indicators(KPIs) and Process Parameters. Finally a weighted ensemble of Kernel Regressor and Support Vector Regressor are found to be fitting well.
- **Head Teaching Assistant** IIT Kharagpur
CS60013 : Programming & Data Structures Autumn 2022
Taught [Programming & Data Structures tutorials](#) in Python for a class of 20+ masters medical students. Developed and maintained [course webpage](#) for delivering announcements, assignments and final projects. Also, setup auto-grading for programming assignments with GitHub Classroom and Python unittests.

PUBLICATIONS

- [arXiv](#) : **Autonomous Agriculture Robot for Smart Farming** (Aug 2022)
- [arXiv](#) : **U-Net and its variants for Medical Image Segmentation : A short review** (April 2022)

RESEARCH PROJECTS

- **Continual Learning for Medical Image Segmentation** Deep learning models are prone to catastrophic forgetting when trying to learn over time. Continual Learning is the ability of the machine to learn the tasks/classes sequentially while preserving previous knowledge. Currently working on Multi Site Prostate Segmentation using Rehearsal/Replay based Continual Learning Methods. Evaluating following replay methods : Naive/Raw Replay, Representational Replay, Generative Replay, Hybrid Replay. (Aug 2022 - Present)
- **Semi-Autonomous Agriculture Application Robot** AAR is an semi-autonomous robot designed to roam in the agriculture fields to detect diseased plants, remove weeds, precision watering. This project has received a grant of INR 330,000 through MANAGE Hyderabad from Ministry of Agriculture, Govt of India. (Dec 2018 - Dec 2020)
- **AI based Tele-Pathology** Design, development and implementation of a fully functional telepathology web application. This application serves as a remote bridge for patients and pathologists. Features include registration, logging, pathology sample submission, AI-based sample classification, AI-based pathology tissue segmentation, and more. **Tech Stack** : Python, PyTorch, ReactJS, NodeJS, MongoDB, Git, Azure Cloud, Heroku Cloud. (Jan 2022 - April 2022)
- **Auto Diabetic Retinopathy Grading** This project involves automatic grading of retinal images into five classes. The following methods are thoroughly investigated : Traditional ML techniques, Image based feature extraction and classification, Deep ConvNets for end-to-end classification. **Tech Stack** : Python, Scikit-Learn, Matlab, PyTorch. (Feb 2022 - April 2022)

- **Image-to-Image Translation with Conditional Generative Adversarial Networks** This project is a re-implementation of Phillip Isola's original work Pix2Pix at MIT. This project was presented as a implementation project for neural networks and applications in autumn 2021 at IIT Kharagpur. **Tech Stack** : Python, PyTorch. (Sep 2021 - Nov 2021)
- **Malarial Image Classification** The aim of this project is to develop an image-based algorithm for the automatic classification of microscopic hemoglobin smear samples into malarial and non-malarial classes. Created using exclusively classic image processing algorithms. This is a class project for Digital Image Processing and Applications course in autumn 2021 at IIT Kharagpur. **Tech Stack** : Matlab. (Nov 2021)

HONORS AND AWARDS

- Awarded Student Travel Grant for attending CODS-COMAD 2023 at IIT Bombay.
- Awarded Student Scholarship for attending Asian Conference on Machine Learning (ACML) 2022 at ISB Hyderabad.
- Our startup *TechInAg* received seed grant of INR 330,000 for the development of Agriculture Application Robot for Smart Farming. (Dec 2020)
- Secured a Dual Degree(BTech+MS) admission at IIIT-Hyderabad. (Jul 2019)
- MRS Smart City Model Exhibition Award in the International Conference on Green Energy Technologies for Smart Cities. (Dec 2018)

MISCELLANEOUS

- Volunteered and attended CODS-COMAD 2023 at IIT Bombay in January 2023.
- Attended Asian Conference on Machine Learning (ACML) 2022 at ISB Hyderabad in December 2022.
- Attended 6th Summer School on AI With focus on Computer Vision & Machine Learning at IIIT Hyderabad (Jul 2022)
- Lead Organizer at Astronics 3.0 : Organized third sequel of 3-day Astronics workshop at RGUKT RK Valley. Attended by 250+ students. (Nov 2019)
- Competed in a 48-hour nationwide hackathon - ACI Challenge (Artificial Intelligence, Cloud, Internet of Things) at GRIET Hyderabad. (Oct 2018)
- Competed in Agri AI Hackathon organized by CDAC and Nvidia. (Oct 2020)