

Ananth Kalyanasundaram

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RESEARCH INTERESTS

My research interests broadly lie in the field of Computer Vision and Deep Learning. My main research interests lie in 3D scene Reconstruction, panoptic segmentation and exploring the relationship between the 2D image space and the 3D voxel space. In addition to this, I would like to work on generative models such as GANs and diffusion models.

EDUCATION

Technical University of Munich

MSc. Informatics

October 2021 - October 2023 (expected)

Munich, Germany

SRM Institute of Science and Technology

B.Tech (Computer Science and Engineering)

July 2016 - June 2020

Chennai, India

Percentage: 87.35/100

PUBLICATIONS

- **MRI Super-resolution using Laplacian Convolutional Neural Networks with Isotropic Undecimated Wavelet Loss.** S.Ramanarayanan, B.Murugesan, **A.Kalyanasundaram**, S.Prabhakaran, S.Patil, M.Sivaprakasam. 42nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society 2020 (EMBC 2020).
- **Detection of Pathological Myopia using Convolutional Neural Networks.** **A.Kalyanasundaram**, S.Prabhakaran, Briskilal.J, Senthil Kumar.D. International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 05, 2020

WORK EXPERIENCE

Human Analysis Lab, Michigan State University

Research Intern

September 2020 - Present

East Lansing, Michigan, USA

- Currently working on improving the performance of deep neural networks for the purpose of multi task learning under the supervision of Professor Vishnu Boddeti.

KPMG India

Data Analyst Intern

July 2020 - October 2020

Mumbai, India

- Worked on optimizing tax processes after analysis of data for the Tax Technology and Transformation team.
- Created automation software for OTP verification in websites.
- Tested several bots and ensured high quality output was produced.

SRM Medical College

Research Intern

August 2019 - June 2020

Chennai, India

- Analyzed and cleaned real-life Knee MRI data. Used image processing techniques to make the data trainable.
- Developed a novel loss function for this task which delivered better results and published a paper on the same at the IEEE EMBC 2020 conference.

- Implemented several state-of-the-art deep learning architectures for the task of Image Segmentation and Classification.
- Achieved a position in the top 20 of the leaderboard at the time of conclusion of challenges held by ISBI and SPIE Medical Imaging conferences.
- Conducted research using different architectures for the task of Super-resolution on Brain MRI.

PROJECTS

3D Scene Generation conditioned on Natural Languages September 2022 - Ongoing

We propose a novel idea to generate 3D indoor scenes from just sentences using the ScanNet dataset. Diffusion models are used to generate objects and the layout, conditioned on text prompts. This is done as guided research under Prof. Dr.Matthias Niessner's group.

Inverse Rendering by Shape, Light, and Material Decomposition from Images using Monte Carlo Rendering and Denoising September 2022- March 2023

In this project we optimize 3D geometry, lighting and material from multi-view images of an object. This was done under the practical course offered by Prof. Dr.Matthias Niessner.

3D Flow Solvers using Physics Informed Deep Learning September 2022 - Ongoing

Our team worked on creating a dataset consisting of 3D simulations of karman vortices and the consequent vortex shedding. Developed physics informed 3D UNets which predicted the karman vortices in a recurrent fashion, which is 10 times faster than just the physics simulator. Done under Prof. Dr. Nils Thuerey's group.

3D Semantic Reconstruction from a Single RGB Image May 2022 - August 2022

The task is to predict 3D meshes of objects with semantic labels from a single RGB image. We propose a novel method to ensure feature propagation of pretrained 2D architectures into the 3D space. This project was done as a part of the elite ADL4CV course offered by Prof. Dr.Matthias Niessner's group at TUM .

Cancer Cellularity Prediction System December 2018 - March 2019

The challenge was to predict cancer cellularity given an image of a tissue. Achieved a position of 6 out of 100 teams at the time of conclusion, with a prediction probability of 0.88 using an ensemble of ResNet architectures. Developed a user interface for the same using Kivy.

COURSES

University Courses

- IN2064 Machine Learning
- IN2346 Introduction to Deep Learning
- IN2390 Advanced Deep Learning for Computer Vision : Visual Computing
- IN2298 Advanced Deep Learning for Physics
- IN2375 Computer Vision III: Detection, Segmentation and Tracking
- IN2354 3D Scanning and Motion Capture

TECHNICAL SKILLS

Skills:	Machine Learning, Computer Vision
Languages:	Python, C++, MATLAB
Frameworks:	Tensorflow, Pytorch, Keras, OpenCV