Harinandan Teja Katam

Masters student at TU Munich

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Machine Learning enthusiast with practical experience in the application of Deep Learning to Computer Vision

Education

Technische Universität München — *Munich, Germany*

Masters in Informatics - **GPA: 1.639/4.0** (Best possible grade - 1.0) — *Oct 2018 - present*

- Specializing in **Machine Learning, Deep Learning and Computer Vision**

Indian Institute of Technology Bombay — *Mumbai, India*

Bachelor of Technology in Computer Science and Engineering - **GPA: 7.83/10.0** — *April 2012 - Aug 2016*

- Secured all India rank 35 in IITJEE (Indian Institute of Technology Joint Entrance Examination) 2012 among 470,000 people

Skills

Machine Learning	Regression, Decision trees, Random forests, Boosting, Bagging, SVM, Variational Methods
Deep Learning	CNNs, Generative Models, Recurrect Neural Networks, Transformers, Tracking, Detection, Segmentation, Graph Neural Networks, Reinforcement learning, 3D Segmentation, 3D Reconstruction, Optical Flow
Languages and Frameworks	Python, Java, C++, Bash, LaTeX, Cuda TensorFlow, PyTorch, PyTorch3D, Docker, OpenCV, Django, Flask, Spring Batch, Git, Slurm
Spoken Languages	English, German (A1), Hindi, Telugu (Mother tongue)

Research Projects

Deutschen Zentrums für Luft- und Raumfahrt (DLR) — *Oberpfaffenhofen, Germany*

Work Student — *June 2019 - Feb. 2020*

- Developed an algorithm to compress a **TSDF(Truncated Sign Distance Field)** volume of a 3D scene by 64 times using **generative models**
- Experimented with different generative model architectures **(GAN, Generative Latent Optimization (GLO), Auto Encoders)** and training methods using **TensorFlow**
- Designed various **loss shaping** strategies to improve the reconstruction from the compressed TSDF
- Incorporated semantic information to the encodings to further improve the reconstruction
- Helped writing code to generate segmentation data for the TSDF volumes from 3D meshes efficiently using **C++**

Master Thesis - 3D Mesh Segmentation using Transformer Based Graph Operations — *DLR Oberpfaffenhofen, Germany*

Prof. Rudolph Triebel — *March 2020 - Nov 2020*

- Designed a new graph convolution operation based on the famous **transformer** architecture using the attention mechanism
- Tested the effect of positional encoding on the convolution layer for the task of **3D mesh segmentation** on **ShapeNet** and **Coseg** datasets
- Implemented a custom **c++/cuda extension** to **PyTorch** to dynamically calculate neighbors up to a certain depth on GPU, to apply the concept of atrous convolution.

Deep Building Design Assistant — *TUM Munich, Germany*

Jimmy Abualdenien, PhD Student — *June 2019 - Jan 2020*

- Implemented an algorithm inspired from **Pix2Pix** to generate realistic looking 3D building plans with just the shape of the building as an input
- Built an end to end pipline involving data generation, model training **(GAN, FCNN)** in **TensorFlow 2.2**
- Wrote scripts using **OpenCV** to generate vectorized form from the output of the model and using Blender to generate the 3D building plans from the vectorization

Experience

Flipkart — *Bangalore, India*

Software Development Engineer I — *June 2017 - August 2018*

- Developed a **Django** based web application for the support team to automate the debugging of an issue raised by the customer.
- Used **Docker** to create images of the application and host the web app internally
- Built a Java **Spring** application to process huge Excel files of product information from the sellers and update them in the Flipkart Seller system.
- Used **Spring Batch** Remote Chunking (master slave) to distribute the processing of huge files to the slaves using **Apache Kafka** as a messaging system between the master and the slave.
- Used **Apache Kafka** to maintain priority queues to prioritize the processing of the files of premium sellers.

Dolat Capital

Mumbai, India

Quantitative Analyst

July 2016 - May 2017

- Helped developing various strategies to trade Stock Options, Futures and Equity at very high frequency profitably.
- Built a linear regression model with features generated using various technical indicators like Bollinger Bands, Z-score, Weighted average price.
- Used multiple feature and model filtering techniques such as p-value, t-test, z-test, R-Squared, Variation Inflation Factor.

Microsoft India Development Center

Hyderabad, India

Software Developer Intern

May. 2015 - July. 2015

- Developed an Android app which enables the user to explore and obtain all required details about attractions nearby, or in any other city
- Extended the app to provide popular phrases pertaining to that region that could be useful along with their translation, transliteration and possible responses
- Worked on both front-end and back-end making use of Model-View-Controller (MVC), Entity Framework, ASP.NET, Azure Web Service and Python scripts to insert data

Academic Projects

Articulation aware Canonical Surface Mapping

TUM Munich, Germany

Prof. Thies Justus

April 2020 - July 2020

- Implemened the algorithm from the **CSM** paper to predict canonical surface mapping to map pixels of an object from an image to a 3D mesh template. Trained the model on **ImageNet (Zebra), p3d (car) and cub (bird)** datasets
- Implemened **U-Net** architecture to predict the surface mappings and **ResNet-50** powered model to predict camera parameters
- Used the latest **PyTorch** and **PyTorch3D** libraries for the rendering of 3D template

Visualizing and understanding Network Topologies

TUM Munich, Germany

Vladimir Golkov, PhD Student

Nov 2019 - April 2020

- Helped designing a visual language for neural network topologies which is simpler, easier to understand and compare with other topologies
- Designed multiple famous network topologies **GAN, Auto Encoders** using the visual language.

Machine Learning on Building data

TUM Munich, Germany

Zahedi Ata, M.Sc.

June 2019 - Aug 2019

- Using **Dynamo** extracted multiple features such of the area of the walls, distribution of area in different directions, from a building model imported into **Revit**.
- Trained a machine learning model to predict the type of the building using the extracted features

3D Reconstruction via Direct Semi-Dense Visual Odometry using Stereo Camera

TUM Munich, Germany

Prof. Thies Justus

Jan 2019 - Feb 2019

- Helped implementing an algorithm to estimate Odometry from stereo camera setup in real time at 30fps.
- Implemented a **block matching** algorithm to generate depth from stereo images.

3D Scanning and Motion Capture

TUM Munich, Germany

Prof. Thies Justus

Nov 2018 - Jan 2019

- Implemented **Iterative Closest Point(ICP)** algorithm in c++ to align two bunny point clouds
- Implemented a simpler version of the bundle adjustment to **reconstruct a 3D scene**

Key point prediction on face using CNN

TUM Munich, Germany

Prof. Dr. Laura Leal-Taixé and Prof. Dr. Matthias Niessner

Jan 2018

- Implemented a **Fully Convolutional Neural Network** to detect keypoints on a face using **PyTorch**.

SAFE (QuizApp)

IIT Mumbai, India

Prof. Bhaskaran Raman and Prof. Kameshwari

- Developed an **iOS** application in **swift** and Objective-C used by instructors to conduct online examinations in classroom for students securely

Open Source Contributions

BlenderProc

DLR, Oberpfaffenhofen, Germany

https://arxiv.org/abs/1911.01911

- Implemented texture randomization feature which when used for training makes sure the model learns from the geometry rather than from the textures
- Github: https://github.com/DLR-RM/BlenderProc