

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 (TUM)

MASTERS IN INFORMATICS - GPA: GERMAN 1.639/4.0, US 3.6/4.0

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

Munich, Germany

Oct 2018 - present

Indian Institute of Technology Bombay (IIT Bombay)

BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING - GPA: 7.83/10.0

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

Mumbai, India

April 2012 - Aug 2016

Skills

Machine Learning

Regression, Decision trees, Random forests, Boosting, Bagging, SVM, Variational Methods

Deep Learning

CNNs, Generative Models, Recurrent 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

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.

German Aerospace Center (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++**

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 pipeline 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

QUANTITATIVE ANALYST

Mumbai, India

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

SOFTWARE DEVELOPER INTERN

Hyderabad, India

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

PROF. THIES JUSTUS

TUM Munich, Germany

April 2020 - July 2020

- Implemented 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
- Implemented **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

VLADIMIR GOLKOV, PHD STUDENT

TUM Munich, Germany

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

ZAHEDI ATA, M.SC.

TUM Munich, Germany

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

PROF. THIES JUSTUS

TUM Munich, Germany

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

PROF. THIES JUSTUS

TUM Munich, Germany

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

PROF. DR. LAURA LEAL-ITAIXÉ AND PROF. DR. MATTHIAS NIESSNER

TUM Munich, Germany

Jan 2018

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

SAFE (QuizApp)

PROF. BHASKARAN RAMAN AND PROF. KAMESHWARI

IIT Mumbai, India

- 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

[HTTPS://ARXIV.ORG/ABS/1911.01911](https://arxiv.org/abs/1911.01911)

DLR, Oberpfaffenhofen, Germany

- 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>