rish-av.github.io

Rishav

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Education

Birla Institute of Technology & Science, Pilani, Rajasthan, India — August 2020
Bachelor of Engineering in Computer Science
Relevant Coursework: Data Structures and Algorithms, Neural Networks and Fuzzy Logic, Probability and Statistics , Linear Algebra, Differential Calculus, Integral Calculus, Pattern Recognition, Machine Learning

Publications

1. Rishav*, Ramy Battrawy*, et. al. DeepLiDARFlow: A Deep Learning Architecture For Scene Flow Estimation Using Monocular Camera and Sparse LiDAR. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS-2020)*.
2. Rishav*, René Schuster*, et. al. ResFPN: Residual Skip Connections in Multi-Resolution Feature Pyramid Networks for Accurate Dense Pixel Matching. *In IEEE International Conference on Pattern Recognition (ICPR-2020)*, Oral (top 6%) (Rejected from CVPR-2020)

Experience

Augmented Vision, DFKI, Kaiserslautern, Germany — March 2021 - Present
Research Engineer under Professor Dr. Didier Stricker

- Working on *real-time* deep learning algorithms for *spot spraying* in agricultural fields in collaboration with industrial partner HYDAC.
- Developed a channel attention based semantic segmentation model that can use global information to successfully segment crops and weeds across varying growth stages.
- Developed an unsupervised stereo matching network to estimate biomass with the help of the predicted disparity.
- Currently working on quantization aware training and knowledge distillation for increasing the speed to 20 fps from 2 fps on NVIDIA Javier NX platform.

Wells Fargo EGS, Hyderabad, India — Aug 2020 – Feb 2021
Software Engineer in the Capital Markets Team

- Automated monitoring of ETL jobs involving over 10 Terabytes of Wells Fargo's financial data everyday, a task that was done manually previously: *Stack: Visual Studio, ReactJS, NodeJS, SpringMVC, SQL*
- Assisted in EPL migration (version transfer) of Wells Fargo's trading software

Chloropy, Singapore — Summer 2020
Research Intern

- Developed an unsupervised learning algorithm for estimating crop depth (height) using drone images from multiple views.
- Assisted in curating the dataset for training the algorithm.
- The work was used as a proof of concept by Chloropy.

Augmented Vision, DFKI, Kaiserslautern, Germany — July 2019 – Dec 2019
Research Intern (undergraduate thesis) under Prof. Dr. Didier Stricker

- Developed a deep learning algorithm for effectively combining *monocular* RGB and LiDAR information for predicting robust scene flow especially in difficult regions like reflective surfaces.
- Used confidence-based convolutions to handle sparsity in LiDAR maps and further used the confidence maps to effectively fuse RGB and LiDAR features.
- Outperformed state-of-the-art Image only and LiDAR only scene flow methods on challenging KITTI dataset and obtained large improvements in difficult regions.
- Additionally, developed a design tweak in Feature Pyramid Networks that improved results on all dense matching tasks on all datasets. Work was presented at *IROS-2020 and ICPR-2020*.

Pixxel, Bengaluru, India — Summer 2018

Research Intern

- Worked on deep Learning algorithms for denoising hyperspectral images.
- Implemented 3D CNN based HSID-CNN for the same and trained it on LANDSAT images.
- Deployed it on google cloud, used *Google BigQuery* to feed in the model.

Academic & Implementation Projects

- **GAN for Cross Modal Stereo Matching**: PyTorch implementation of "Unsupervised cross spectral stereo matching by learning to synthesize", involves spectral translation with CycleGAN and matching with DispNet using unsupervised disparity losses.
- **Visual Common-Sense Reasoning**: Implemented the baseline version of VCR in PyTorch and experimented a new attention mechanism based on bounding boxes of objects, obtained marginal improvements. **(Fall 2019)**
- **Compiler Construction :** Built a compiler for a given language specification in C language, included separate modules for lexer, parser, semantic-analyzer, code-generator. (**Fall 2018**)
- **Machine Learning for Structural Health Monitoring**: - Implemented auto-regressive model for feature extraction and several unsupervised algorithms like one-class SVM for final classification. Integrated a new backbone into segmentation models API for semantic segmentation using Keras. These projects were done at CEERI-Pilani. (**Fall 2017**)
- **Active Learning**: Implemented active learning algorithms on MNIST, tested various techniques like Query by committee & uncertainty sampling, also tested cluster based testing technique where whole dataset was labelled on the basis of just 10% of points. (**Spring 2019**)

Technical Experience

Head Teaching Assistant, Neural Networks and Fuzzy Logic — Jan 2020 – May 2020

TA under Professor Surekha Bhanot

- Guided a team of 10 TAs and assisted Prof. Surekha Bhanot for designing assignments and course projects for a class of 150 students.
- Automated assignment grading using NBgrader.

Achievements

- Awarded certificate of excellence by Govt. of India for scoring 99.0/100.0 in Mathematics in High School All-India Exam.
- Obtained a score of 390/450 in BITSAT, test for admission to BITS Pilani, placing me in top 1000 out of 350 thousand students.
- Obtained an all India percentile of 99.90 out of 1.2 million candidates in Joint Entrance Examination (Main).
- Amongst 4,000 people selected for National Talent Search Examination scholarship out of 0.5 million candidates for the year 2014.

Extra Curriculars

- **Senior Member, BITS-ACM Member of the student chapter of ACM at BITS Pilani**: Regular contributor to the machine learning and computer vision special interest group.
- **Team Leader, Nirmaan Organization**: Lead the social project Gyanbodh Harinagar, introduced the concept of Activity Based Learning to Kids of the Hari Nagar village.

References

- **Prof. Dr. Didier Stricker,** Director at Augmented Vision, DFKI, Germany (Didier.Stricker@dfki.de)
- **Prof. Oliver Wasenmueller**, Professor at Hochschule Mannheim, Germany (o.wasenmueller@hs-mannheim.de)
- **Prof. Surekha Bhanot,** Professor at BITS Pilani, Rajasthan, India (surekha@pilani.bits-pilani.ac.in)