SHRISUDHAN G
INDIAN INSTITUE OF TECHNOLOGY, MADRAS

EDUCATION

Program	Institution	CGPA / %	Year
Integrated Dual Degree: Mechanical Engineering & Data Science	Indian Institute of Technology, Madras	9.17	2022
Class XII	Maharishi Vidya Mandir, Chennai	96.2	2017
Class X	Maharishi Vidya Mandir, Chennai	10.0 pts	2015

RELEVANT COURSE WORK AND SKILLS

Introduction to Programming using C	The Joy of Programming using Python	Probability, Statistics and Stochastic Process
Mathematical Foundations for Data Science	Pattern Recognition and Machine Learning	Deep Learning
Reinforcement Learning	System Engineering for Deep Learning	Computer Vision
Computational Photography	Computational Imaging and Displays	Big Data Laboratory
Programming Languages: Python, C, C++, MATLAB	Frameworks: Pytorch, OpenCV, NumPy, Pandas, Sklearn, Spark	

SCHOLASTIC ACHIEVEMENTS

AISSCE-2017	**Top 0.1% in AISSEC-2017** in Physics and Mathematics Exam conducted by Central Board of Secondary Education, India
NSEC-2017	**Top 1% in NSEC at National level** conducted by Association of Chemistry Teachers, India
NSEP-2017	**Top 1% in NSEP at State level** conducted by Indian Association of Physics Teachers, India
RMO-2016	Among **Top 33 candidates in Tamil Nadu** in **Regional Maths Olympiad** conducted by HBCSE, India

PROFESSIONAL EXPERIENCE

Summer Internship

Data Scientist at Microsoft India (STCI), Hyderbad — **May'21 – Jul'21**

- **Extracted important features** for a ranking algorithm **from the raw user log** and **developed an Online Ranker to rank related suggestions** for ranking queries based on the relatedness and usefulness of the suggestion in an **Enterprise-level setup**.
- **Implemented Generative Adversarial Network** based approach to improve the performance on a large block of unlabelled data and **improve generalization**.
- **Improved the DCG score** of the ranker **from a baseline of 1.53 to 2.34 on test set.**
- Recipient of **Pre-Placement Offer** for my work during internship.

Summer Internship

Machine Learning Engineer at AutoInfer Pvt. Ltd., Bangalore — **June'20 – Aug'20**

- Developed a Generative Adversarial Network for **generation of realistic documents from user-specified layouts** inspired by the Layout2Image algorithm.
- Developed an algorithm to **render additional noise, erosion, and dilation effects** to improve the realistic quality of the document. The rendered document is warped on different backgrounds using perspective projection to mimic captured documents.
- **Built a table detection network** inspired by LayoutLM algorithm which **extracts textual and image features** from the document to detect tables and information. The network was trained on a combination of ICDAR dataset and generated dataset.

Summer Internship

Production Engineer India Yamaha Motors Pvt. Ltd., Chennai — **June'19 - July'19**

- Developed a procedure to **optimize and semi-automate the assembly process** for head cylinder used in Yamaha Z-ray.
- **Designed an easily transportable carrier** for transporting assembled head cylinders from one production line to another.

RESEARCH PROJECTS

Research projects, Guided by Prof. Kaushik Mitra

Self-Supervised Light Field Video Reconstruction for Smart Phones

- Developed a **self-supervised algorithm** which **uses monocular input video** from camera incorporated in smartphones **to reconstruct Light field video**.
- Incorporated **Convolutional LSTM architecture to obtain temporal information** from the video to facilitate Light Field reconstruction for videos.
- Incorporated **Adaptive Tensor Display module** which will be used to **reconstruct novel-views** from the intermediate light field feature representation adjusting to the input depth map of the image.
- **Additional losses** are added to ensure **photometric consistency**, **geometric consistency and temporal continuity.**
- A **novel occlusion handling loss** was introduced to fill dis-occluded regions in angular views from consecutive video frames.
- A **novel transformer-based refinement block** was implemented to **refine reconstructed light-field** based on **angular-attention**.
- **Outperforms current SOTA** light field reconstruction networks from monocular video.
- Paper accepted for **Oral presentation in ECCV'22, Tel Aviv, Isreal.**
- Developing a self-supervised algorithm to **reconstruct light-field video from Dual-Pixel video** obtained from **Google Pixel 4 smartphone**.
- **Winner of Qualcomm Innovation Fellowship (QIF) 2021** in Multimedia platform across different universities in India.

COURSE & OTHER PROJECTS

IRIS Controls, Centre for Innovation

Head of Computer Vision team

- **Guided a team of 10 members** working on improving and implementing SOTA networks on lane detection in roads, 3D object detection from stereo pair, signal and sign board detection and object tracking for vehicles.

	• Developed **multi-task learning algorithm**, with a common MobileNet backbone utilizing the above specified networks' task specific layers **to reduce the latency per prediction & improve generalization.** • **Guided a team of 3 members** who were **developing mobile application for enhanced edge application of deep learning models** on utilizing inbuilt Adreno GPUs **optimally using pruning and caching techniques**.
Computational Photography Course Project	**Self-Supervised HDR Video Reconstruction using Coded Exposure Sensor** • Developed a Seg-Net based **HDR (High Dynamic Range) reconstruction network** which **uses multiple neighbouring frames with alternate LDR (Low Dynamic Range)** exposures as the input **to reconstruct HDR frames**. • **Temporal-Shift Module (TSM)** was incorporated to **improve information retrieval** and to **enable the network to learn temporal consistency**.
Computational Imaging and Displays Course project	**Implemented HoloGAN: Unsupervised learning of 3D representations from natural images paper** • Implemented HoloGAN model for 3D novel-view synthesis from a single input image using 3D CNN to extract 3D representational information and pinhole camera model for projection. • Improved network performance by **introducing skip connections** and used bottleneck **architecture for optimizing latency and compute**.
System Engineering for Deep Learning Course project	**Caching in DNNs - Speeding up inference for similar inputs** • Analysing the **effect of caching** across various layers of a deep convolutional network **to solve poor information propagation** in various models and **to improve inference time.** Developing fast and robust classifier for the cache obtained from the pre-trained models. • **Improved accuracies** of various baseline models by **2-5% for CIFAR-10/100.** • **Enhanced privacy** by preventing white box attacks across various models.
Deep Learning Course project	**Implemented Large-scale Video Classification with Convolutional Neural Networks paper** • Implemented and analysed the performance of various frame fusion techniques for efficient video classification on UCF-101 dataset. • Implemented **back-bone models with skip-connections** and **improved classification accuracy by 3-5**%.
Reinforcement Learning Course project	**Hierarchical RL for Room Grid World and Deep RL for CartPole** • Implemented **Semi-MDP based Q-learning technique with and without intra-option** learning model to learn the policy/action value function for Room Grid World. • Implemented **ANN architecture-based Q-learning algorithm with Experience Replay** to avoid overfitting and **Target Network** for learning action value function for CartPole environment.
Pattern Recognition and Machine Learning Course Project	**Data Contest: Rank Cyclist group Preferences based on different cycling tours** • Extracted biker, biker's friends, and tour related features from raw real-life dataset. • Trained Gradient Boosting Tree based classifier to predict whether the tour will be liked by the biker. • Obtained an **MAP@k of 0.736 in the private test set** and 0.**762 in public test set**.
Mathematical Foundations for Data Science Course project	**Analysis on COVID-19 data, Application of Singular Value Decomposition for Face-classification** • Applied **SVD on a set of images** provided for each person's face to obtain the **most optimal representation** across various images with different orientation, camera position and direction of view. Obtained prediction **accuracy of 99.3% over 10 classes**. • Analysed COVID-19 data provided for a month to highlight the effect of transmission across states and identified current hotspots and potential hotspots. Predicted the future medical facilities requirements using ARIMA algorithm.
EXTRA AND CO-CURRICULAR ACTIVITIES	
International Data Analytics Olympiad (IDAO) 2021	**Dark Matter Search with CYGNO experiments** • Applied **bilateral filtering technique** to perform **denoising** to retrieve error-free recorded Electron and Nuclear recoil image results recordings. • Trained a Deep CNN model based on DenseNet architecture to predict the KeV of the recoil. • Ranked **6th in public test set** and **27th in private test set** among various participants across the world.
Subex AI Challenge, IITM Shaastra 2021	**Table Detection for Documents** • Developed **object detection and NLP inter-linked model** inspired by LayoutLM paper to extract both textual, positional, and visual features. Achieved a score of **0.86 MAP@0.5 in private test set**. • Awarded **2nd place among 50 contestants** in Table structure and Information extraction from documents.
Astrazeneca AI Challenge, IITM Shaastra 2020	**Pneumonia detection and Toxic sentence identification** • Developed **object detection network** for identifying the **presence of Pneumonia** and other lung infection from X-ray scans with an **IoU of 0.64**. • Developed simple **two-layer Bi-LSTM** to identify the **presence of toxicity in a sentence** with **92% prediction accuracy**. • Awarded **Fourth place among 30 contestants** in a competition with CV and NLP tasks.
Inter IIT Tech Meet, 2019	• Represented IIT-Madras in Engineer's Conclave event in **7th Inter-IIT Tech Meet**, 2019 and presented work on ADAS.
Sports & other activities	• Represented IIT-Madras Football team in Sports Fest - 2019 & have won in badminton and football events for Ganga hostel. • Trinity College London, Theory of Music Grade 2 with distinction awardee