Gopi **Kishan**

Machine Learning Enthusiast

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"What I can not create, I do not understand."

Summary

A curious computer scientist in making trying to find answers and solutions for problems in Artificial Intelligence. Familiar with Machine Learning, Deep Learning, Reinforcement Learning and Computer Science Fundamentals, with a specific interest in Computer Vision, Bayesian Learning and Representation Learning. Easily excited by mathematics, music and tea.

Education

Indian Institute of Technology, Roorkee — *Roorkee, India*

B.Tech. in Computer Science and Engineering — *2017 - Exp. 2021*

- CGPA: 9.1/10

Cambridge Public School, Raxaul — *Raxaul, India*

Grade 12 (Senior Secondary Level) — *2017*

- Percentage: 90%

Cambridge Public School, Raxaul — *Raxaul, India*

Grade 10 (Secondary Level) — *2015*

- CGPA: 10/10

Experience

CVR - VISTA Vision Science Summer School 2020 — *York University, Canada*

CVRSS summer school fellow — *July 6, 2020 - July 10, 2020*

- Selected for vision summer school program (under 40 around the world), goes virtual due to COVID-19

Max Planck Institute - Intelligent System (MPI-IS) — *Tübingen, Germany*

Remote Research Internship — *May, 2020 - *Dec, 2020*

- Summer Research Internship under the guidance of Prof. Stefan Bauer and post-doc Xiaoguang Dong.
- Working jointly with Empirical Inference and Physical Intelligence Departments
- Work involves building a gym-simulator for particles and applying Deep Reinforcement Learning for control.
- Next step will be sim2real onsite depending on COVID-19 situation

University of British Columbia, Okanagan (UBCO) — *British Columbia, Canada*

Project Collaboration — *Since April, 2020*

- Collaborating on project under the guidance of Prof. Apurva Narayan, Department of Computer Science, UBCO
- Part of the Data Science and Artificial Intelligence Group (DSAIG)
- Work involves verification of robustness of Deep Learning systems.

Indian Institute of Science (IISc) — *Bangalore, India*

Research Internship — *May, 2019 - Dec, 2019*

- Summer Research Internship under the guidance of Prof. Debasish Ghose.
- Part of the Guidance, Control and Decision Systems Laboratory (GCDSL) at the Department of Aerospace, IISc.
- Worked on model compression techniques.
- Experimented with pruning, weight matrix factorization, quantization and knowledge distillation on DNN and autoencoders.
- Explored latent representation priors in Variational AutoEncoder. Github *link*.

Indian Institute of Technology Bombay (IIT B) — *Mumbai, India*

Internship — *June 2018 - July 2018*

- Summer internship under the supervision of Dr. Biplab Banerjee
- Associated with VIP lab under CSRE department IIT Bombay
- Worked on Face detection algorithms (RCNN, Fast-RCNN, Faster-RCNN, YOLO) on VGG-16 architecture and trained on Widerface dataset.

Projects

Quantum Machine Learning
IIT Roorkee 2020

Lab Based Project — *Jan, 2020 - June, 2020*

- This project, under the guidance of Dr Sugata Gangopadhyay, aims at applying the advantages of quantum computing to Deep Learning.
- Explored the structure of Quantum GANs and method to discriminate a randomly initialised qubit.
- For a complete detail refer my *report* and *presentation* on this project and play around the experiments in google colab *here* and *here*.

Reproducibility Challenge
NeurIPS 2019

Competitive Gradient Descent — *Nov 1, 2019 - Dec, 2019*

- The paper introduces a novel algorithm for the numerical computation of Nash equilibria of competitive two-player games.
- Following baseline track, I have re-implemented the proposed CGD algorithm in python3 (using PyTorch).
- The reproducibility report is publised at *arXiv* and source code in this GitHub *repository*.

PunyNet
DeepMind, hosted at NeurIPS 2019

MicroNet: Large-Scale Model Compression Competition — *May, 2019 - Oct, 2019*

- This project aims at efficient inference on CIFAR100 dataset by compressing the model size.
- Quantized a resnet18 model by learning a codebook C that minimizes the difference between the output activations and their reconstructions.
- Detailed description and code are available *here*.

Self Balancing Bot using RL
IIT Roorkee, India

Project under ARIES, IIT Roorkee — *October, 2018 - March, 2019*

- This project aims at stabilising a two-wheeled robot using Reinforcement Learning.
- Q-learning algorithm is used to train the bot in a virtual environment made using gym and pyBullet.
- Detailed description and code are available *here*.

Honours & Achievements

2020 **ICML,** Selected for volunteer at virtual ICML conference.

2020 **CVRSS,** Selected for Vision Science Summer School at York University, Canada. Goes Virtual due to COVID-19

2020 **MITACS Fellow,** Selected for the MITACS Globalink program. Cancelled due to COVID-19 — *UBCO, Canada*

2019 **Micronet Challenge,** TPU Credits Awardee, Awarded to global top 25 proposals.

2019 **Flipkart Grid-Challenge,** Under top 5 at IITR (and 36th in India).

2017 **All India Rank - 1114,** JEE Advanced, administered by Indian Institutes of Technology

2017 **All India Rank - 2700,** JEE Main, taken by more than a million students.

AIChallenges

IDAO 2020
Online Round

International Data Analysis Olympiad 2020 — *Jan 15, 2020 - Feb 11, 2020*

- The problem statement involves modeling of accurate trajectories of satellites from previous data. Repo at *link*.

Inter-IIT Tech Meet 8.0
India

BITGRIT's Data Science Contest — *Nov. 2019 - Dec. 2019*

- The problem statement involves modeling of variation of exchange rates between local and foreign currency.

PanIIT Challenge 2019
India

Organised by Tata Consultancy Services Limited (TCS) — *Jan. 2019*

- Built a tuberculosis detection andriod app based on Deep Visual Attention using TFLite.

Microsoft AI Challenge 2018
India

Organised by Microsoft — *December 2018*

- phase 1 : Involved improvement in classical page rank algorithm.
- phase 2 : Involved exploration of NLP based technique to find relevant search results on bing search engines.

Writing

Tricks for Manipulating Probability
Medium

writer — *Dec 20, 2019*

- Published at towards data science, medium, this blog aims at summing up together the various techniques applied in different probability problems to make calculations easier and, sometimes,even possible! *Read*

Skills

Programming	Python, C++, JAVA, C, Javascript
Frameworks and Packages	Tensorflow, Keras, scikit-learn,, openCV, gym, Numpy, Pandas, Matplotlib
Utilities	Git, Linux Shell, Vim, VS Code, GitHub, jupyter
Relevant Courses (online)	Deeplearning.ai Specialization (by Andrew Ng), csn231n (for Computer Vision) csn229 (for Machine Learning), RL course by David Silver, stat110 (for Probability and Statistics)
Books Referred	Deeplearning by Goodfellow, Pattern Recognition and Machine Learning by Bishop, Reinforcement Learning : An Introduction by S. Sutton
Courses	Mathematics-1 (covered Linear Algebra and Calculus), Optimization Techniques, Artificial Intelligence Signal and Systems, Discrete Structures, Data Structures and Algorithms, Machine Learning, Quantum Computing

Extracurricular Activity

Google Code-in 2019 *India*

Tensorflow Mentor *Dec,2 2019 - Jan., 2020*

- Here, I lent a helping hand to pre-university students to learn what it's like to work on an open source project.

Artificial Intelligence and Electronic Society (ArIES) *IIT Roorkee, India*

Core Member *May 2019 - PRESENT*

- Here, I am currently working on robustness against Adversarial Attacks. I am studying various attacks and defence mechanisms with a particular interest in vision models.
- Alongside, I am mentoring the project "Translational Tools" for SHRISTI, an Annual Technical Exhibition of IIT Roorkee.

ACM-IIT Roorkee Chapter *IIT Roorkee, India*

Outreach Head, (Previously Moderator) *July 2019 - PRESENT*

- As Outreach Head, I connect researchers from ACM network and organise talks.
- As Linux discussion moderator, my responsibility was to organise discussions on Linux OS for freshers and sophomores.

Smart India Hackathon Grand Finale *India*

Organised by MHRD, India *2019*

- Built a Blockchain based complaint system to assist fixing water wastage issues.

References

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