

Divyam Goel

SENIOR YEAR - ELECTRONICS AND COMMUNICATIONS
Indian Institute of Technology Roorkee, India

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Education

Indian Institute of Technology Roorkee

B.TECH. IN ELECTRONICS AND COMMUNICATIONS ENGINEERING

- Cumulative Grade Point Average - **9.16/10.0**

Roorkee, India

2018 - Present

Delhi Public School Gurgaon

SENIOR SECONDARY EDUCATION

- All India Senior School Certificate Examination - **93.75%**
- All India Secondary School Examination - **9.8/10.0**

Gurgaon, India

2014 - 2017

Publications

On the Cross-Modal Transfer from Natural Language to Code Through Adapter Modules

ICPC 2022

DIVYAM GOEL | RAMANSH GROVER | FATEMEH H. FARD

Paper Link

- D. Goel, R. Grover, and F. H. Fard, "On the cross-modal transfer from natural language to code through adapter modules," 2022. [Online]. Available: <https://arxiv.org/abs/2204.08653>

Work Experience

Research Assistant | GIST Vision Lab

PROF. JONGHYUN CHOI | GIST

Gwangju, South Korea

July 2021 - Present

- Working on improving the current state of vision and language navigation for embodied agents.
- Collaborated on a research project which aims to build multi-modal transformers for story visualization.

MITACS Globalink Research Intern

PROF. FATEMEH H. FARD | THE UNIVERSITY OF BRITISH COLUMBIA

Kelowna, Canada

June 2021 - Sept. 2021

- Led a collaborative effort to develop efficient but accurate language models for software engineering tasks.
- Exploited cross-modal transfer of adapters to achieve 140× better parameter budget and ~95% efficient storage over SOTA.
- Built the Super Code Clone Detection - 88 (SCD-88) dataset for evaluation on python-specific code clone detection.
- [Github Link] [Data]

Research Intern | Pando Labs

PANDO CORP PLC

Chennai, India

Aug 2020 - Nov 2020

- Worked on developing novel deep reinforcement learning solutions to optimize shipping costs in the freight industry.
- Achieved ~ 85% packing efficiency in 3D bin packing and ~ 50% cost efficiency in capacitative vehicle routing over existing solutions using off-policy agents in simulated environments.
- Re-architected a heuristic algorithm to improve efficiency and allow parallelised operations on GPUs.

Selected Projects

Semi-NMF Regularized Autoencoders for Hyperspectral Unmixing

PROF. SAURABH KHANNA | INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

IIT Roorkee

Feb. 2021 - July 2021

- Derived a new regularization scheme for autoencoders based on Semi-NMF optimization constraints.
- Applied to hyperspectral unmixing, showing improvements in performance over synthetic and real world datasets.
- Submitted to 2022 IEEE International Conference on Signal Processing and Communications (SPCOM)

A Multi-Task Approach for the POS Tagging of Code-Mixed Social Media Data

PROF. RAKSHA SHARMA | INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

IIT Roorkee

Sept. 2020 - Feb. 2021

- Led a collaborative effort to develop a novel Multi-Task learning approach for code-mixed POS tagging (Hindi & English).
- Proposed methodology augments the capacity of word embeddings and can be extended to other low-resource domains.

Leveraging Dependency Grammar for Offensive Language Detection

PROF. RAKSHA SHARMA | INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

IIT Roorkee

June 2020 - Sept. 2020

- Developed a novel approach for hate speech detection on Twitter which achieves state-of-the-art performance.
- The proposed approach utilizes inherent dependency structures to overcome biases introduced by pejorative word senses.
- Submitted to the 10th International Workshop on Natural Language Processing for Social Media @ NAACL 2022

Customer Churn Management

IIT Roorkee

PROF. JONGENDRA KUMAR NAYAK | INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Aug. 2020 - Dec. 2020

- Led a collaborative effort to develop an agent that predicts consumer churn in the Indian Telecom Industry.
- Conducted an empirical analysis of the interpretability of data mining techniques as customer churn prediction models.
- Hosted the demo agent on the heroku-app. [\[Report\]](#) [\[Demo\]](#)

Direction Finding Proximity Fuze Sensor

IIT Roorkee

TERM PAPER | ENGINEERING ELECTROMAGNETICS

Feb. 2020 - April 2020

- Surveyed Machine Learning methods employing the use of LIDAR for a proximity fuze sensor.
- Proposed a Gaussian Mixture Model for mesh clutter reduction over the LIDAR generated state space.

Medical Image Segmentation and Classification Problems

IIT Roorkee

PROF. BALASUBRAMANIAN RAMAN | INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Dec 2019 - March 2020

- Designed an agent using dilated convolutions, trained using an active contour loss for segmentation.
- Developed a conditional-GAN for data augmentation and noise reduction specific to ultrasound images.
- Reviewed latest research in GANs, HCI and other Deep Learning techniques for improved segmentation in medical imaging.

Self Driving Car

IIT Roorkee

TEAM MEMBER | ARTIFICIAL INTELLIGENCE AND ELECTRONICS SOCIETY

Jan 2019 - April 2019

- Project was presented at the annual technical exhibition - **Srishti**.
- Developed a pipeline for lane detection using a combination of heuristic and deep learning methods.
- Integrated the python codes with Raspbian modules for sensorimotor control of the RC vehicle. [\[Github Link\]](#) [\[Demo\]](#)

Open Source Projects

- **HyperspecAE**: Code for the experiments on the Samson Dataset as presented in the paper: Hyperspectral Unmixing Using a Neural Network Autoencoder (Palsson et al. 2018) [\[Github Link\]](#)
- **Sentiment Analysis**: Fine Tuned a BERT model on the SMILE Twitter Emotion Dataset [\[Github Link\]](#)
- **Neural Network Visualizer**: Developed a Web Application using Flask and Streamlit for improved visualization of simple FFNNs trained using the Keras Functional API [\[Github Link\]](#)
- **Snake**: First github repository (2018), console based game of snake. During my first year of undergrad studies. Just compile the code and you are ready to go! [\[Github Link\]](#)

Notable Achievements

- 2022 **IIT Roorkee Heritage Foundation Excellence Award for 2021**: Awarded for excellence in academia & leadership.
- 2021 **MITACS GRI Scholar**: Research grant awarded by the **Mitacs-SICI partnership** to top international undergraduates for a research internship under the supervision of Canadian university faculty members.
- 2020 **IIT Roorkee Heritage Foundation Excellence Award for 2019**: Awarded for excellence in academia & leadership.
- 2017 **The Special Award For Academic Excellence**: Awarded to the top 3 students of DPS Gurgaon for academic excellence.

Relevant Courses

Machine Learning	Artificial Intelligence, Deep Learning for Computer Vision, Natural Language Processing
Mathematics	Probability and Statistics, Linear Algebra, Calculus, Discrete Mathematics
Fundamentals	Data Structures, Computer Architecture, Computer Programming, Digital Logic Design
Electronics	Digital Signal Processing, Digital Image Processing, Signals and Systems, Automatic Control Systems, Communication Systems and Techniques, Digital Communication
MOOCs	Reinforcement Learning (David Silver), Deep Learning Specialization (DeepLearning.AI), Convex Optimization (Stephen Boyd)

Datasets

Super Code Clone Detection - 88 (SCD-88)

Kelowna, Canada

PROF. FATEMEH H. FARD | THE UNIVERSITY OF BRITISH COLUMBIA

Sept. 2021

- The dataset contains 11,400 python code examples for a retrieval based code clone detection task.
- The dataset is a python-specific subset of the cross-language code clone detection dataset scraped from AtCoder.

Programming Skills

Languages	Python, Java, C++, Matlab, Octave, PERL
Tools and Libraries	PyTorch, Keras, Tensorflow, Scikit, Jupyter, Numpy, OpenCV, Flask, Streamlit
Others	Git, Vim, LaTeX, Bash, HTML/CSS, Docker

Extracurricular Activities

Vision and Language Group | Core Member

Dec 2020 - Present

- Organised deep learning centric paper reading sessions and contributing to ongoing research projects.

IEEE Student Chapter | Core Member

Feb. 2020 - Present

- Organised several paper reading sessions and invited talks to promote student interest in electronics and computing.

Watch Out! | Chief News Coordinator

Aug. 2018 - Present

- Leading a team of over 75 editors, designers and web-developers at the official student media body of IIT Roorkee.

National Sports Organisation | Squash Team

Aug. 2018 - Present

- Participated in both inter and intra college sporting events.

Kshitij - The Literary Magazine | Senior Coordinator

Aug. 2018 - April 2020

- As the member of the English Editorial Cell wrote for the semesterly magazine and performed spoken word poetry at the Annual Slam Poetry Festival, Eunoia 2019

References

- **Fatemeh H. Fard**, Assistant Professor, The University of British Columbia (fatemeh.fard@ubc.ca)
- **Saurabh Khanna**, Assistant Professor, IIT Roorkee (sakhanna@ece.iitr.ac.in)
- **Raksha Sharma**, Assistant Professor, IIT Roorkee (raksha.sharma@cs.iitr.ac.in)