

# Divyam Goel

DEEP LEARNING JUNIOR RESEARCHER

Rephrase AI

☎ (+91)8826034373 | ✉ divyamoffic@gmail.com | 🏠 dv-fenix.github.io | 🌀 dv-fenix | in divyamgoel3

## Education

### Indian Institute of Technology Roorkee

Roorkee, India

B.TECH. IN ELECTRONICS AND COMMUNICATIONS ENGINEERING

2018 - 2022

- Cumulative Grade Point Average - **9.04/10.0**

### Delhi Public School Gurgaon

Gurgaon, India

SENIOR SECONDARY EDUCATION

2014 - 2017

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

## Publications

### Language Guided Meta-Control for Embodied Instruction Following

EAI @ CVPR 2022

DIVYAM GOEL | KUNAL PRATAP SINGH | JONGHYUN CHOI

[Paper Link](#)

- Goel, D., Singh, K.P. and Choi, J., Language Guided Meta-Control for Embodied Instruction Following.

### Leveraging Dependency Grammar for Fine-Grained Offensive Language Detection using Graph Convolutional Networks

SocialNLP @ NAACL 2022

DIVYAM GOEL | RAKSHA SHARMA

[Paper Link](#)

- Goel, D. and Sharma, R., 2022. Leveraging Dependency Grammar for Fine-Grained Offensive Language Detection using Graph Convolutional Networks. arXiv preprint arXiv:2205.13164.

### 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

### Rephrase.ai

Bangalore, India

DEEP LEARNING JUNIOR RESEARCHER

June 2022 - Present

- Currently working on text conditioned many-to-one voice cloning.
- Working on improving the robustness of the facial feature generation pipeline to natural audio artifacts.
- Part of the research arm of the company aimed at developing tech to generate highly personalised videos from text scripts.

### GIST Vision Lab

Gwangju, South Korea

RESEARCH ASSISTANT | PROF. JONGHYUN CHOI

July 2021 - Present

- Working on the TeaCh benchmark to solve vision and language navigation of embodied agents through human dialogue.
- Collaborated on a research project which aims to build multi-modal transformers for story visualization.

### The University of British Columbia

Kelowna, Canada

MITACS GLOBALINK RESEARCH INTERN | PROF. FATEMEH H. FARD

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.
- [\[Github Link\]](#) [\[Data\]](#)

### Pando Labs - PandoCorp PLC

Chennai, India

RESEARCH AND DEVELOPMENT INTERN

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

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### Semi-NMF Regularized Autoencoders for Hyperspectral Unmixing

IIT Roorkee

PROF. SAURABH KHANNA | INDIAN INSTITUTE OF TECHNOLOGY 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

IIT Roorkee

PROF. RAKSHA SHARMA | INDIAN INSTITUTE OF TECHNOLOGY 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

IIT Roorkee

PROF. RAKSHA SHARMA | INDIAN INSTITUTE OF TECHNOLOGY 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.

### 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

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- 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

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

## Datasets

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### 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

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

## Extracurricular Activities

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### 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

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- **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)