Ayush JAIN

⚲ https://ayushjain1144.github.io/   ▢ +91 7011024220   @ ayushjain1144@gmail.com
 github.com/ayushjain1144   in linkedin.com/in/ayush-jain-010236150

RESEARCH INTERESTS

My research interests include computer vision, NLP and robotic control. I want to enable self-supervised robots that can interact and learn about the world in a never-ending learning fashion without requiring explicit human supervision.

EDUCATION

Year	Degree	Grade	Rank
2017-2021	B.E. (Hons.) in Computer Science, BITS Pilani, Pilani Campus	9.25 / 10.0	Department Top 10%
2015-2017	Senior Secondary, Modern International School	95.4%	State Top 3%

ACADEMIC AND INDUSTRIAL RESEARCH EXPERIENCE

May 2019 – Present

Carnegie Mellon University (CMU) | Research Associate, PITTSBURGH, USA
Project Page   Code   Arxiv
- Developed a method enabling an embodied agent to learn about objects without ground truth supervision in an unseen 3D environment by allowing the agent to move around. Research paper under review at CVPR.
- Currently working on using language cues to improve embodied visual capabilities.

August 2019 – May 2020

MultiCog Research Group | Computer Vision Research Assistant, PILANI, India
Project Page   Code   Paper Preprint
- Implemented **retinanet** from scratch and developed an aerial object detection pipeline in Tensorflow.
- Achieved **about 10%** increase in mean average precision than baseline retinanet model
- Achieved **top performances in ECCV 2020** Aiskyeye Object Detection Challenge obtaining **14%** better performance than their baseline model. (Paper in submission)

May 2019 – August 2019

Indira Gandhi Center for Atomic Research | Research Assistant, CHENNAI, India
Project Page   Code   Arxiv
- Preprocessed **7000 PDF** Nuclear research papers to build **first nuclear language dataset - NText**
- Built **NQuAD(Nuclear Question Answering Dataset)** consisting of 730 Q/A.
- Achieved F1 score of **93.87** and exact match score of **88.31** a 1.22 improvement on former and 5.21 revision on latter from Google's BERT model. (Paper in submission)

PUBLICATIONS AND PREPRINTS

2020	**Jain, A.***, Sarch, G.*, Fang, Z.*, Harley, A., Fragkiadaki, K., 2020 "Move to See Better : Towards Self-Supervised Amodal Object Detection". https://arxiv.org/abs/2012.00057 (submitted to CVPR)
2020	**Jain, A.***, Ramaprasad, R.*, Narang, P., Mandal M., et al., 2020 "AI-Enabled Object Detection in Unmanned Aerial Vehicles for Edge Computing Applications." (submitted to IEEE comsoc)
2020	Dawei Du, Longyin Wen, Pengfei Zhu, Heng Fan, Qinghua Hu, Haibin Ling, Mubarak Shah, Junwen Pan, **Jain, A.**, Narang, P., et al., 2020 "VisDrone-DET2020 : The Vision Meets Drone Object Detection in Image Challenge Results. European Conference on Computer Vision (ECCV)" (Challenge Report, in Press)
2020	**Jain, A.***, Meenachi, N.M. and Venkatraman, B., 2020 "NukeBERT : A Pre-trained language model for Low Resource Nuclear Domain." arXiv preprint arXiv:2003.13821 (2020). https://arxiv.org/abs/2003.13821

PROJECT

TOWARDS LEARNING SPATIAL COMMON SENSE THROUGH WEAK SUPERVISION : A COMPARITIVE STUDY   2019 - 2020
Report   Presentation
Reviewed, compared and analysed three recent papers proposed in generalising to novel views through the use of view-prediction self-supervision tasks as part of a course project. The report received special mention from course supervisor.

Named Entity Recognition from scratch
2019-2020

Code   Presentation

Built multilayer perceptron network for Named Entity Recognition on CONLL2003 dataset from scratch, implementing backpropagation and gradient checking. Implemented Synthetic Minority Oversampling Technique to mitigate class imbalance issues, achieving 6 point gain in F1 scores.

ABB Robot Simulation
2019-2020

Cursive Alphabet   Block Alphabets   Curved Design

Built simulation of various tasks like writing a cursive and block alphabets on a paper and building complex curved designs using AutoPath, which is finally executed on a real ABB Robot

Earthquake Prediction and Management
2018-2019

Code   Video

Implemented Rundle et al.'s research paper for probabilistic prediction of earthquake based on nowcasting. Using the previous nowcast points, a CDF is formed, using which probability of next big earthquake is predicted. This project was made under the guidance of **Dr. Sumanta Pasari**. and received **award from Microsoft**

Teaching and Leadership Roles

2019-20	Teaching Assistant, Artificial Intelligence at BITS PILANI
2019-20	Teaching Assistant, Machine Learning at BITS PILANI
2019-20	Team Leader, Microsoft Student Partner, BITS Pilani
2018-20	Teaching Assistant, Computer Programming at BITS PILANI

Course Work

On Campus	AI[1], Machine Learning[1], Foundations of Data Science, Robotics, Selected topics in CS(CV and NLP)[1]
Online	Machine Learning(Stanford), Deeplearning Specialization, CNN for Visual Recognition(Stanford), NLP with Deep Learning(Stanford), Reinforcement Learning Specialisation, Multi View Geometry (Prof. Cremers)

Awards and Scholarships

2019-20	**Google AI Summer School** 1/50 students across India selected for Google AI summer school
2019-20	**York CVR – VISTA Vision Science Summer School** 1/50 students selected worldwide
2018-20	**Institute Merit Scholarship** Awarded to top 3% students for Exceptional Academic Performance
2018-19	**Flipkart Machine Learning Hackathon (Level 1)** 2nd position in university and 33rd position nationwide
2017-18	**Mcrosoft Codefundo++ Hackathon** Placed 3rd/150+ teams on campus
2016-17	**KVPY Scholar** A national level drive for adjudging high research potential
2016-17	**National Science Examination in Physics (NSEP) Fellow**

Technical Expertise

Programmation	**Python**, **C**, **C++**, Java, HTML, CSS
Frameworks	**Pytorch**, **Tensorflow**, Django
Operating Systems	Linux, Mac OS, Wnidows 7/8/10

References

Dr. Katerina Fragkiadaki, Asst. Prof., Machine Learning Dept., Carnegie Mellon University; katef@cs.cmu.edu
Dr. Pratik Narang, Asst. Prof., Computer Science Dept., BITS Pilani; pratik.narang@pilani.bits-pilani.ac.in
Dr. N.M. Meenachi, Scientist, Indira Gandhi Center for Atomic Research; meenachi@igcar.gov.in

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1. Course Topper