

Jaspreet Ranjit

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RESEARCH INTERESTS

I am a Research Assistant in the **Vision, Language and Learning Lab** at UVA/Rice, working with **Dr. Vicente Ordóñez Román** on exploring biases in Convolutional Neural Networks. I am interested in topics of fairness and explainability of machine learning models. Currently, I am an MS candidate in Computer Science at the University of Virginia.

EDUCATION

University of Virginia, Charlottesville, VA
Master of Science, Computer Science, December 2021 GPA: 3.96
Advisor: Prof. Vicente Ordóñez Román
Focus: Analyzing Gender Biases in CNNs
Relevant Courses: Machine Learning, Vision and Language, Natural Language Processing, Algorithms, Cloud Computing, Geometry of Data, Machine Learning in Image Analysis

University of Virginia, Charlottesville, VA
Bachelor of Science, Computer Science, May 2021
Rodman Scholar: Top 5% of Engineering Class
Relevant Courses: Computer Science - Python, Java & C++/C, Analysis of Algorithms, Theory of Computation, Computer Architecture, Machine Learning, Artificial Intelligence, Human Computer Interaction in Software Development, Operating Systems

RESEARCH EXPERIENCE

The Vision, Language and Learning Lab at UVA Charlottesville, VA
Nov 2020 - Present
Machine Learning Research Assistant
Advisor: Prof. Vicente Ordóñez Román
Focus: Developing a tool that analyzes the implicit feature representations of large models with respect to bias. This tool allows for comparison of implicit feature representations across different models and synthesizes this data for convenient comparison. Co-advised by Prof. Baishakhi Ray
Applied Skills: Pytorch, Python, Vision Transformers, Convolutional Neural Networks, Numpy, Coco, Openimages

UVA Engineering Link Lab Charlottesville, VA
Aug 2019 - Present
Machine Learning Research Assistant
Advisor: Prof. Madhur Behl
Focus: Propose a certification scheme to determine the level of safety and reliability which allows for safe market introduction of automated/autonomous vehicles. Performed natural language processing analysis on caption data to extract high-level representations of a traffic scenarios. Aggregated the Traffic Scenario Similarity Dataset (TSS) that which contains human ranking annotations for the similarity between traffic scenarios. [Project Site](#)
Applied Skills: Python, Tensorflow, Pytorch, Transformer networks (i.e. bert), BDDX Dataset

UVA Aerospace Engineering Research Group Charlottesville, VA
Oct 2017 - Aug 2019
Machine Learning Research Assistant
Advisor: Prof. David Sheffler
Focus: Developed a prototype of a 3D printed UAV that completes a mission autonomously and designed machine learning programs for object recognition and communication for precise missions.
Applied Skills: Python, Open Computer Vision, Companion Computers: Raspberry Pi, Object Detection Algorithms: Yolo, Single shot detectors

WORK EXPERIENCE

Vimeo

New York, NY

Machine Learning Researcher on Search and Recommendations Jun 2021 - Aug 2021

Mentor: Silvena Chan

Focus: Analyzed gender biases in Vimeo's search and recommendation system and formulated a bias identification framework with the Rank Bias metric that quantifies gender biases in ranked search results. Developed proof of concept learning to rank (LTR) models leveraging state of the rate algorithms such as RankNet and LambdaMART and developed internal dataset for training/evaluating LTR models in private search

Applied Skills: Python, Pytorch, Snowflake, SQL, Scikit-Learn, TSNE

Minimally Invasive Spinal Technology

Charlottesville, VA

Machine Learning Engineer and SWE Lead

Oct 2019 - Aug 2020

Mentor: Alexander Singh

Focus: Developed machine learning algorithms for the analysis and prediction of scoliosis using Unet++ and Centernet

[Letter of Recommendation](#)

Applied Skills: Python, Tensorflow, and Keras, Docker, AWS, Django

Expedition Technology

Herndon, VA

Machine Learning Researcher

Dec 2019 - Jan 2020

Mentor: Andrew Draganov

Focus: Research novel semi-supervised framework for detecting out-of-distribution inputs. Implemented the OpenMax algorithm: a methodology to adapt deep networks for open set recognition, which estimates the probability of an input being from an unknown class. Investigated existing literature in the domain of Open Set Recognition and performed A-B testing

Applied Skills: Python, Tensorflow, Unix, Git, and Agile Software Development

Expedition Technology

Herndon, VA

Machine Learning Engineer

Jun 2019 - Aug 2019

Mentor: Cheryl Daner

Focus: Researched and leveraged anchorless object detection techniques for 3D point cloud object detection. Designed a convolutional neural network on the basis of existing VoxelNet and CenterNet architectures. [Summary of Work](#)

Applied Skills: Python, Tensorflow, Pytorch, Unix, Amazon Web Services, Git, and Agile Software Development

NASA Goddard Spaceflight Center

Greenbelt, MD

Core Flight Software Engineer

Jun 2018 - Aug 2018

Mentor: Alessandro Geist

Focus: Developed and benchmarked core Flight Software apps that directed AI image processing and command/telemetry with ground station.

[Summary of Work](#)

Applied Skills: Python, C, Linux Platform, Xilinx Platform Studio and ISE Design Suite

NASA Langley Research Center

Hampton, VA

core Flight Software Engineer

Jun 2016 - Aug 2016

Mentor: Godfrey Sauti

Focus: Leverage sensor technology to design to improve the dimensional integrity of a printed component

[Summary of Work](#)

Applied Skills: Inventor, AutoCAD, OpenScad, SketchUP, Pronterface

PUBLICATIONS Aron Harder, **Jaspreet Ranjit**, and Madhur Behl. 2021. Scenario2Vector: scenario description language based embeddings for traffic situations. *Proceedings of the ACM/IEEE 12th International Conference on Cyber-Physical Systems (ICCPs '21)*. Association for Computing Machinery, New York, NY, USA, 167–176. <https://doi.org/10.1145/3450267.3450544>

Draganov, A., Brown, C., Mattei, E., Dalton, C., & **Ranjit, J.** (2020). Open set recognition through unsupervised and class-distance learning. *Proceedings of the 2nd ACM Workshop on Wireless Security and Machine Learning*, 7– 12. <https://doi.org/10.1145/3395352.3402901>

Ranjit, J., Behl, Madhur (advisor), & Baritaud, Catherine (advisor) (2020). *Scenario2Vec: A Scenario Description Language to Characterize Traffic Scenarios for the Development of a Certification Scheme*. University of Virginia, School of Engineering and Applied Science, BS (Bachelor of Science), 2020: Charlottesville, VA. Retrieved from <https://doi.org/10.18130/v3-16d9-gn66>

PROJECTS & EXTRA

Cornell, Maryland, and Max Planck Pre-Doctoral Research School Saarbrücken, Germany

Promising undergraduate and Masters students are invited to attend this program that provides an overview of the state of the art research in Computer Science.

[Overview of Program](#)

Society of Women Engineers

Charlottesville, VA

Performed service projects at high schools in Charlottesville area to educate minority students about engineering opportunities

Rodman Scholar

Charlottesville, VA

Academic honor awarded to top 5% of the engineering class.

Project Clear Skies: UVA HooHacks

Charlottesville, VA

Focus: Aggregates real time data about a natural disaster from a variety of social media sources giving the first responders the ability to perform rapid searches using key words and features. Uses image classification to provide an accurate assessment of the severity disasters to reach victims and allocate resources more efficiently.

[Code Release](#) *Applied Skills:* Google Vision API, TensorFlow, Rest API

Save the Children: UVA Data Science Hackathon

Charlottesville, VA

Focus: Prototyped transformer models for generating infrastructure damage values that can be applied to MDI's predictive analytics model in an effort to better help with displacement efforts due to disasters.

[Code Release](#) *Applied Skills:* Pytorch

Truly OpenML

Charlottesville, VA

Focus: A web application that provides a collaborative, intuitive and accessible platform for individuals who are passionate about learning machine learning (ML).

[American Evolution Innovator's Cup: Semifinalist](#)

SKILLS

Machine Learning: Tensorflow, Pytorch, Open Computer Vision, Numpy, Scikit-learn, Keras, Amazon Web Services, Convolutional Neural Networks, Transformer Networks

Software: Python, Java, C++, Snowflake, SQL, Django, Agile Methodologies, Git, Heroku, L^AT_EX

Operating Systems: Unix, Linux, Mac OSX, Windows

REFERENCES

Vicente Ordóñez Román

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Department of Computer Science
Rice University
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Madhur Behl

Assistant Professor
Department of Computer Science
University of Virginia
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Silvena Chan

Software Engineer
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