

JASPREET RANJIT

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EDUCATION

University of Virginia, Charlottesville, Virginia

Pursuing Masters in Computer Science with a focus on Deep Learning

Expected December 2021

- **GPA:** 3.925
- **Relevant Courses (Graduate):** Machine Learning, Vision and Language, Natural Language Processing, Algorithms, Cloud Computing, Geometry of Data, Machine Learning in Image Analysis

Bachelor of Science in Engineering

- **Rodman Scholar:** Top 5% of Engineering Class *Expected May 2021*
- **Relevant Courses (Undergraduate):** Computer Science I, II & III (Python, Java & C++/C), Analysis of Algorithms, Theory of Computation, Computer Architecture, Machine Learning, Artificial Intelligence, Human Computer Interaction in Software Development, Operating Systems

**Pursuing 4+1 Master's program: started Master's in 4th year of undergrad, finishing in the following semester after graduation*

RESEARCH EXPERIENCE

The Vision, Language and Learning Lab at UVA | Charlottesville, Virginia

Machine Learning Researcher

Nov 2020 – Present

- Goal: Exploring and mitigating implicit biases in state of the art machine learning models
- 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
- Applying skills in Pytorch, Python, Vision Transformers, Convolutional Neural Networks, Numpy, Coco, Openimages

UVA Engineering Link Lab | Charlottesville, Virginia

Machine Learning Researcher

Aug 2019-Present

- Goal: Propose a certification scheme to determine the level of safety and reliability which allows for safe market introduction of automated/autonomous vehicles.
- Analyzing dashcam footage of traffic situations and performing natural language processing analysis on caption data to extract high-level representations of a traffic scenario using domain knowledge and used this embedding to perform scenario similarity and scenario retrieval tasks
- Developing an architecture that captures the temporal structures of traffic scenarios to form fixed-length vector representations of traffic scenarios and automatically tags a traffic scenario with key descriptors
- Aggregated the Traffic Scenario Similarity Dataset (TSS) that which contains human ranking annotations for the similarity between traffic scenarios
- *Publication in International Conference on Cyberphysical Systems (ICCPS 2021)*
- Applying skills in Python, Tensorflow, Pytorch, Transformer networks (i.e. bert), BDDX Dataset

UVA Aerospace Engineering Research Group | Charlottesville, Virginia

Machine Learning Researcher under Professor David Sheffler

October 2017-August 2019

- 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 in Python, Open Computer Vision, companion computers: Raspberry Pi

WORK EXPERIENCE

Vimeo | New York, New York

Machine Learning Researcher on Search and Recommendations Team

June 2021-Aug 2021

- 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
- Performed exploratory analysis on search data and generated TSNE results illustrating distributions of the data
- 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 in Python, Python, Snowflake, SQL, Scikit-Learn, TSNE

Minimally Invasive Spinal Technology | Charlottesville, Virginia

Machine Learning Engineer and Software Development Manager

Oct 2019-Aug 2020

- Developed machine learning algorithms for the analysis and prediction of scoliosis using Unet++ and Centernet
- Served as an agile scrum master, organized weekly retrospective sessions, and guided development
- Letter of Recommendation from CEO: <https://tinyurl.com/y5y6a972>
- Applied skills in Python, Tensorflow, and Keras, Docker, AWS, Django

Expedition Technology | Herndon, Virginia

Deep Learning (ML) and SWE Intern under the mentorship of Andrew Draganov

Dec 2019-Jan 2020

- Performed research to develop a novel semi-supervised framework for training classifiers and simultaneously 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 that contributed to results published in *WiseML 2020*
- Applied skills in Python, Tensorflow, Unix, Git, and Agile Software Development

Expedition Technology | Herndon, Virginia

Machine Learning (ML) and SWE Intern under the mentorship of Cheryl Danner

June 2019-August 2019

- Designed a custom convolutional neural network (CNN) working in the ML pipeline on the basis of existing VoxelNet and CenterNet architectures. Developed and optimized an end to end differentiable CNN by extending an existing codebase to modify preprocessing of data, inner CNN architecture, and post-processing and evaluation
- Researched and *leveraged* anchorless object detection techniques for 3D point cloud object detection
- Summary of my work: <https://tinyurl.com/expstech>
- Applied skills in Python, Tensorflow, Pytorch, Unix, Amazon Web Services, Git, and Agile Software Development

National Aeronautics and Space Administration | Greenbelt, Maryland

Intern at the Goddard Spaceflight Center under Alessandro Geist

June 2018-August 2018

- Worked as an Embedded Hardware/Software Systems Design and Test intern on Mission CAESAR
- Developed applications with an ML510 development board; cross compiled with the Microblaze and PowerPC processors on a Virtex 5 card through a JTAG-USB cable
- Design and documentation of embedded systems that target space flight applications: developed and benchmarked core Flight Software apps that directed AI image processing and command/telemetry with ground station
- Summary of my work: <https://tinyurl.com/nasagoddard>
- Applied skills in Python, C, Linux Platform, Xilinx Platform Studio and ISE Design Suite

National Aeronautics and Space Administration | Hampton, Virginia

Intern at the Langley Research Center under Dr. Godfrey Sauti

June 2016-August 2016

- Worked with the characterization of 3D printer and acquired mechanical skills in the workings of a 3D printer
- Used sensor technology to design to improve the dimensional integrity of a printed component
- Analyzed trends in data collected from an IR temperature sensor, laser profilometer, IR camera, and load monitor
- Summary of my work: <https://tinyurl.com/nasalangle>
- Applied skills in Inventor, AutoCAD, OpenScad, SketchUP, Pronterface

SOFTWARE PROJECTS: <https://github.com/jr4fs>

Project Clear Skies: UVA Hackathon | Department of Engineering and Applied Science

February 2019

- Provides developers with a system that can aggregate real time data about a natural disaster from a variety of social media sources giving the developer the ability to perform rapid searches using key words and features
- Applied skills in Google Vision API, TensorFlow, Rest API and machine learning for image classification giving first time responders an accurate assessment of the severity of the affected area to reach victims and allocate resources more efficiently <https://github.com/CalvinKrist/DisasterRelief>

Truly OpenML

September 2019-June 2019

- Developing a web application that provides a collaborative, intuitive and accessible platform for individuals who are passionate about machine learning (ML).
- American Evolution Innovator's Cup: Semifinalist in 2019 in the Commonwealth Challenge: <https://tinyurl.com/yyp5zr>

SKILLS

- **Machine Learning:** Tensorflow, Pytorch, Open Computer Vision, Numpy, Scikit-learn, Keras, Amazon Web Services, Convolutional Neural Networks, Transformer Networks
- **Software Skills:** Python, Java, C++, Snowflake, SQL, Django, Agile Methodologies, Git, Heroku

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>