# Amin Nasim Saravi

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## About Me

Highly motivated Machine Learning Specialist with a Master's in Computer Science from the University of Calgary and 5 years of experience in deep learning, scientific visualization, and GPU programming. Proficient in Python, C++, and libraries such as PyTorch, and TensorFlow (Keras). Strong Mathematical and statistical foundations with a proven ability to develop scalable digital solutions. Passionate about leveraging expertise to contribute to transformative projects.

## Education

**Master of Science in Computer Science** — **Graduation Date: June 2024**
*University of Calgary, Calgary, Canada*
GPA: 4.0/4.0
**Relevant coursework:**
**Social Media Analysis & Data Mining | Stochastic Processes | Rendering | Animation & Simulation**

**Bachelor of Science in Computer Engineering** — **Graduation Date: Jan 2020**
*Bu-Ali Sina University, Hamedan, Iran*
GPA: 3.9/4.0
**Relevant coursework:**
**Linear Algebra | Pattern Recognition | NLP | Probability and Statistics**

## Skills

**Programming Languages:** Python | C/C++ | Cuda C | SQL

**Frameworks:** OpenCV | PyTorch | TensorFlow (Keras)

**Libraries:** OpenGL | NumPy | Matplotlib | Scikit-Learn

**Tools:** Git | Jira | TensorBoard | Jupyter | Paraview | Power BI

**Other:** Linux | SLURM Job Scheduler | LaTeX

## Certificates

**Neural Networks and Deep Learning:** Link

**Structuring Machine Learning Project:** Link

**Improving Deep Neural Networks:** Link

**Convolutional Neural Networks:** Link

## Recent Projects

**TTF Project: Machine Learning for Visualization** Portfolio — **Published SIBGRAPI 2024**

- Developed, and tested a neural network with a differentiable volume rendering layer on GPU to automate segmentation and volume rendering of complex 3D data by generating transfer functions tailored to a given aspect of the data a user intends to track. **Python | PyTorch | TensorBoard**
- Developed an interactive GUI for visualizing volumetric data and manipulating transfer functions. Compared and checked the results with other available volume renders. **Matplotlib | 3D Slicer | VTK**
- Applied the method to MRI brain volumes to visualize white matter, gray matter, and CSF, and to NASA's asteroid impact simulation dataset to track pressure shockwaves. **3D Data**
- Developed a script to convert the output transfer functions into a compatible format for 3D Slicer, including transfer functions and colormaps. **Python | 3D Slicer**

**Series of Simulations & Animations** Portfolio

- Created a physically based simulation of a roller coaster with a GUI and simulation controls. Taking into account the preservation of energy, centrifugal force, and tack banking. **C++ | OpenGL**
- Implemented a mass-spring system for simulating cloth and jelly cube behavior with boundary- and self-collision detection. **C++ | OpenGL**

- Simulated bird flocking behavior using the BOIDs algorithm, incorporating smooth steering to prevent collisions with obstacles. **C++ | OpenGL**

**Visualization of 3D Data Using GAN Architecture**

- Developed a GAN architecture with an integrated differentiable volume rendering layer to automatically extract key features and patterns from 3D volumetric data, and visualize them with consistent optical properties. **Python | Pytorch**
- The generator optimized a transfer function that controlled voxel colors and opacities, while the discriminator evaluated the rendered images against real images.

**Machine Learning Rendering**

- Optimized rendering performance by storing Cook-Torrance shading in a texture map, based on light and observer angles. **Python | Scikit-Learn**

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## Professional Experience

**Data Analysis and Visualization Specialist (Intern)** **Oct 2024 – Now**
*Canadian Angus Association, MITACS, University of Calgary*

- Designed and implemented ML models and data pipelines to analyze and visualize agricultural data, enhancing decision-making processes in ecosystem management
- Applied data cleaning, statistical analysis, and machine learning techniques using Python libraries (e.g., NumPy, Pandas, Scikit-learn).
- Designed efficient data models (e.g., snowflake schema) and automated pipelines with SQL for Power BI.
- Created intuitive dashboards with Power BI, HTML, CSS, and Python, collaborating with experts to deliver insights.

**Research Assistant** **Sep 2020 – May 2024**
*University of Calgary*

- Collaborated with radiology and fluid dynamics experts to explore 3D visualization applications on MRI and simulation volumes, identifying limitations and areas for improvement.
- Utilized the University of Calgary's Advanced Research Computing (ARC) cluster and SLURM Job Schedule to perform computations in parallel.
- Researched, implemented, and profiled deep learning methods to assist and automate 3D data visualization. Co-authored a research paper introducing a novel approach to reducing manual effort in volume visualization. Full thesis available on PRISM.

**Teaching Assistant** **Jan 2021 – April 2024**
*University of Calgary*

- Assisted in teaching over 400 students in courses including Deep Learning for Vision, Numerical Methods, Computer Graphics, Data Visualization, and Applied AI in Games.
- Developed course materials, interactive visualizations, and automated grading scripts using unit and integration testing.

**Mentorship** **Jun 2023 – Aug 2023**
*UofC AI Summer School*

- Guided five students on an audio command project, assisting with data preprocessing, model training, GitHub management, and meeting coordination under Dr. Farhad Maleki's supervision.

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## Publications

**TTF: A Guided Approach to Transfer Function Optimization in Volume Visualization** **2024**
*SIBGRAPI, Manaus, Brazil*
**Link:** authors.elsevier.com/sd/article/S0097-8493(24)00202-4

**An Efficient Approach for Using EM Algorithm in Capsule Networks** **2019**
*International Conference on Machine Vision and Image Processing supported, Qom, Iran*
**Arxiv:** arxiv.org/abs/1912.05333