Amin Nasim Saravi

⌂ Calgary, AB · ✉ amin.nasim76@gmail.com · ☐ (587)830-4001

in amin-nasim · 💼 amin1nasim.github.io · ◯ amin1nasim

About Me

Highly motivated professional with a **Master's in Computer Science** from **University of Calgary**. I am passionate about **Software Development**, **Problem-Solving**, and **Mathematics**. With **four years** of hands-on experience in **Deep Learning**, **Computer Graphics**, **Visualization of 3D Data (MRI)**, and **GPU Programming**, I am a lifelong learner eager to contribute to cutting-edge projects.

Education

Master of Science in Computer Science   **Graduation Date: June 2024**

University of Calgary, Calgary, Canada
GPA: 4.0/4.0
Relevant coursework: Analysis of Stochastic Processes | Rendering | Simulation & Animation

Bachelor of Science in Computer Engineering   **Graduation Date: Jan 2020**

Bu-Ali Sina University, Hamedan, Iran
GPA: 3.9/4.0
Relevant coursework: Image Processing | Signal Processing | Pattern Recognition

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 **visualization** of complex **3D volumetric data** by generating transfer functions tailored to a given aspect of the data a user intends to track. Python | PyTorch | TensorBoard

- Collaborated with **radiologists**, **fluid dynamics experts**, and **mathematicians** to apply our method to **NASA's asteroid impact simulation** dataset to track pressure shockwaves, and to **MRI brain volumes** to visualize white matter, gray matter, and CSF. 3D Volumetric Data

- Developed an **interactive GUI for visualizing volumetric data** and manipulating transfer functions. Compared and checked the results with other available volume renders. NumPy | Matplotlib | 3D Slicer | VTK

- 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 **physically based mass-spring system** for **simulating cloth** and **jelly** cube behavior with boundary- and self-collision detection. C++ | OpenGL

- Implemented **realistic simulation 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 | NumPy | Scikit-Learn`

Professional Experience

Research Assistant   Sep 2020 – May 2024
University of Calgary

- **radiologists** and **Collaborated with fluid dynamics experts** to explore **3D visualization applications**. Identifying applications, limitations, and areas for **improvement**.

- **Researched**, **implemented**, and **profiled deep learning** methods to assist and **automate 3D data visualization**.

- Utilized the University of Calgary's Advanced Research Computing **(ARC) cluster** and **SLURM Job Schedule** to perform computations in **parallel**.

- **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** across courses such as **Deep Learning for Vision**, **Numerical Methods**, **Computer Graphics**, and **Data and Visualization** .

- Created **course materials** and interactive visualizations to enhance student comprehension of complex topics.

- Developed unit and integration **testing** scripts to **automate the grading** process for student assignments.

Mentorship   Jun 2023 – Aug 2023
UofC AI Summer School

- **Mentored** a group of five students on their **audio command** project under the supervision of Dr. Farhad Maleki.

Network Monitoring Intern   Jun 2018 – Aug 2018
SabaNet, Iran

- Monitored and reported internet bandwidth usage using Cacti.

- Assisted ISP users with access point configuration and reported issues to the relevant department.

Skills

Programming Languages: `Python | C++ | C | Cuda | SQL`

Frameworks: `PyTorch | TensorFlow (Keras)`

Libraries: `OpenGL | NumPy | Scikit-Learn | Matplotlib | Pandas`

Tools: `Git | 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

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