Sepand AliMadadSoltani

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Education

University of Claude Bernard, Lyon 1 — Lyon, France
Master II in Medical Device Engineering — Fall 2024-Ongoing
10,000€ Excellence Scholarship Recipient; Awarded for Excellent Academic Background

K.N. Toosi University of Technology — Tehran, Iran
4 Year Bachelor of Science in Electrical Engineering — 2018-2023
Concentration: **Biomedical Engineering**
GPA: 16.33/20 (Last two years: 17.29/20)

Research Interests

- Medical Image Segmentation
- Machine Learning and Artificial Intelligence in Health
- MRI
- 3D Rendering and Visualization in Medical Applications

Bachelor Thesis

MedVisPy: Python-Based Medical Image Analysis Software with an Interactive Tissue Boundary Segmentation Tool Spring-Summer 2023

- Developed "MedVisPy", a Python-based medical image analysis software, from scratch utilizing Python, VTK, and PyQt libraries
- Demonstrated proficiency in utilizing VTK for advanced visualization and manipulation of medical images
- Implemented multiple interactive tools (ruler, shapes, and text insertion tools)
- Developed an image processing algorithm for tissue boundary detection and integrated it in a smart interactive scissor tool for fast semi-automatic tissue segmentation
- Enabled users to import custom plugins to extend the functionality of the software based on their needs
- Successfully shipped the software for Linux and Windows operating systems

Skills

- **Programming Language:** Python, C++, MATLAB, QML, CMake, Bash
- **Software and Tools:** Tensorflow, FMRIB FSL, GNU/Linux, Git, Qt Framework, Visualization Toolkit (VTK)
- **Language:** Persian (Native), English (TOEFL: **Overall: 101/120, R: 27, L:27, S:23, R:24**), French (Beginner-A2)

Academic Projects

Image-based Persian and English Character Sequence Recognition using Recurrent Convolutional Neural Networks(RCNN) Winter 2023

- Implemented the network based on a paper using the Tensorflow library in Python
- Synthesized images of Persian text of different variety
- Applied data augmentation techniques such as rotating, translating, adding distortion, and adding noise to images
- Successfully trained the model for both languages using the self-made synthesized Persian dataset and public English datasets
- Achieved +85% accuracy for both languages

Exploring Possibility of Alzheimer's Disease Detection using Deep Neural Network based on fMRI Functional Connectivity Maps and Time-series Data Fall 2022-Winter 2023

- Pre-processed and processed raw fMRI and MRI data from the ADNI database using the FSL library to extract time-series data to calculate functional connectivity maps of the subjects' brains
- Studied the previous works on this subject to find the gap
- Experimented with RCNN & CNN networks using Tensorflow to extract temporal and spatial features from images
- Gained hands-on experience with image pre-processing, neural network architecture, and deep learning principles
- Although a full model was not achieved, a lot of experience and insight were gained into medical imaging and deep learning concepts deep learning concepts

Automated fMRI Pre-processing and Time-series Extraction Pipeline for Large Datasets using FSL in Python Summer 2022

- Implemented brain extraction from structural reference MR image
- Implemented fMRI pre-processing including motion correction, slice timing correction, spatial smoothing, and co-registration

- Implemented atlas-based ROI time-series extraction
- Enabled parallel processing to accelerate computation for large datasets
- Utilized the program for processing fMRI data from the ADNI dataset

Tetris player bot using Deep Reinforcement Learning Summer 2022

- Developed the game from scratch using C++
- Created a custom C++ to Python API for the game using the Pybind11 library
- Developed a Deep Q learning agent for training the AI player to learn how to play the game

The Game of Tetris with a Custom Game Engine Using OpenGL in C++ Spring 2022

- Developed a custom 2D graphics renderer completely from scratch using the OpenGL graphics API in C++
- Implemented user input handling, navigatable menus, and text rendering capabilities to the engine
- Designed and implemented the game of Tetris using the said engine in Object Oriented C++

Calculating the Magnetic Field Caused by a Spherical Solenoid Winter 2019

- Derived the formula for the magnetic field caused by a spherical solenoid
- Calculated and graphed the magnetic field on multiple plates
- Integrated the graphs and the calculator in a custom GUI developed using MATLAB App Designer

Work Experience

NTH Tehran, Iran
Junior C++ & QML Developer Oct 2023-July 2024

- Designed and developed a modern interface using the Qt Framework's QML language, focusing on robustness and reliability
- Built and optimized backend logic in C++ to handle large volumes of data efficiently

TECVICO Vancouver, Canada (Remote)
Medical Image Visualization Software (Freelance Project) Summer 2023

- Created a Python-based medical analysis software focusing on user-friendliness and user experience
- Designed and implemented a workflow user interface for bioinformatics analysis and processing using the Qt framework
- Worked with a team of engineers to integrate various machine learning algorithms into the workflow
- Designed and integrated a medical image visualizer using VTK
- Integrated multiple visualization tools and pipelines such as colormaps, image thresholding and interactive segmentation

Razeq Co. Tehran, Iran
Electronics Engineer Internship Summer 2021

- Researched the design and development process of a parametric speaker (directional speaker) and examined the feasibility of manufacturing it
- Implemented smart presence detection and remote-control support for the monitor stand in Valiasr Street Museum
- Developed and assembled various hardware for installation in Iran's pavilion in Dubai Expo 2020 (Electric control panel, wiring, lighting and presence detection system)