Sepand AliMadadSoltani

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Education

Master 2 in Medical Device Engineering — Lyon, France
Polytech Lyon, Claude Bernard University Lyon 1 — Fall 2024-Present
GPA: 14.12/20
Courses: Magnetic Resonance Imaging, Segmentation & Registration, Artificial Intelligence in Medical Imaging, Image Reconstruction & Inverse Problems

Bachelor of Science in Electrical Engineering (Bac+4) — Tehran, Iran
K.N. Toosi University of Technology — 2018-2023
Concentration: Biomedical Engineering
GPA: 16.33/20 (Last two years: 17.29/20)
Courses: Statistical Pattern Recognition, Signals & Systems

Honors and Awards

- **€10,000** Excellence Scholarship awarded for excellent academic background by the Medical Device Engineering Graduate School program at Polytech Lyon

Research Interests

- Neuroscience
- Functional Imaging
- Positron Emission Tomography (PET)
- Magnetic Resonance Imaging (MRI)

Research Experience

M2 Internship: Estimation of Image-Derived Input Function in Hybrid MRI and Dynamic Brain PET Imaging — Lyon, France
CERMEP — March 2025-August 2025

- Conducted a state-of-the-art literature review
- Conducted pre-processing steps on **MRI and PET** images to ensure data quality and consistency
- Developed a robust segmentation algorithm for accurate extraction of internal carotid arteries from MR angiography images in python
- Implemented different Partial Volume Correction algorithms for obtaining accurate input function
- Assessed method performance across multiple datasets with different radiotracers using multiple **PET quantification techniques**
- Colabored with the BioMaps team (Paris-Saclay) to independently validate findings
- Performed **Monte Carlo PET simulations** to support and strengthen evaluation outcomes
- Developed new tools and improved existing ones for fast and efficient processing of PET and MRI data in C and Python

Bachelor's Thesis: Interactive and Intelligent Tissue Boundary Segmentation Tool — Tehran, Iran
Machine Vision & Medical Image Processing Laboratory (MVMIP), KNTU — January-June 2023

- Developed a **Python-based medical image analysis** software, from scratch utilizing VTK and PyQt libraries
- Implemented multiple interactive tools (ruler, shapes, and text insertion tools)
- Developed an image processing algorithm for detecting tissue boundaries
- Designed a smart interactive scissor tool for fast, semi-automatic **tissue segmentation**
- Ensured compatibility across various tissue types and imaging modalities
- 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:** Python, C, C++, CMake, Bash, MATLAB, QML
- **Software and Tools:** GNU/Linux, Git, FMRIB FSL, 3D Slicer, NiftyReg, dcm2niix, TPCCLIB
- **Libraries:** Tensorflow, PyTorch, NumPy, pandas, scikit-learn, Matplotlib, ITK, VTK, Qt, PyQt
- **Languages:** Persian (Native), English (TOEFL: **Overall: 101/120, R: 27, L:27, S:23, R:24**), French (Beginner-A2)

Work Experience

TECVICO Vancouver, Canada (Remote)
Medical Image Visualization Software (Freelance Project) July-September 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

- Implemented smart presence detection and remote-control support for the monitor stand in Valiasr Street Museum

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

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

- Implemented brain extraction from structural reference MR image Summer 2022
- 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

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++