NEURAL NETWORK APPLICATIONS COURSE (CSE616) FINAL PROJECT – FINAL REPORT

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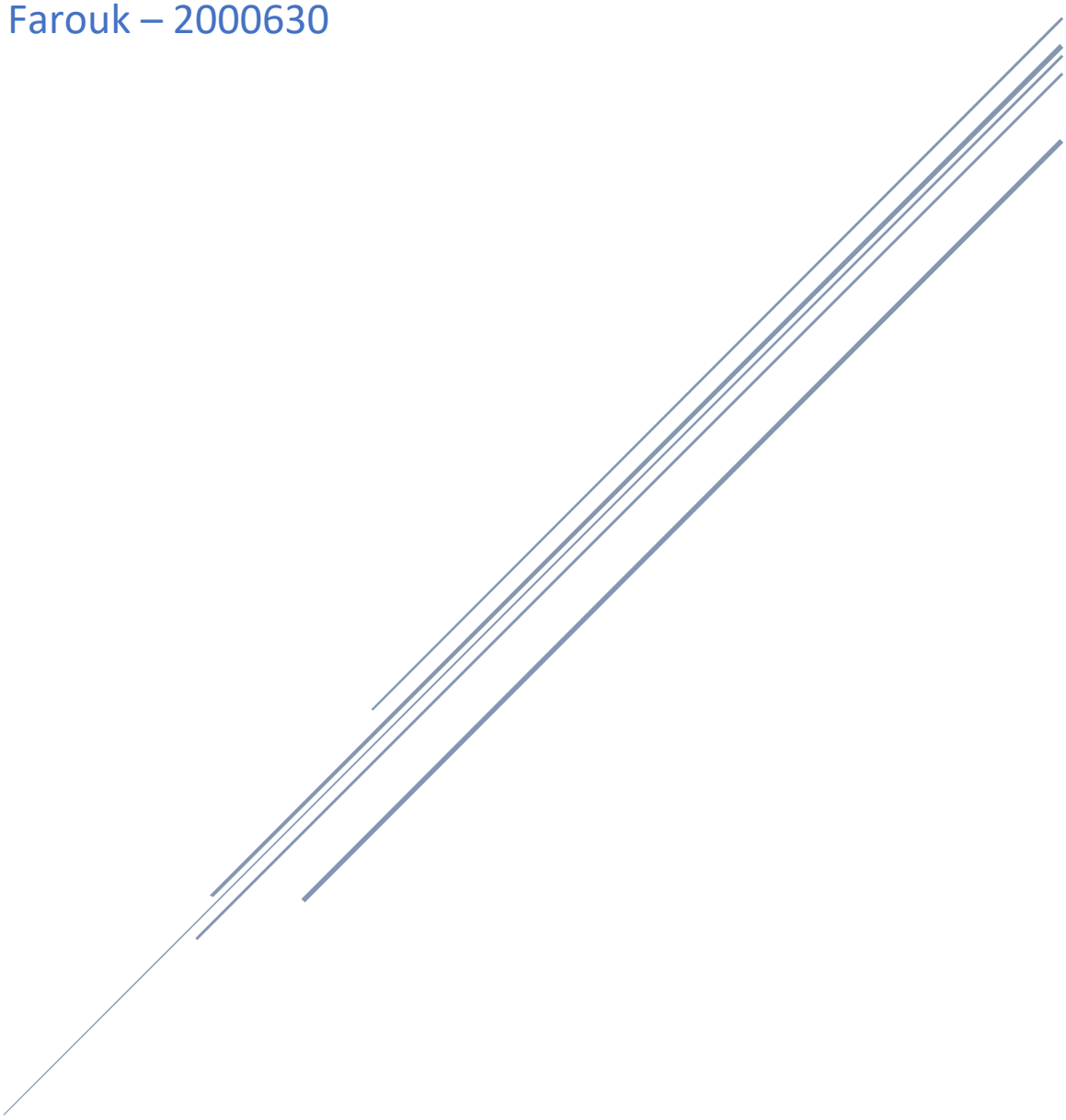

Introduction

This project implements the solution proposed in "**A Study on Arrhythmia via ECG Signal Classification Using the Convolutional Neural Network**" paper in Python, as the solution should have been implemented in Matlab but there's no reference for the code in the paper.

Architecture

- One-dimensional 12-Layer convolution with Average Pooling
- Dropout Layer
- Fully Connected Layer
- Softmax Output Layer

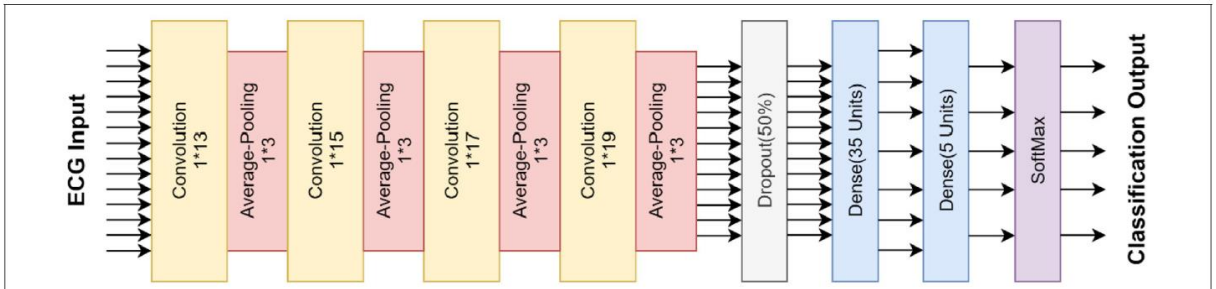

FIGURE 3 | The architecture for the proposed CNN model.

Data Preprocessing

- Data De-noising
- Data Segmentation
- Data Enhancement

Results

We achieved about 99% training and testing accuracy, which is better than the accuracy in the paper, which is about 97%.

Project Link

https://www.kaggle.com/yomnahesham/cse616-final-project

Paper Link

https://www.frontiersin.org/articles/10.3389/fncom.2020.564015/full

Challenges

- The dataset was rarely to be found in .csv format.
- No medical knowledge background for the team members.
- Difficulties with understanding and dealing with the dataset structure.
- Little technical experience for the team members in signal processing, that is needed in the data denoising phase.
- Most coding references in medical field generally and in dealing with ECG signals specially are in MatLab.
- Most coding references in CNN uses images as input (2-3 dim input data), unlike the data used in the problem, which is 1D.

References

- https://www.kaggle.com/taejoongyoon/mitbit-arrhythmia-database
- https://www.kaggle.com/khatri007/mitbh-cnn
- https://github.com/MProx/Wavelet-denoising/blob/master/wavelets.py
- https://www.youtube.com/watch?v=HSG-gVALa84
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- https://www.youtube.com/watch?v=WZdxt9xatrY