

Part One: Project Performance

My project report on ECG arrhythmia classification focused on the use of evolutionary algorithms, specifically BioHEL, an evolutionary learning system. In comparison to the paper that inspired this research, BioHEL reduced the false negative rate of arrhythmia detection by 14%. These findings suggest the potential of evolutionary algorithms, such as BioHEL, as a promising approach for improving the accuracy of arrhythmia classification.

The project proposal offered several possible directions, including options for data visualization or neural network-based classification. To pursue a novel research angle, I opted to investigate the potential of evolutionary algorithms as classical neural networks are a well-established research area in ECG arrhythmia classification. This provided more opportunities for original insights and experimentation.

I experienced several challenges during my project experimentation. The limited documentation for BioHEL meant that I had to devote more time to learning how to use the system effectively. Furthermore, there was no obvious option to save the classifier and run it on various test sets. Therefore, when testing on individual patients, the classifier had to go through the training process. This meant significant wait times for results. To reduce this, I developed my Bash skills learned during my Year in Industry to automate running multiple tests. I was able to develop my proficiency in this skill while solving a problem during my project.

I had to create innovative and bespoke solutions to overcome the limitations of existing tools during my research: a script to write arff files, and another to generate a training curve graph by extracting data from BioHEL logs. While these solutions were innovative, they required time to develop, so I had to adapt my approach by simplifying my pre-processing methods. If I were to repeat this project, I would like to explore the various pre-processing methods I researched and perform an experiment to identify the optimal approach.

Overall, I believe my project to be successful as I met all the evaluation criteria as well as learned many valuable skills throughout. I was able to adapt my methodology to meet the challenges of the project, manage my time effectively, and produce results that are competitive with those found in existing research.

Part Two: Professional skills

During my project on arrhythmia classification, I was able to develop a variety of professional skills that would be valuable in the workplace or further study. As I intend to pursue a master's degree in data science next year, my project selection enabled me to improve upon fundamental technical aspects of the field, including data ingestion, data management, pre-processing, and artificial intelligence. The project allowed me to enhance my proficiency in widely used data science libraries such as Pandas, NumPy, SciPy, and Matplotlib. Since these tools are extensively used in the industry and will be part of my future studies, gaining expertise in them was valuable.

I also had to learn to work independently which is an important skill for my master's degree. However, I prefer to work in a team and pair program as I did during my Year in Industry. Another valuable skill that I improved during this project was time management. I had to adapt my approach and simplify certain methods (such as using a simpler pre-processing method) to meet my project deadline while still achieving the project aims. This is a key skill needed during work to meet company deadlines. I used a Kanban board to plan my work to meet deadlines. Kanban is a popular agile approach used in software engineering teams that I enjoyed using in my previous job and hope to use in my future career.

For this project, I needed to have strong communication skills, particularly the ability to articulate complex concepts clearly and concisely. At the start of the project, I found writing a formal report and analysing research papers to be a challenge due to my lack of prior experience. However, I made significant progress in both these areas. This skill will be useful when writing documentation in a professional setting. My favourite part of this project was analysing results and creating graphs and visualisations to effectively communicate. An example of this was the boxplot showing the accuracy of arrhythmia detection on patients which allowed me to discover data anomalies. Effective presentation of results is crucial in the workplace to demonstrate project success and facilitate project discovery.

In conclusion, my project has helped me develop and utilize a variety of professional skills that are valuable in the workplace or in further studies. I have improved my data visualization, time management and written communication skills. I am confident that these skills will be crucial for my future studies and career.