COMP4026 Project Plan

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Course: COMP4026: Research Project in Computer Science (AI)

1. **Project title.**

Pneumonia detection based on deep learning

2. **Statement of the research problem.**

Pneumonia is a serious lung infection that kills millions of people worldwide every year. Pneumonia is usually divided into two types, bacterial pneumonia and viral pneumonia. Early detection of pneumonia is crucial. Traditional methods for diagnosing pneumonia require highly experienced clinical staff which will take a lot of time and be inefficient. Use deep learning technology to detect chest X-rays and detect whether the lungs are normal or have pneumonia. If it is diagnosed as pneumonia, the type of pneumonia is determined, such as bacterial pneumonia or viral pneumonia. The project aims to develop a deep learning model to detect pneumonia from chest X-ray images with high accuracy and efficiency.

3. **Related work.**

Most studies use CNN model to do some similar deep learning tasks about medical field, having a breakthrough in images classification and medical images analysis. Convolutional Neural Network (**CNN**) is a deep learning model specially designed for processing and analyzing image data. It can effectively learn features from images and perform tasks such as classification, detection or segmentation. Many studies have good results from experiment. But they have some limitations, including the size of data set too small, computational cost too high, the diversity of data set too small. This project attempts to solve these problems by developing a new model based on deep learning, which is different from previous studies.

4. Methodology.

Firstly, I will check the data set and perform preprocessing tasks such as resizing images and normalization. Then, I will augment the data to enhance the dataset's robustness. Secondly, I will experiment with different deep learning models, comparing their strengths and weaknesses to identify the model that achieves the best classification results. Performance metrics such as accuracy, recall, and sensitivity will be used for evaluation. Finally, I will refine the model by adjusting parameters and other aspects, continually using performance metrics to improve its effectiveness.

5. Programme of work.

Work Package 1 (WP1) – Literature Review. Find some relevant papers by using some keywords, then read them one by one, and understand the process of study, comparing the advantages the disadvantages, then study the advantages of research and summarize the different limitations encountered in different studies.
Milestone 1 (M1) – Literature review chapter of dissertation completed.

Work Package 2 (WP2) – Data Preprocessing. Checking the chest X-rays images data set and having a comprehensive understanding to do dimensionality reduction, feature election or data augmentation.

Milestone 2 (M2) – Data Preprocessing section of Methodology chapter of dissertation completed.

Work Package 3 (WP3) – Build a Model. Choosing the deep learning model by comparing diifferent model, then program it in Matlab, Pycharm or Jupter, using the training data, validation data and test data. Then tune parameters to make model have better performance.

Milestone 3 (M3) – Model section of Methodology chapter of dissertation completed.

Work Package 4 (WP4) – Evaluation. Using different evaluation metrics to evaluate the model performance, like accuracy, recall, and sensitivity. In addition, confusion metrics also can be used as visible charts.

Milestone 4 (M4) – Evaluation chapter of dissertation completed.

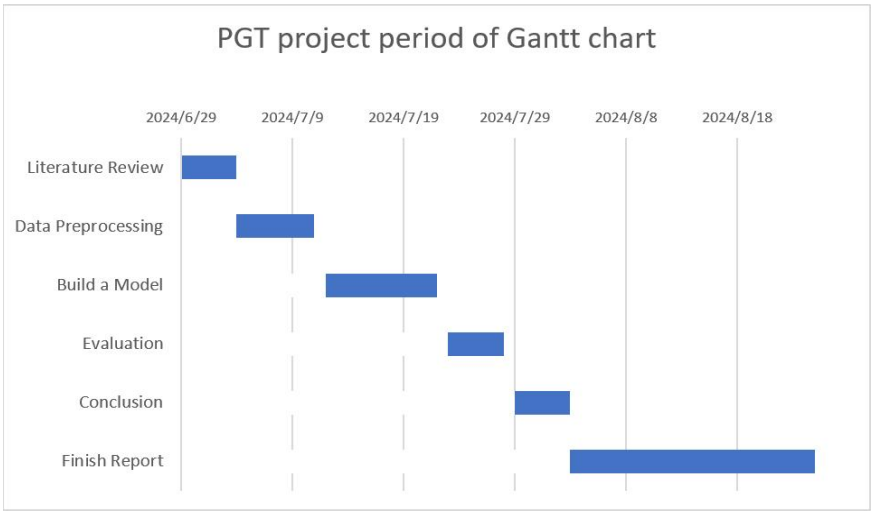
Work Package 5 (WP5) – Conclusion. Summarize the entire research process, express your own understanding of the research, analyze the advantages, disadvantages and limitations of the research, discuss the salient features of the process, point out areas that need to be further improved in the research and future research directions in this field

Milestone 5 (M5) – Conclusion chapter of dissertation completed.

Work Package 6 (WP6) – Finish Report. Complete the report according to experiment.

Milestone 6 (M6) – Report completed.

6. **Time plan.**



Reference

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