

Artificial Intelligence Techniques in Classifying Printed Electrocardiograms

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Introduction: Billions of traditional electrocardiograms (ECG) printed papers have been used as a mainstay of cardiac care over the last century. The digital ECG methods can potentially assess different heart conditions. For this reason, researchers have been interested in designing a method for classifying the ECG papers. This work aims to classify the ECG printouts using artificial intelligence approaches.

Methodology: Deep Residual Network (ResNet) and Random Forest were used in ECG printed paper classification. ResNet was used for feature extraction and Random Forest was used as a classification model. ResNet is a convolutional neural network architecture that utilizes residual connections to skip certain layers, allowing for the direct flow of information from earlier layers to deeper layers to bypass the potentially diminishing effect of deep layers. Particularly, ResNet50 which is composed of 50 layers including convolutional, pooling, and fully connected layers, pre-trained on a large-scale image dataset was used for this work. Afterwards, Random Forest classifier, which is an ensemble learning method that utilizes multiple decision trees to classify data, leveraging the power of averaging and feature randomness, was used for training and testing as it is known for its ability to handle high-dimensional data and capture complex relationships between features and class labels (Fig. 1). F1-measure was used to analyse the model performance.

Results: Our team, Leicester Fox had a successful submission for the unofficial phase. The result showed an F1-measure of 0.44. On our local machine, we had F1-measure of 0.76 on images without distortion.

Conclusion: Our findings show that ResNet is suitable for feature extraction in ECG classification with the help of random forest as a classification model.

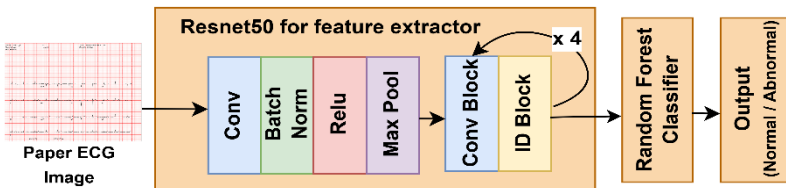


Fig. 1: The proposed method