Cardiovascular Diseases Classification based on ECG Scans with Transfer Learning

Hui Lu[1], Adithya Ramachandran[2]

[1]Brandenburg University of Technology, Cottbus, Germany
[2]University of Erlangen-Nuremberg, Erlangen, Germany

Aim: Cardiovascular diseases (CVD) are one of the main causes of death in the world. To necessitate and enable accurate and timely diagnosis and treatment methods for effective management of CVDs, ECG emerges as a safe, non-invasive, and dependable tool in the healthcare industry. The goal of the George B. Moody PhysioNet Challenge 2024 was to digitize and classify ECG captured from images or paper printouts.

Methods: Our team Dublub proposed a Deep Learning (DL) based framework for classifying scanned ECG signal data. For training the neural network, we utilized the ECG-Image-Kit synthetic ECG image generator that provides ECG images for normal and different cardiovascular abnormalities, along with ground truth data. Each ECG image was reshaped with the shape of 299*299*3, and all pixel values were normalized to the range of [0, 1]. The pre-trained Inception V3 model on ImageNet data was used as the feature extractor, and 2048 features were extracted from each ECG image. 20% of the data were left out as the validation set. 20% of the public training data were left out as a validation set for model selection. The extracted features were fed into the random forest classifier to classify the ECG images.

Results: For preliminary experiments as a multi class problem, we achieved nominal training and performance on the validation data, with the challenge score pf around 0.6. However, the binary classes challenge score was 0 on the hidden validation data.

Conclusion: With the achieved results, further analysis should be performed to improve the performance on the unseen test data.