Automated Cardiac Disease Challenge (ACDC)

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Introduction

- Using cine-MRI data from 150 patients, classify heart scans into 5 subgroups

- Subgroups:

    - Healthy - NOR

    - Myocardial infarction - MINF

    - Dilated cardiomyopathy - DCM

    - Hypertrophic cardiomyopathy - HCM

    - Abnormal right ventricle - RV

- Previous solutions

    - 1D CNN for practicality to use normal CPU, achieving 97% on training and 96% on testing

Methods and Results

- We created our own model with 1D CNN with a 80-20 split
- Achieved 86% training and validation accuracy
  - 33% test accuracy

```
Model: "sequential_1"
_____
 Layer (type)                Output Shape              Param #
=================================================================
 conv1d_2 (Conv1D)           (None, 107, 9)            66537

 max_pooling1d_2 (MaxPoolin  (None, 106, 9)            0
 g1D)

 dropout_3 (Dropout)         (None, 106, 9)            0

 conv1d_3 (Conv1D)           (None, 59, 9)             3897

 max_pooling1d_3 (MaxPoolin  (None, 29, 9)             0
 g1D)

 dropout_4 (Dropout)         (None, 29, 9)             0

 flatten_1 (Flatten)         (None, 261)               0

 dense_2 (Dense)             (None, 128)               33536

 dropout_5 (Dropout)         (None, 128)               0

 dense_3 (Dense)             (None, 5)                 645

=================================================================
Total params: 104615 (408.65 KB)
Trainable params: 104615 (408.65 KB)
Non-trainable params: 0 (0.00 Byte)
_____
```

Evaluation

- Balanced accuracy score: 33.2%

- Classification report

- Confusion matrix

```
              precision    recall  f1-score   support

           0       0.24      0.14      0.18       795
           1       0.31      0.18      0.23       711
           2       0.29      0.45      0.35       870
           3       0.34      0.43      0.38       855
           4       0.54      0.46      0.50       591

    accuracy                           0.33      3822
   macro avg       0.34      0.33      0.33      3822
weighted avg       0.33      0.33      0.32      3822
```
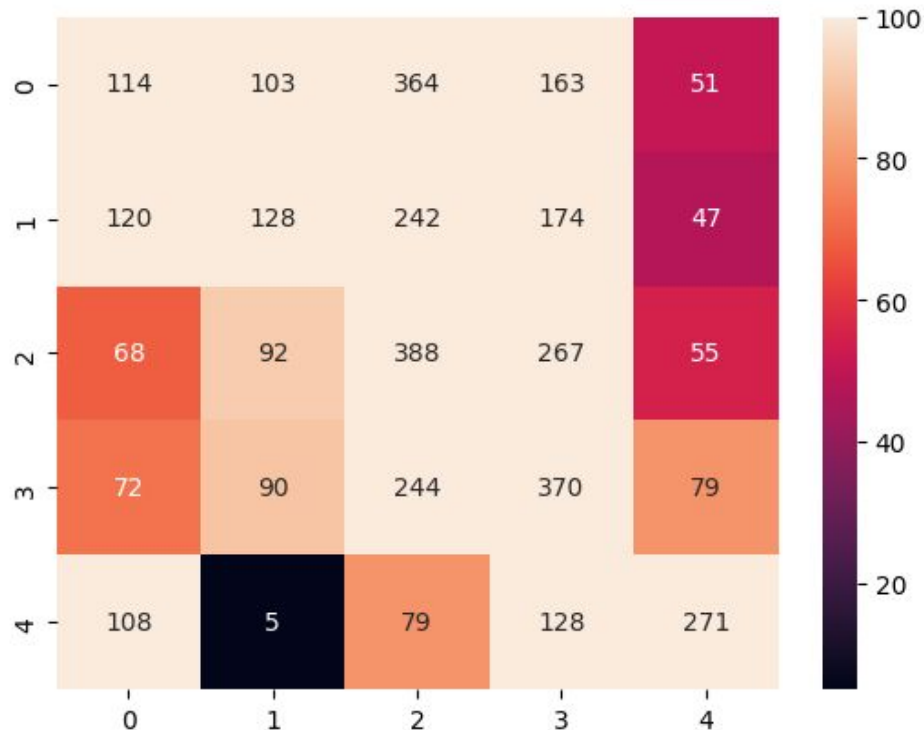
Discussion

- Possibility of overfitting due to disparity between training and test accuracy

- Solutions:

  - Use greater amounts of data to prevent overfitting

  - Use a less complex model

  - Use cross-validation