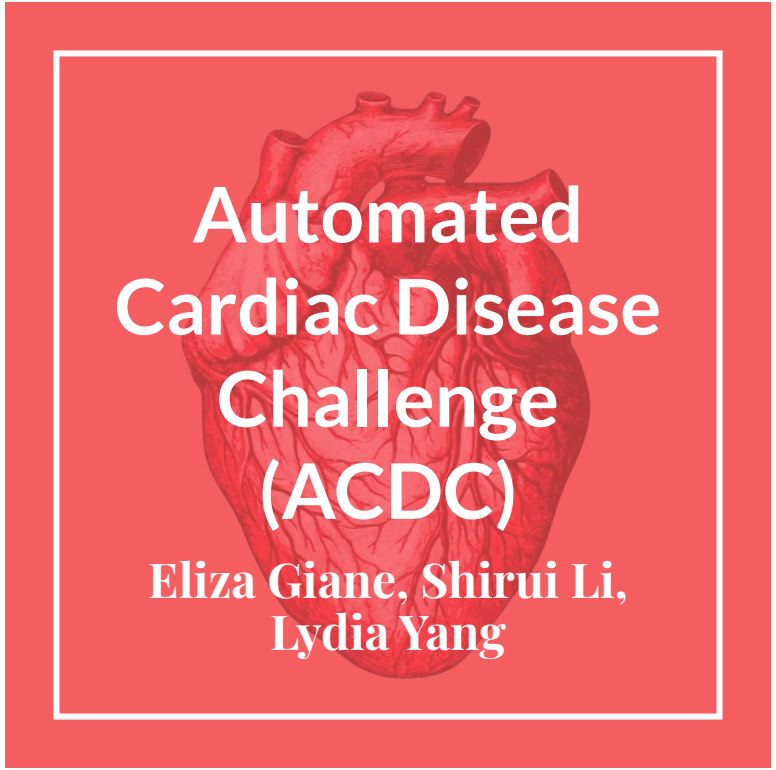
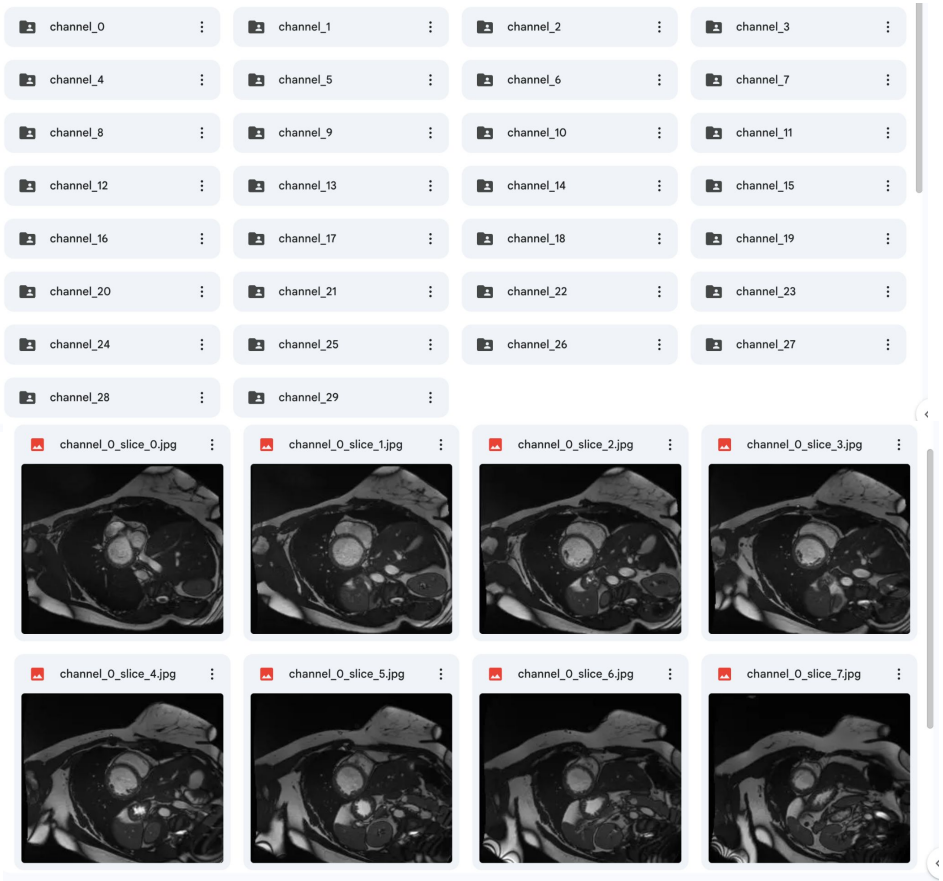


Automated Cardiac Disease Challenge (ACDC)

Eliza Giane, Shirui Li, Lydia Yang

Background about MRI

- Non-invasive technique
- Uses a strong magnetic field and radio waves to produce images
- **Representation**:
  - Matrices whose positions represent spatial locations
  - Each value is a **voxel** (pixel with volume) - 0.5 to 4mm
  - **MRIs** consist of multiple **“slices”**: 2D arrays of intensity values that represent the signal at different locations.
  - A **stack of slices** can be represented as a 3D array (a volume)
  - **fMRI** images are a series of 3D volumes over time, so they are actually 4D arrays



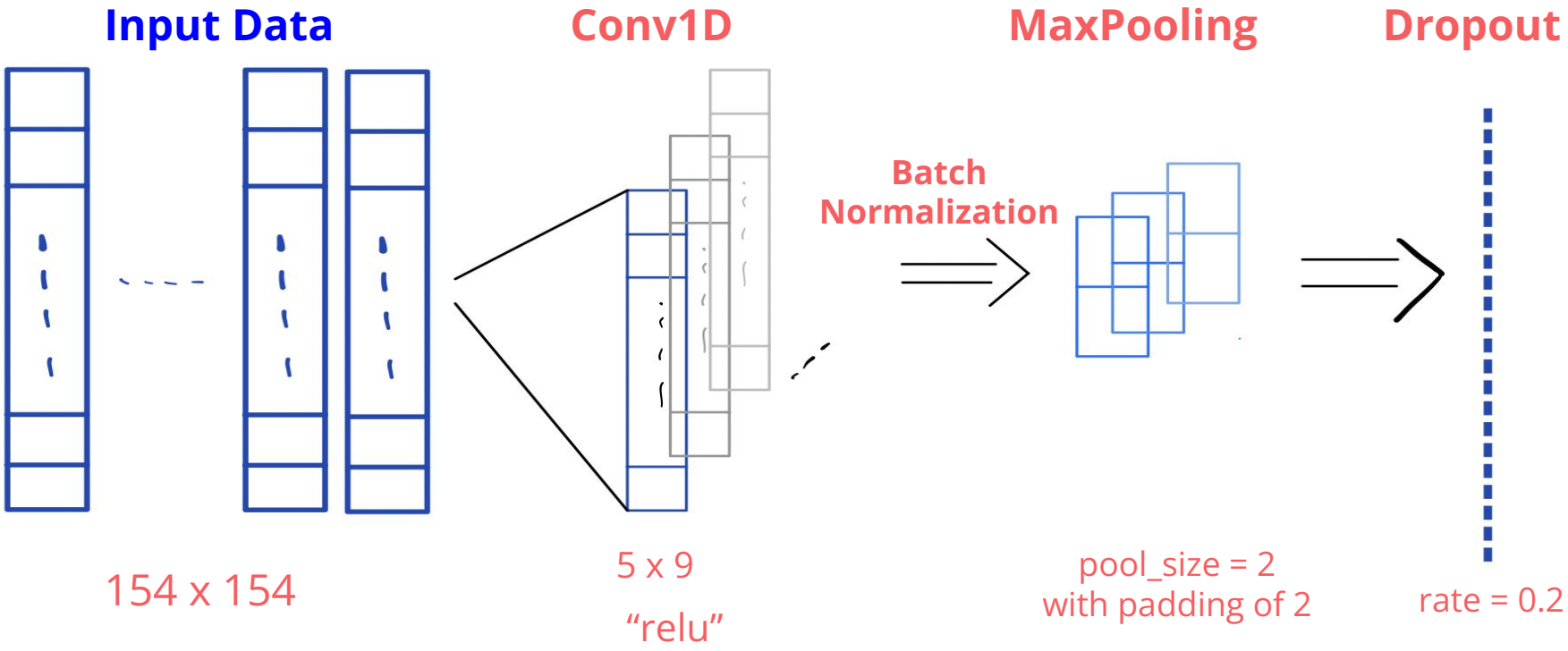
Introduction and Dataset

- 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 (Hussain 2021)

Data Processing

- Loaded a certain random portion of the whole dataset
    - Balanced distribution of patient diseases
    - Uneven image slice numbers between patients
- Resizing the image to standard dimensions
- Training and testing data already given as splitted data
- Choosing an 80-20 split between training and validation data

CNN1D Block Structure



Results and Evaluation

- Valid/Test accuracy: 35.8% / 39.5%
- Balanced accuracy score: 39.7%
- Confusion matrix
- Classification report

	precision	recall	f1-score	support
0	0.36	0.37	0.37	265
1	0.41	0.41	0.41	237
2	0.48	0.20	0.28	290
3	0.42	0.59	0.49	285
4	0.34	0.42	0.37	197
accuracy			0.39	1274
macro avg	0.40	0.40	0.38	1274
weighted avg	0.41	0.39	0.38	1274