SPRINT 2: Classification of Arrhythmia by Using Deep Learning With 2-D ECG Spectral Image Representation

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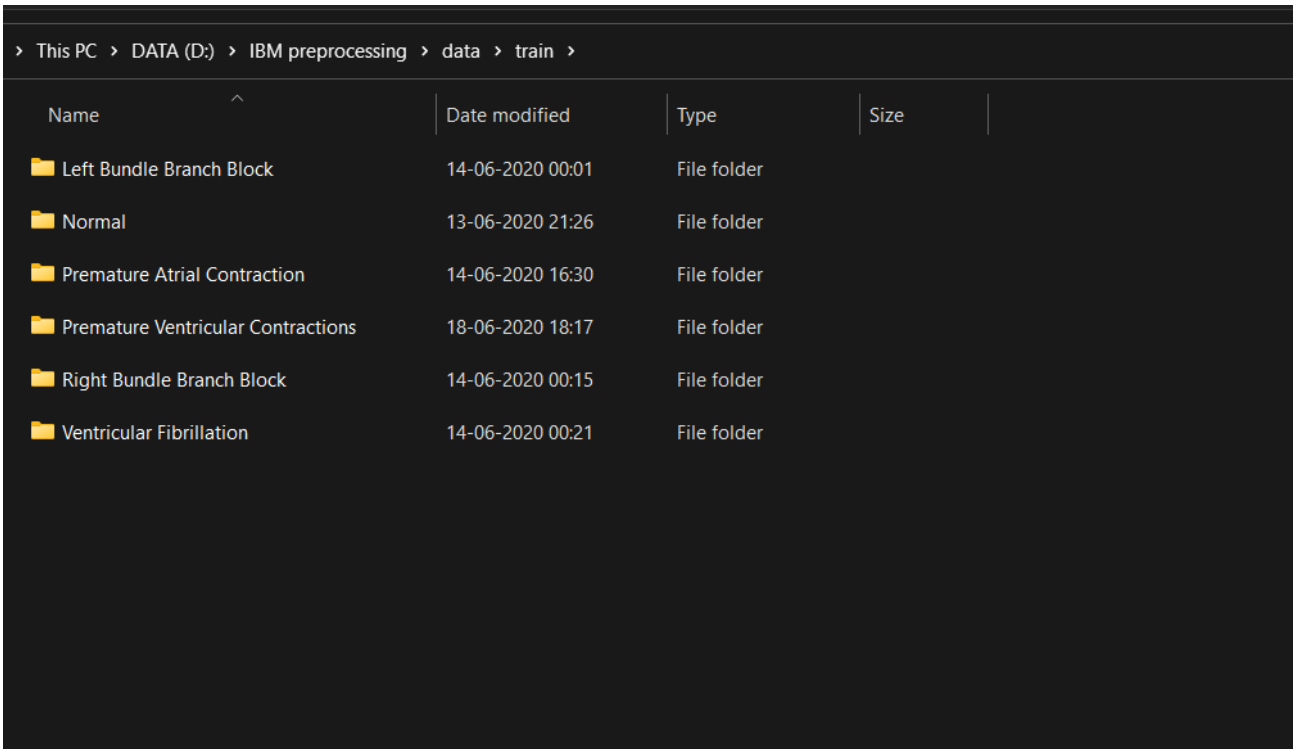
Code: Updated in GitHub in the Deliverables section in Sprint1 folder.

Description of USN and Screenshots:

USN-4:

As a user, I want quality data to be collected for the purposes of training the model. Also, image processing methods must be employed to pre-process the dataset.

Screenshot:



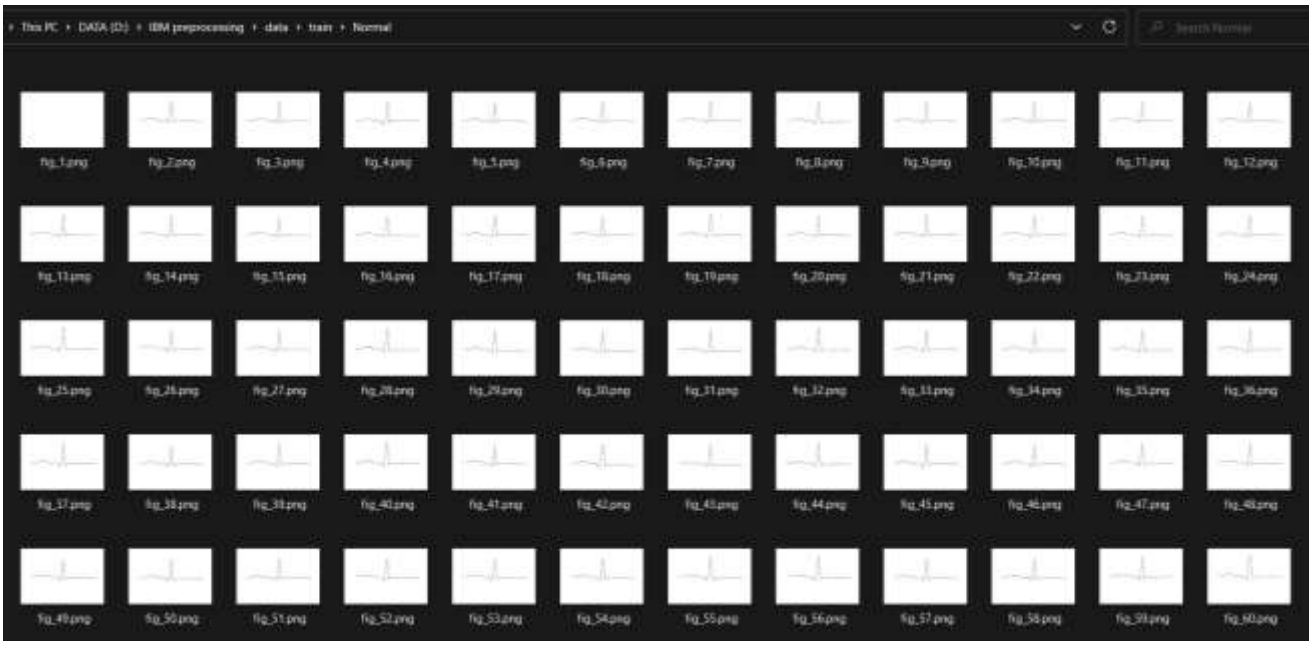


Image Split:

Left Bundle Branch Block – 504 images

Normal – 7436 images

Premature Atrial Contraction – 2054 images

Premature Ventricular Contractions – 2759 images

Right Bundle Branch Block – 2239 images

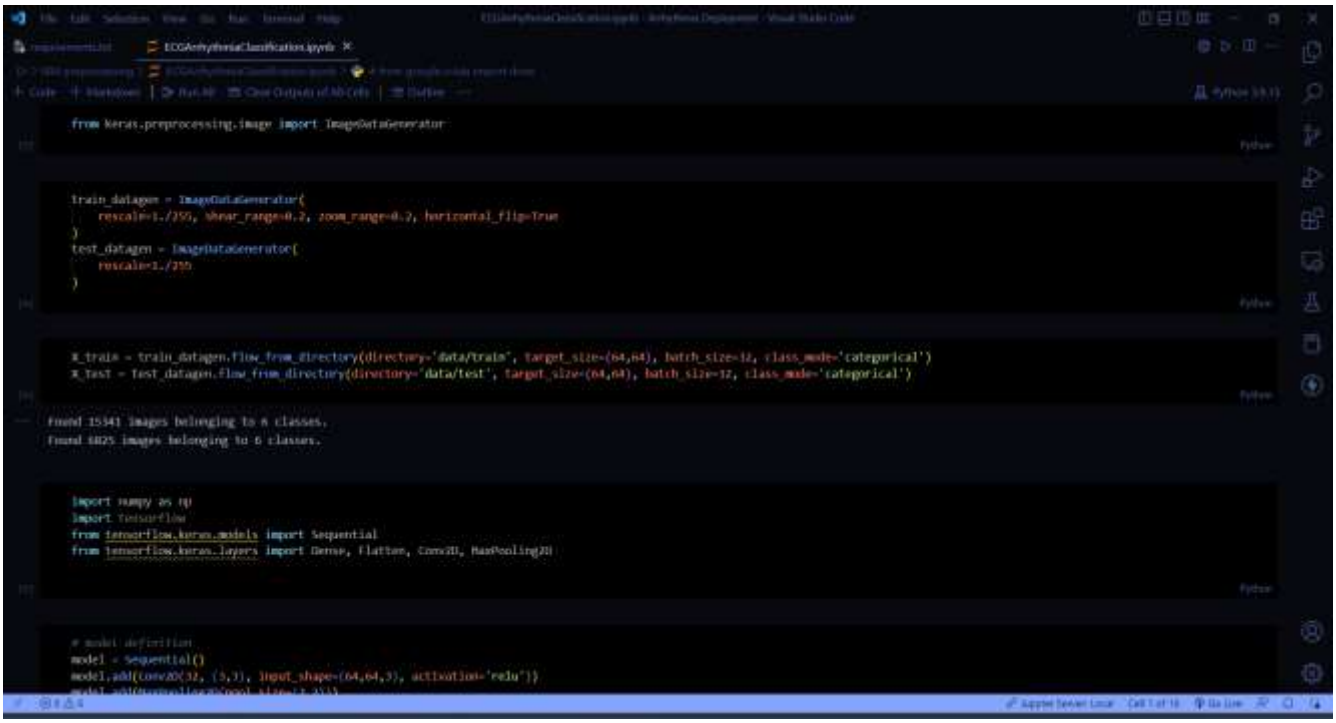
Ventricular Fibrillation – 439 images

For reducing skewness in the dataset, ImageDataGenerator class was used for both processing and handling with data imbalance.

USN-3:

As a user, I want the ML model to be as accurate as possible.

Screenshot:



Model Architecture:

Model: "sequential"

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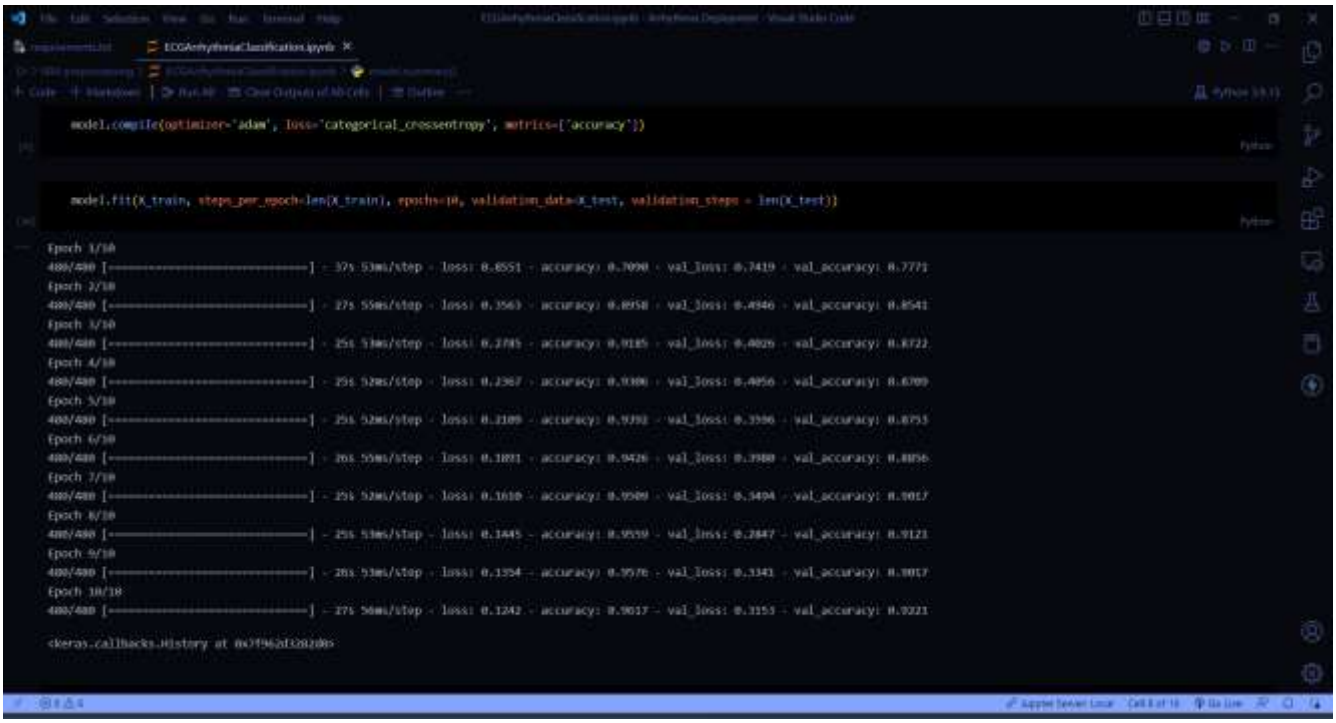
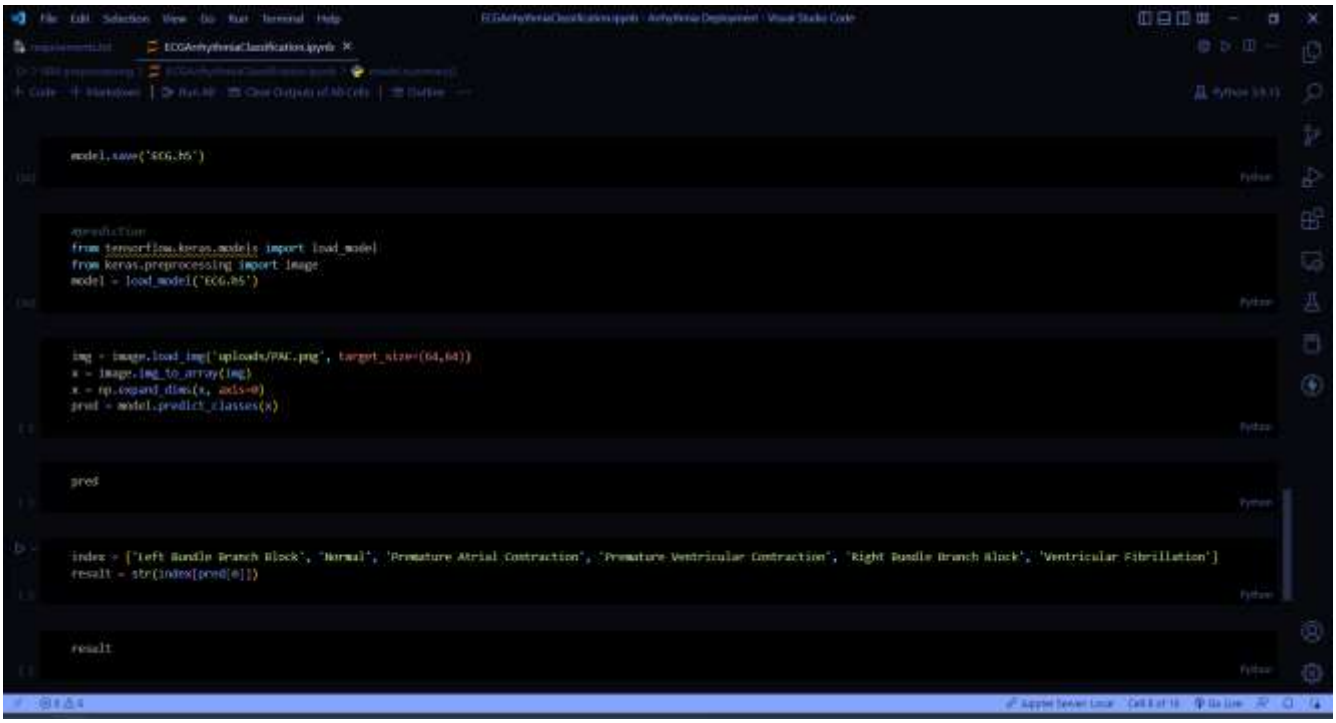
Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 62, 62, 32)	896
max_pooling2d (MaxPooling2D	(None, 31, 31, 32))	0
conv2d_1 (Conv2D)	(None, 29, 29, 32)	9248
max_pooling2d_1 (MaxPooling	(None, 14, 14, 32) 2D)	0
flatten (Flatten)	(None, 6272)	0
dense (Dense)	(None, 32)	200736
dense_1 (Dense)	(None, 6)	198

Total params: 211,078

Trainable params: 211,078

Non-trainable params: 0




model.save('ECG.h5')
Prediction
from tensorflow.keras.models import load_model
from keras.preprocessing import image
model = load_model('ECG.h5')
img = image.load_img('uploads/PAC.png', target_size=(64,64))
x = image.img_to_array(img)
x = np.expand_dims(x, axis=0)
pred = model.predict_classes(x)
pred
index = ['Left Bundle Branch Block', 'Normal', 'Premature Atrial Contraction', 'Premature Ventricular Contraction', 'Right Bundle Branch Block', 'Ventricular Fibrillation']
result = str(index[pred[0]])
result