



بسم الله الرحمن الرحيم



ML Project 2024 of "Machine Learning"

Submitted by:

Name:	ID:
Ahmed Ali Ahmed Ismail	20206005
Mohamed Alaa Mohamed	20206068
Yassin Magdy Abdulghani	20206087
Youssef Abdelrahman Youssef	20206094
Omar Waleed Zenhom	20206130

Group:

Group 1

S4

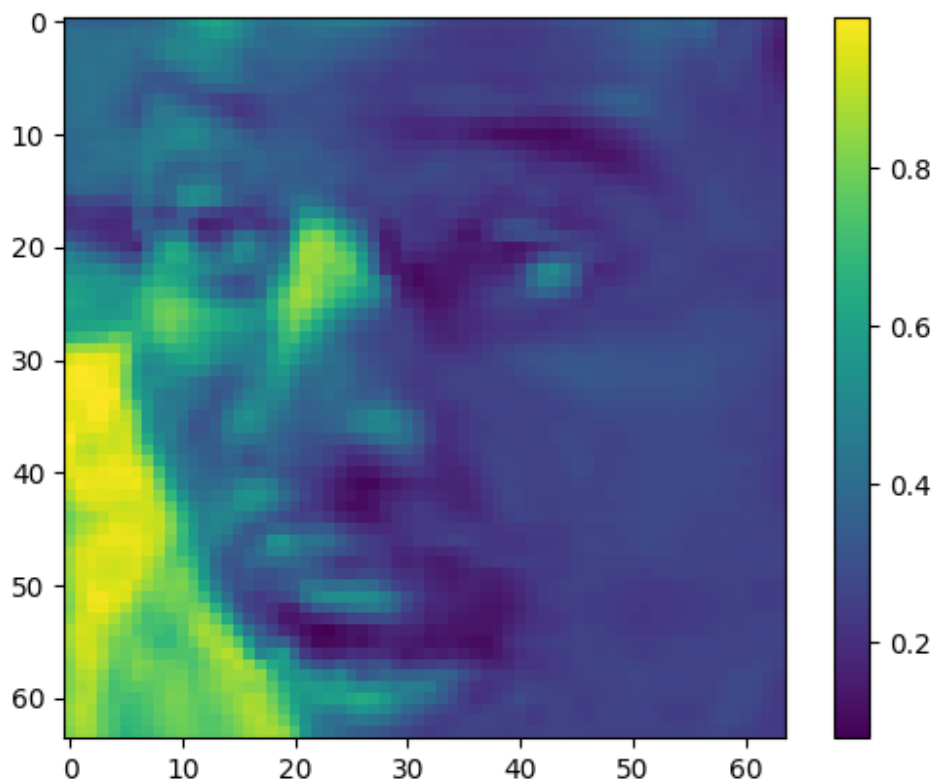
The Chosen Dataset:

<https://www.kaggle.com/datasets/cashutosh/gender-classification-dataset>

Gender Classification Dataset

Code and Graph Screenshots:

Image Plotting:



SVM Output:

```
Run main
:
images shape: (64, 64)
images labels: 0
Reshaping training images: 100% | 37687/37687 [00:00<00:00, 2212398.88it/s]
Reshaping testing images: 100% | 9482/9482 [00:00<00:00, 2358538.26it/s]
Reshaping validation images: 100% | 11649/11649 [00:00<00:00, 2329635.59it/s]
Testing Confusion Matrix:
[[4281  462]
 [ 526 4133]]
Testing Average F1 Score: 0.8949047125464892
Process finished with exit code 0
project_v2 > main.py 22:57 CRLF UTF-8 4 spaces Python 3.10
```

BEST NN Model 2 Output (epochs = 100):

```
588/588 35s 58ms/step - accuracy: 0.9614 - loss: 0.1033 - val_accuracy: 0.9197 - val_loss: 0.2602
Epoch 98/100
588/588 22s 38ms/step - accuracy: 0.9600 - loss: 0.1042 - val_accuracy: 0.9188 - val_loss: 0.2695
Epoch 99/100
588/588 49s 51ms/step - accuracy: 0.9592 - loss: 0.1080 - val_accuracy: 0.9221 - val_loss: 0.2509
Epoch 100/100
588/588 24s 40ms/step - accuracy: 0.9626 - loss: 0.1029 - val_accuracy: 0.9217 - val_loss: 0.2577
Model: "sequential_1"

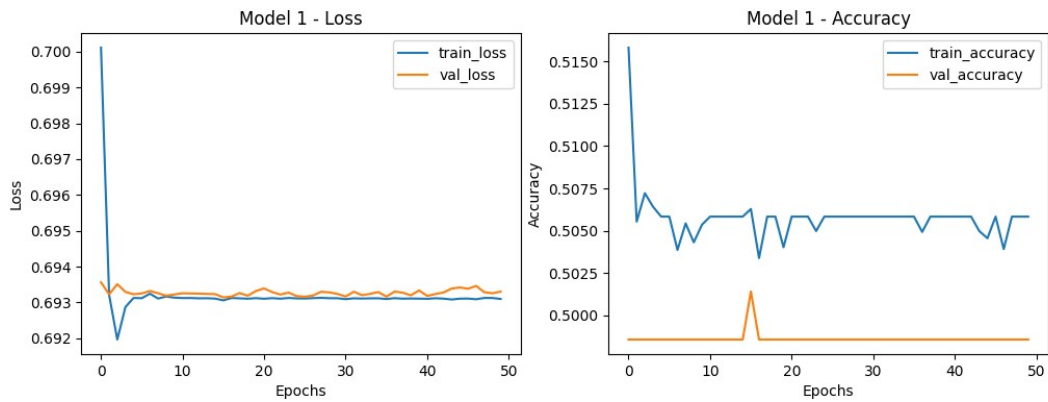


| Layer (type)        | Output Shape | Param #   |
|---------------------|--------------|-----------|
| flatten_1 (Flatten) | (None, 4096) | 0         |
| dense_3 (Dense)     | (None, 256)  | 1,048,832 |
| dense_4 (Dense)     | (None, 128)  | 32,896    |
| dense_5 (Dense)     | (None, 64)   | 8,256     |
| dense_6 (Dense)     | (None, 1)    | 65        |

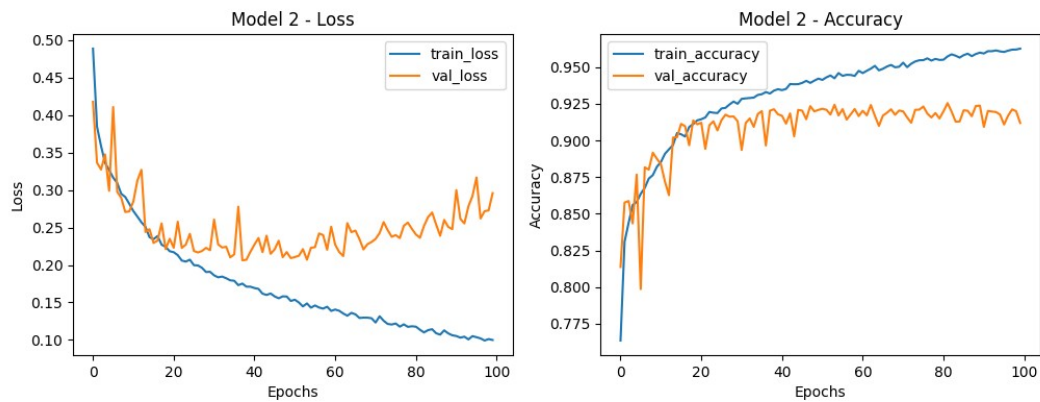


Total params: 3,270,149 (12.47 MB)
Trainable params: 1,090,049 (4.16 MB)
Non-trainable params: 0 (0.00 B)
Optimizer params: 2,180,100 (8.32 MB)
NN_Model_2.keras
294/294 3s 10ms/step
Testing Confusion Matrix:
[[4743  0]
 [4659  0]]
Testing Average F1 Score: 0.3383086065260364
Process finished with exit code 0
```

NN Model 1:



NN Model 2:



CNN Best Model (RGB) Output (epochs = 50):

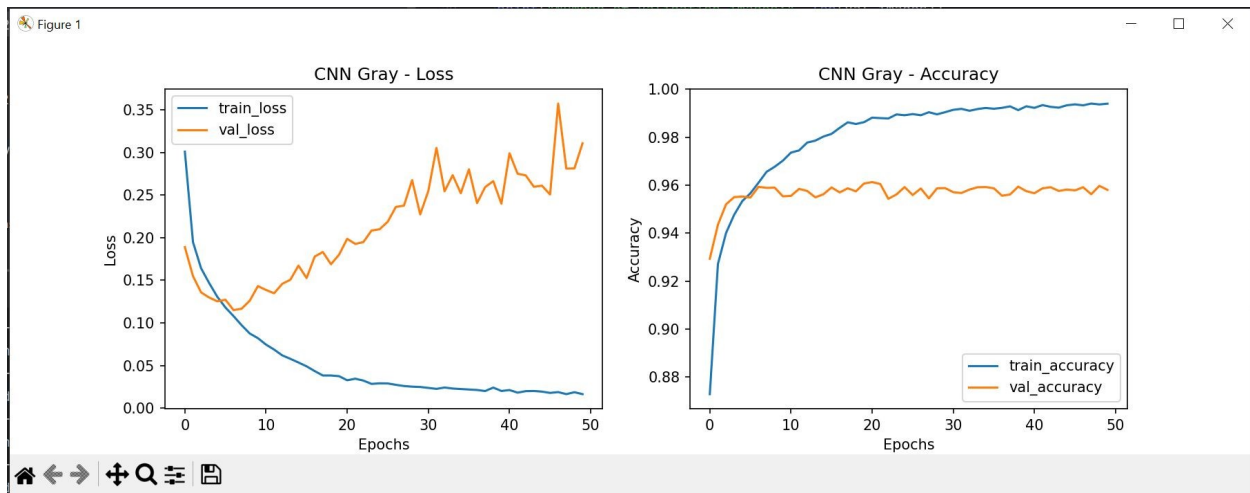
```
1176/1176 — 58s 50ms/step - accuracy: 0.9953 - loss: 0.0126 - val_accuracy: 0.9624 - val_loss: 0.2866
Epoch 50/50
1176/1176 — 61s 52ms/step - accuracy: 0.9952 - loss: 0.0153 - val_accuracy: 0.9613 - val_loss: 0.2894
Model: "sequential_1"
```

Layer (type)	Output Shape	Param #
conv2d_2 (Conv2D)	(None, 62, 62, 32)	896
max_pooling2d_2 (MaxPooling2D)	(None, 31, 31, 32)	0
conv2d_3 (Conv2D)	(None, 29, 29, 64)	18,496
max_pooling2d_3 (MaxPooling2D)	(None, 14, 14, 64)	0
flatten_1 (Flatten)	(None, 12544)	0
dense_2 (Dense)	(None, 128)	1,605,760
dropout_1 (Dropout)	(None, 128)	0
dense_3 (Dense)	(None, 1)	129

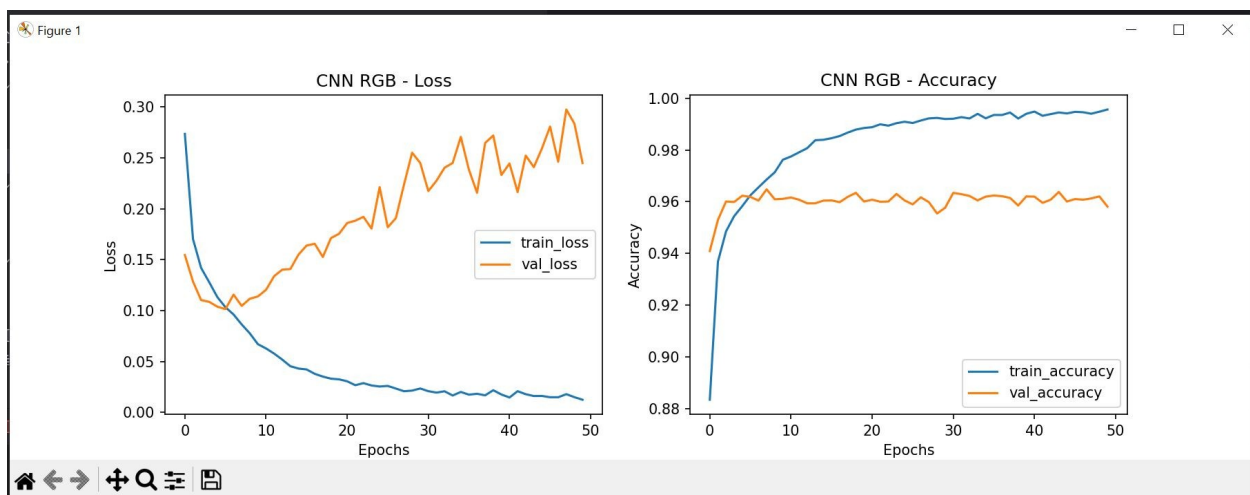
```
Total params: 4,875,845 (18.60 MB)
Trainable params: 1,625,281 (6.20 MB)
Non-trainable params: 0 (0.00 B)
Optimizer params: 3,250,564 (12.40 MB)
```

```
Non-trainable params: 0 (0.00 B)
Optimizer params: 3,250,564 (12.40 MB)
CNN_RGB.keras
294/294 — 2s 8ms/step
Testing Confusion Matrix:
[[4775   0]
 [4627   0]]
Testing Average F1 Score: 0.3421150355181446
Process finished with exit code 0
```

CNN (Gray) Model:



CNN (RGB) Model:



Best Model based on the results:

SVM Model with Accuracy ≈ 0.89