Faculty of
computers and
artificial intelligence

Cover sheet

Selected CS-1 project

Team no. :

Name	ID	Year

Numerical dataset

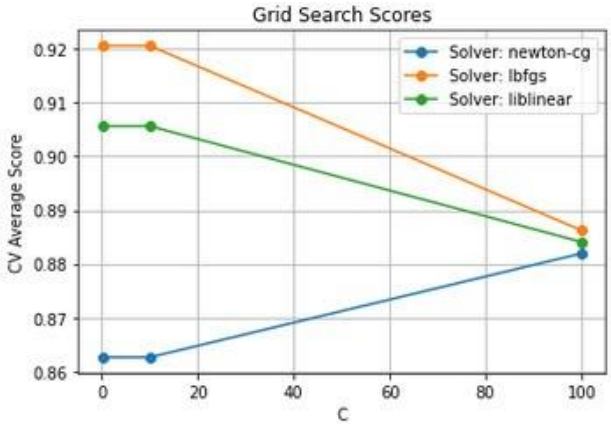
General information about dataset

Name	Milk Quality Prediction
No. of classes	3 (high, low, medium)
Total no. of samples	1059
No. of samples in training\validation	466, 117
No. of samples in testing	65

Logistic Regression

Implementation details:

Cross validation



Hyperparameters

C = 10

Solver = newton-cg

Results details

```
[[21  0  6]
 [ 0  7  0]
 [ 1  0 30]]
```

Figure 1 Confusion Matrix

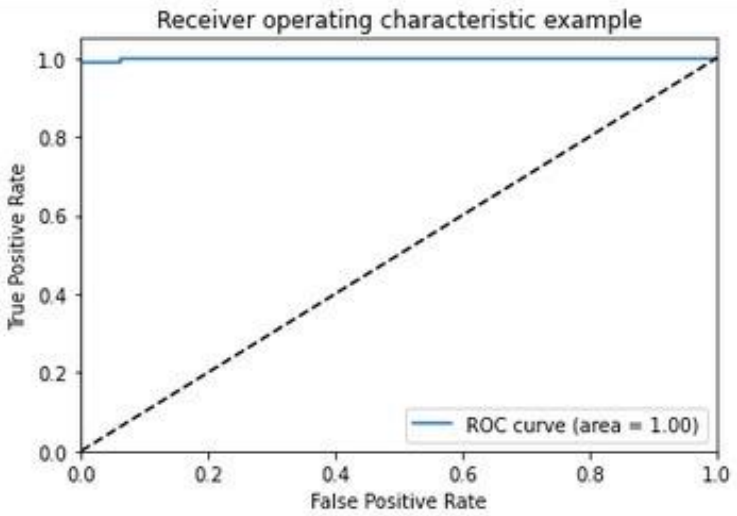
```
training Accuracy 0.8884120171673819
Validation Accuracy 0.8547008547008547
Testing Accuracy 0.8547008547008547
```

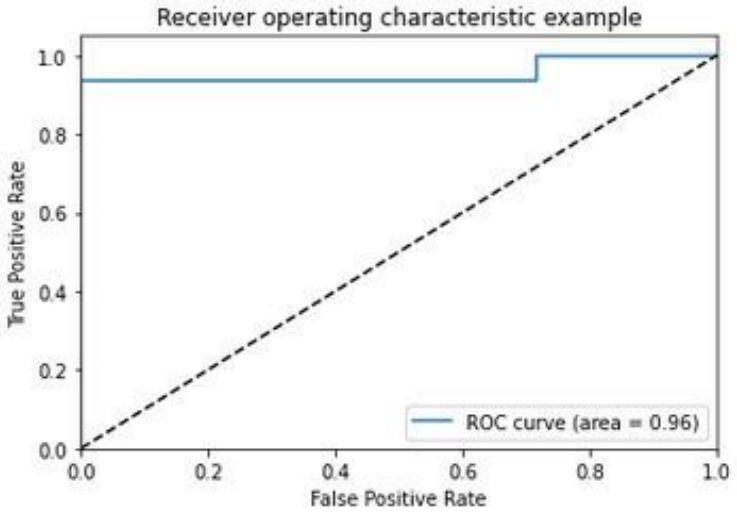
Figure 2 Accuracy of Logistic Regression Model

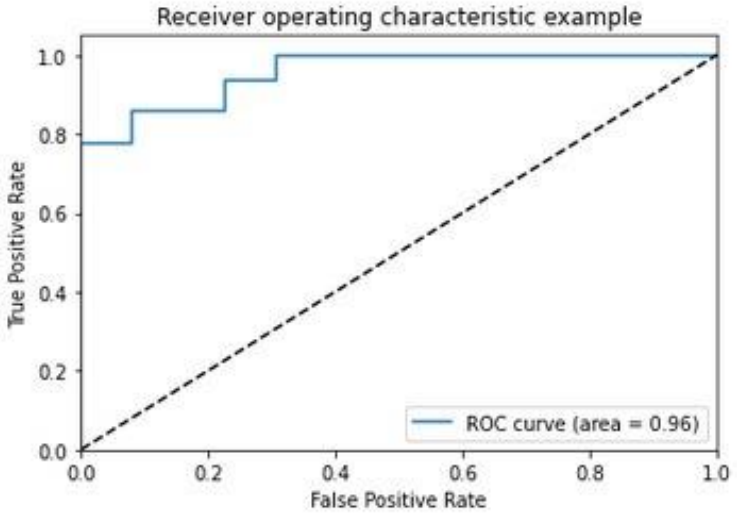
	precision	recall	f1-score	support
0	0.95	0.78	0.86	27
1	1.00	1.00	1.00	7
2	0.83	0.97	0.90	31
accuracy			0.89	65
macro avg	0.93	0.92	0.92	65
weighted avg	0.90	0.89	0.89	65

Figure 3 Matrices Logistic Regression Model

ROC Curve


Receiver operating characteristic example
True Positive Rate
False Positive Rate
ROC curve (area = 1.00)
0.0
0.2
0.4
0.6
0.8
1.0

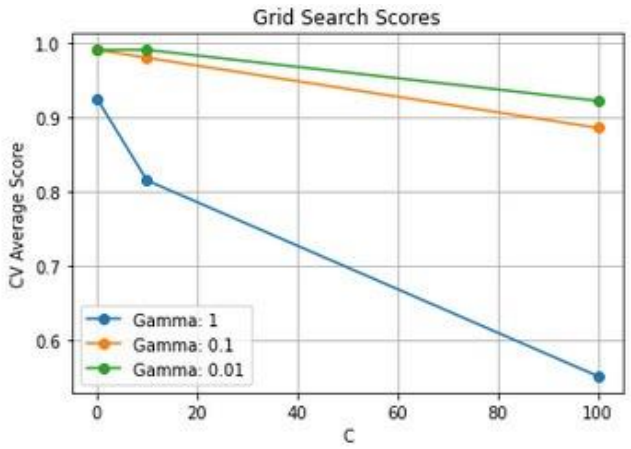

Receiver operating characteristic example
True Positive Rate
False Positive Rate
ROC curve (area = 0.96)
0.0
0.2
0.4
0.6
0.8
1.0


Receiver operating characteristic example
True Positive Rate
False Positive Rate
ROC curve (area = 0.96)
0.0
0.2
0.4
0.6
0.8
1.0

SVM

Implementation details:

Cross validation



Hyperparameters

C = 10

Gamma = 1

Kernel = rbf

Results details

```
[[26  0  1]
 [ 0  7  0]
 [ 2  0 29]]
```

Figure 4 Confusion Matrix

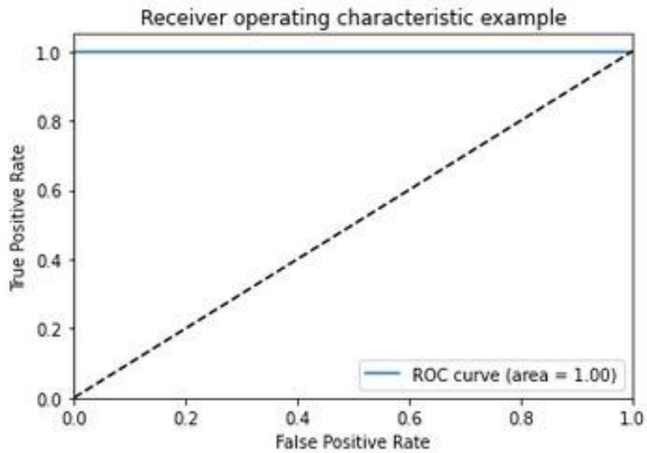
```
training Accuracy 0.9871244635193133
Validation Accuracy 0.9743589743589743
Testing Accuracy 0.9538461538461539
```

Figure 5 Accuracy of SVM Model

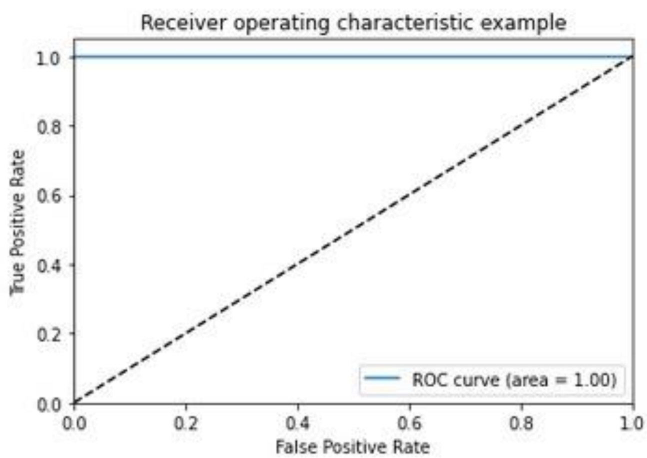
	precision	recall	f1-score	support
0	0.93	0.96	0.95	27
1	1.00	1.00	1.00	7
2	0.97	0.94	0.95	31
accuracy			0.95	65
macro avg	0.97	0.97	0.97	65
weighted avg	0.95	0.95	0.95	65

Figure 6 Matrices SVM Model

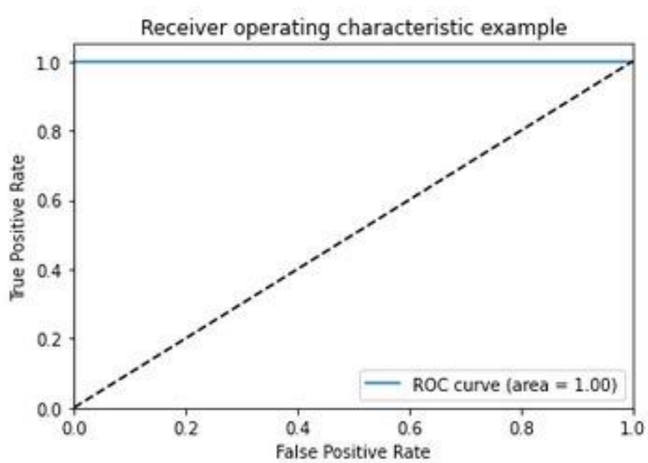
ROC Curve



Receiver operating characteristic example
True Positive Rate
False Positive Rate
ROC curve (area = 1.00)
0.0
0.2
0.4
0.6
0.8
1.0



Receiver operating characteristic example
True Positive Rate
False Positive Rate
ROC curve (area = 1.00)
0.0
0.2
0.4
0.6
0.8
1.0



Receiver operating characteristic example
True Positive Rate
False Positive Rate
ROC curve (area = 1.00)
0.0
0.2
0.4
0.6
0.8
1.0

Image dataset

General information about dataset

Name	UTKFace
No. of classes	5
Total no. of samples	23708
Size of image	200*200*3
No. of samples in training\validation	15173, 3794
No. of samples in testing	4742

SVM

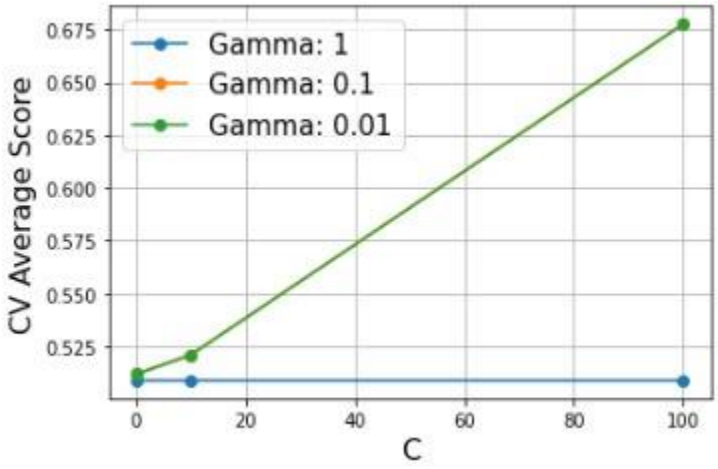
Implementation details:

Features extraction

No. of features extracted per image = 3780

Dimension of resulted features = 2

Cross validation



Hyperparameters

C = 10

Gamma = 1

Kernel = rbf

Results details

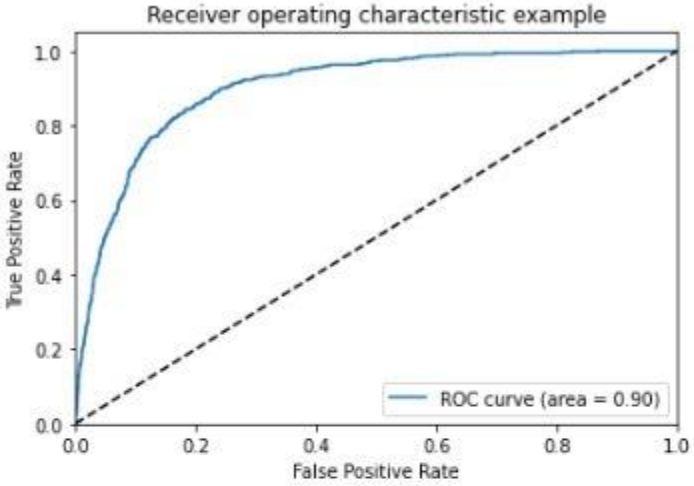
```
Accuracy :  0.7442007591733446
array([[ 716,  265,    9,    0,    1],
       [  40, 2231,  150,    8,    0],
       [   6,  365,  403,   52,    2],
       [   3,   48,  166,  157,    9],
       [   0,    5,   19,   65,   22]])
```

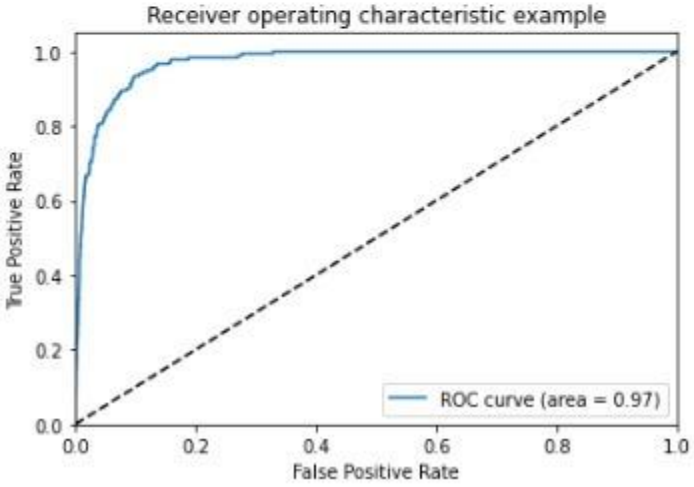
Figure 7 Accuracy of SVM Model

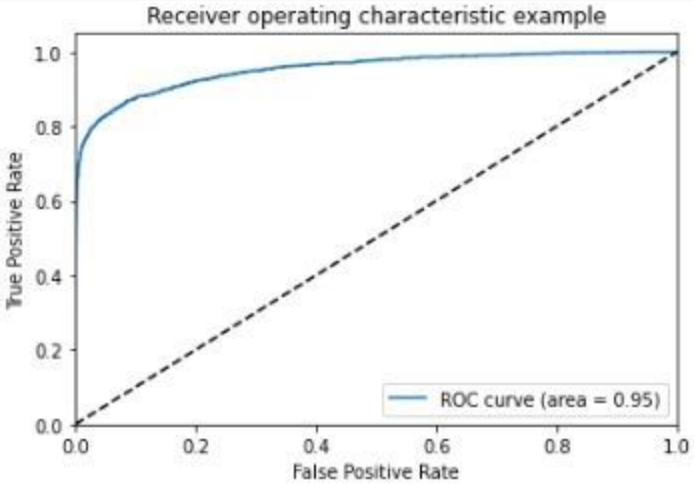
	precision	recall	f1-score	support
0	0.94	0.72	0.82	991
1	0.77	0.92	0.84	2429
2	0.54	0.49	0.51	828
3	0.56	0.41	0.47	383
4	0.65	0.20	0.30	111
accuracy			0.74	4742
macro avg	0.69	0.55	0.59	4742
weighted avg	0.74	0.74	0.73	4742

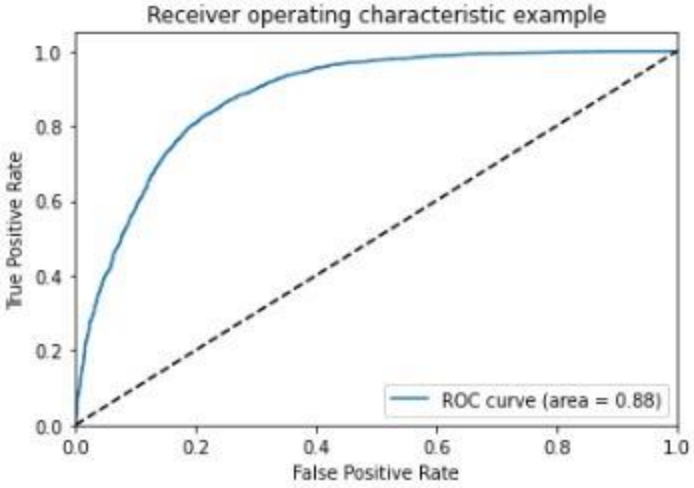
Figure 8 Matrices of SVM Model

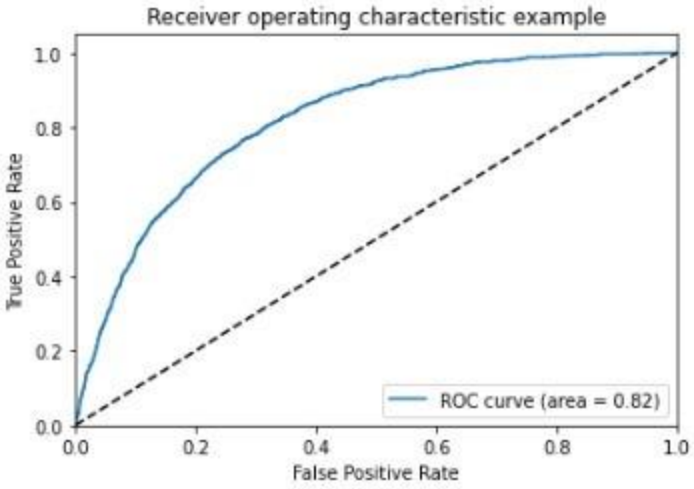
ROC Curve


Receiver operating characteristic example
True Positive Rate
False Positive Rate
ROC curve (area = 0.90)
0.0
0.2
0.4
0.6
0.8
1.0


Receiver operating characteristic example
True Positive Rate
False Positive Rate
ROC curve (area = 0.97)
0.0
0.2
0.4
0.6
0.8
1.0


Receiver operating characteristic example
True Positive Rate
False Positive Rate
ROC curve (area = 0.95)
0.0
0.2
0.4
0.6
0.8
1.0


Receiver operating characteristic example
True Positive Rate
False Positive Rate
ROC curve (area = 0.88)
0.0
0.2
0.4
0.6
0.8
1.0


Receiver operating characteristic example
True Positive Rate
False Positive Rate
ROC curve (area = 0.82)
0.0
0.2
0.4
0.6
0.8
1.0

ANN

Implementation details:

No. of features extracted per image = 3780

Dimension of resulted features = 2

Hyperparameters
Learning rate = 0.0001
Optimizer = adam
Batch size = 16
Regularization = l2 nom
No. of epochs = 20 (increase to 40 if not overfit)

Results details

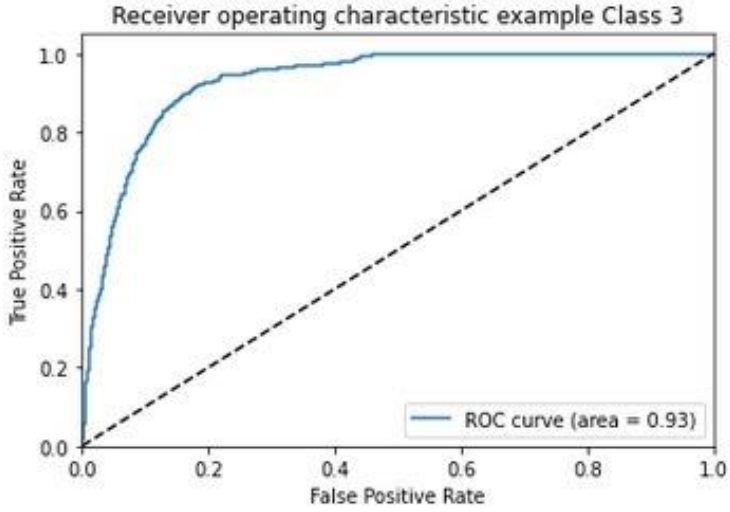
```
Accuracy :  0.7427245887811105
[[ 694  223    9    2    1]
 [  90 2205  158    9    0]
 [  11  351  433   83    3]
 [   2   36  150  151   19]
 [   2    5   16   50   39]]
```

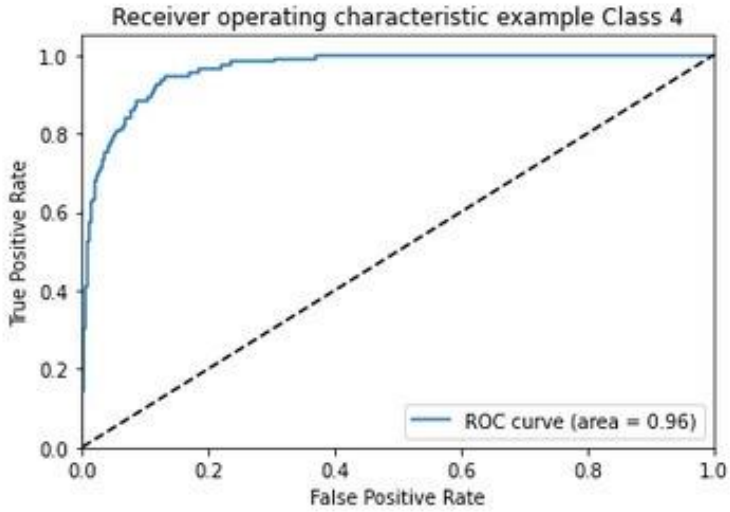
Figure 9 Accuracy of ANN Model

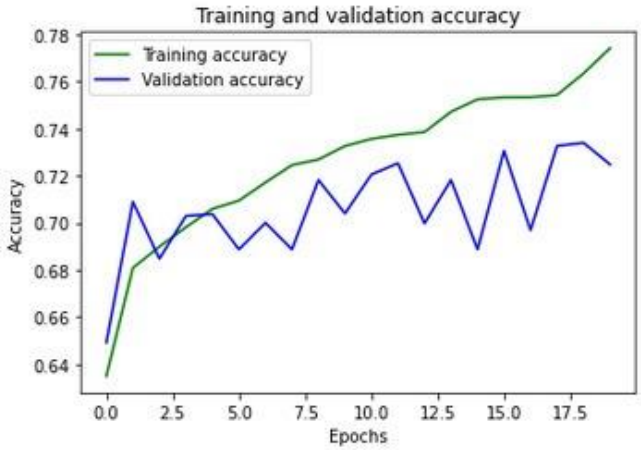
	precision	recall	f1-score	support
0	0.87	0.75	0.80	929
1	0.78	0.90	0.83	2462
2	0.57	0.49	0.53	881
3	0.51	0.42	0.46	358
4	0.63	0.35	0.45	112
accuracy			0.74	4742
macro avg	0.67	0.58	0.61	4742
weighted avg	0.73	0.74	0.73	4742

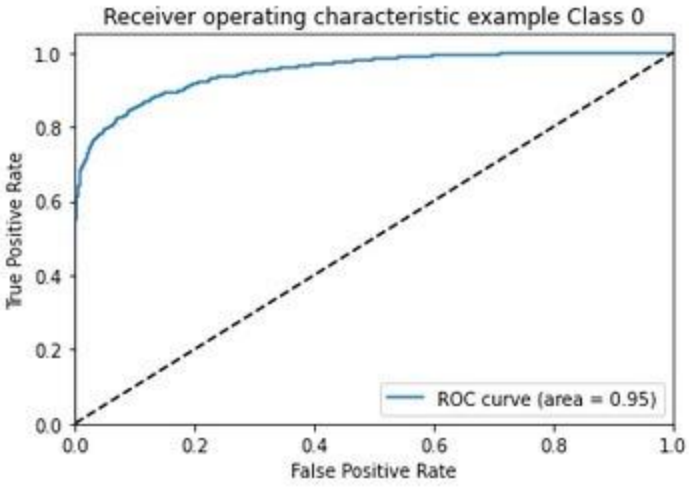
Figure 10 Matrices of ANN Model

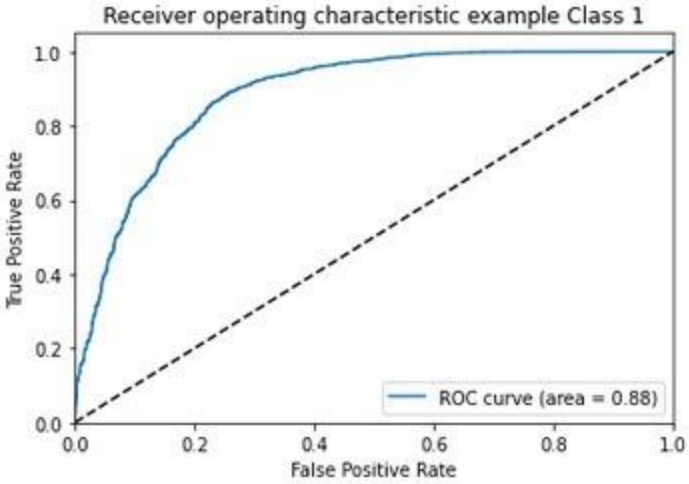
ROC Curve

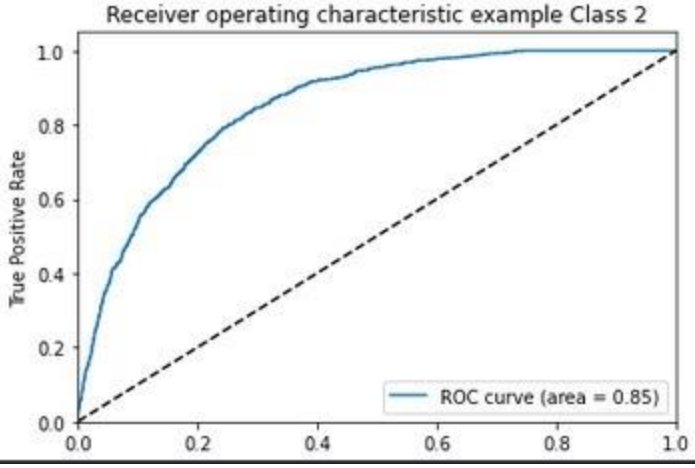

Receiver operating characteristic example Class 3
True Positive Rate
False Positive Rate
ROC curve (area = 0.93)
0.0
0.2
0.4
0.6
0.8
1.0


Receiver operating characteristic example Class 4
True Positive Rate
False Positive Rate
ROC curve (area = 0.96)
0.0
0.2
0.4
0.6
0.8
1.0


Training and validation accuracy
Training accuracy
Validation accuracy
Accuracy
Epochs
0.64
0.66
0.68
0.70
0.72
0.74
0.76
0.78
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5


Receiver operating characteristic example Class 0
True Positive Rate
False Positive Rate
ROC curve (area = 0.95)
0.0
0.2
0.4
0.6
0.8
1.0


Receiver operating characteristic example Class 1
True Positive Rate
False Positive Rate
ROC curve (area = 0.88)
0.0
0.2
0.4
0.6
0.8
1.0


Receiver operating characteristic example Class 2
True Positive Rate
ROC curve (area = 0.85)
0.0
0.2
0.4
0.6
0.8
1.0