Method 1:

**(Fine Tuned VGGNet Model as a Classifier:**

**Test accuracy: 0.9733 - precision: 0.9628 - recall: 0.9895**

**Validation accuracy: 0.9800 - precision: 0.9734 - recall: 1.0000**

Method 2:

**Features Extracted from Fine Tuned VGGNet Model**

**PCA to reduce Features**

**Used SVM , XGBoost and Random Forest for Classification:**

**XGBoost on Reduced Features :**

( Reduced to 50 features )

Test Accuracy = 0.9733333333333334

Val Accuracy = 0.9666666666666667

( Reduced to 20 features )

**Test Accuracy = 0.98**

**Val Accuracy = 0.9666666666666667**

**P = 0.98 Recall = 0.99**

( Reduced to 12 features )

Test Accuracy = 0.9733333333333334

Val Accuracy = 0.96

( Reduced to 9 features )

Test Accuracy = 0.9666666666666667

Val Accuracy = 0.98

( Reduced to 3 features )

Test Accuracy = 0.9666666666666667

Val Accuracy = 0.9666666666666667

**Random Forest on Reduced Features :**

**Out of 32768 extracted features**

( Reduced to 50 features :

Test Accuracy = 0.9733333333333334

Val Accuracy = 0.96

Precision 0.97

Recall 0.99 for class 1

( Reduced to 12 features )

Test Accuracy = 0.96

Val Accuracy = 0.96

( Reduced to 9 features )

**Test Accuracy = 0.98**

**Val Accuracy = 0.9733333333333334**

**Precision = 0.98**

**Recall = 0.99**

( Reduced to 3 features )

Test Accuracy = 0.9733333333333334

Val Accuracy = 0.9666666666666667

**SVM on Reduced Features :**

( Reduced to 50 features :

Rbf

Test Accuracy = 0.98

Val Accuracy = 0.98

Precision= 0.97

Recall= 1.00

Poly

Test Accuracy = 0.88

Val Accuracy = 0.9333333333333333

Precision = 0.83

Recall =1.00

Linear

Test Accuracy = 0.9466666666666667

Val Accuracy = 0.9733333333333334

Precision = 0.95

Recall = 0.95

( Reduced to 20 features :

rbf

Test Accuracy = 0.98

Val Accuracy = 0.98

P = 0.97 R = 1.00

poly

Test Accuracy = 0.9

Val Accuracy = 0.94

linear

Test Accuracy = 0.9666666666666667

Val Accuracy = 0.98

( Reduced to 12 features )

Rbf

Test Accuracy = 0.98

Val Accuracy = 0.98

Precision = 0.97

Recall= 1.00

poly

Test Accuracy = 0.9133333333333333

Val Accuracy = 0.96

linear

Test Accuracy = 0.9733333333333334

Val Accuracy = 0.98

0.97 0.99

( Reduced to 9 features )

rbf

Test Accuracy = 0.98

Val Accuracy = 0.98

Precision = 0.97

Recall= 1.00

poly

Test Accuracy = 0.94

Val Accuracy = 0.96

0.90 1.00

linear  
Test Accuracy = 0.9733333333333334

Val Accuracy = 0.9733333333333334

( Reduced to 3 features )

**Rbf**

**Test Accuracy = 0.98**

**Val Accuracy = 0.98**

**Precision 0.97**

**Recall= 1.00**

**Poly**

**Test Accuracy = 0.94**

**Val Accuracy = 0.96**

**Precision = 0.90**

**Recall= 1.00**

**Linear**

**Test Accuracy = 0.9733333333333334**

**Val Accuracy = 0.98**

**0.97 0.99**

**SVM on All Features Extracted:**

poly

Test Accuracy = 0.94

Val Accuracy = 0.9666666666666667

Rbf

**Test Accuracy = 0.98 ( it was 0.97333 for standardize features)**

**Val Accuracy = 0.98**

**Precision = 0.97 Recall = 1.00**

linear

Test Accuracy = 0.9466666666666667

Val Accuracy = 0.9533333333333334

**XGBoost on All Features Extracted:**

Test Accuracy = 0.9733333333333334

Val Accuracy = 0.9866666666666667

Precision 0.97

recall 0.99

**Random Forest on All Features Extracted:**

Test Accuracy = 0.9733333333333334

Val Accuracy = 0.98

Precision 0.97

Recall 0.99