Faculty of Computers and Artificial Intelligence

Computer Science Department

2021/2022

# CS 395 Selected Topics in CS-1

# Research Project

Report Submitted for Fulfillment of the Requirements and ILO's
for Selected Topics in CS-1 course for Fall 2021

## Team No. 7

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# I. NUMERICAL DATASET

## 1. Project Introduction

**a. Dataset Name**

Mobile App Statistics (Apple iOS app store)

**b. Number of classes and their labels**
(Specify number of classes and their labels.)

2 classes:{0: " didn`t get license",1: " got license "}

**c. Dataset Samples Numbers**
(The total number of samples in dataset)

7198 record

**d. Training, Validation and Testing**
(The number of samples used in training, validation and testing.)

5759 record for training , 1439 for validation and testing.

# 2. Implementation Details

## a. Extracted Features

11 features.

## b. Cross-validation

(Is cross-validation is used in any of implemented models? If yes, specify the number of fold and ratio of training/validation)

**NO.**

## c. Artificial Neural Network (ANN)

℘ **Hyper-parameters**

(Specify all the hyper-parameters (initial learning rate, optimizer, regularization, batch size, no. of epochs…)  with their specified value in implementation)

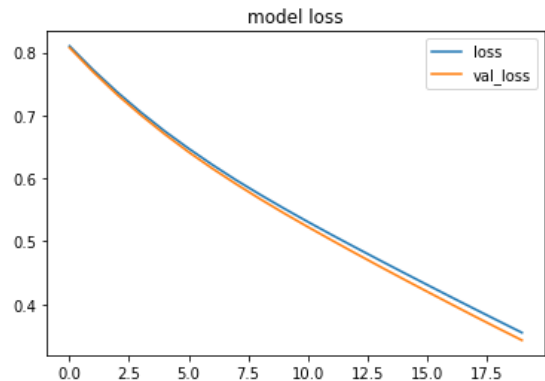| Before optimization | After optimization |
|---|---|
| Initaial learning rate: 0.001 | Initaial learning rate: 0.001 |
| Optimizer:Adam | Optimizer:Adam |
| Regularization: 0.0001 | Regularization: 0.0001 |
| batch size: 500 | batch size: 32 |
| no. of epochs:20 | no. of epochs:50 |
| No. of layers:2 without input layer | No. of layers:3 without input layer |
| (layers) [units : Activation function] (8: tanh,1: sigmoid) | (layers) [units : Activation function] (8: relu,8: relu,1: sigmoid) |

# d.  Support Vector Machine (SVM)
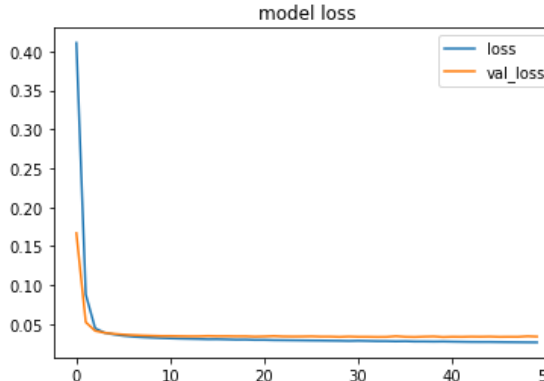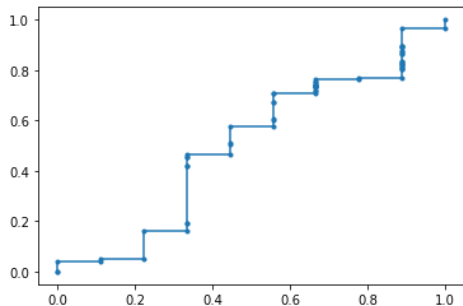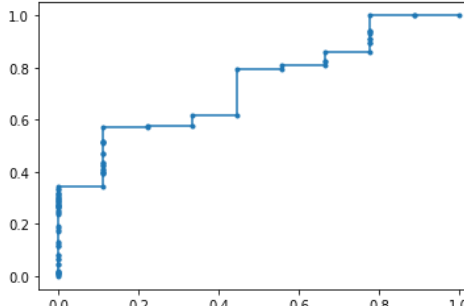
## ℘ Hyper-parameters

(Specify all the hyper-parameters (optimizer, regularization, …)  with their specified value in implementation)

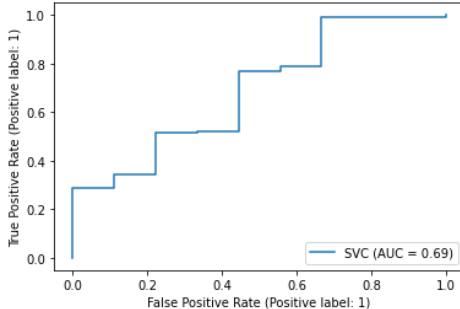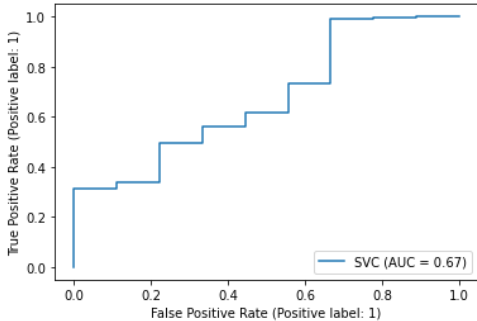| Before optimization | After optimization |
|---|---|
| kernel=" poly " degree = 7 | kernel="rbf" |
| coef0=10 | coef0=0.0 |
| Regularization: 1000 | Regularization: 1.0 |

# 3. Models Results

**For each model you should show all these results for your model on testing data** (loss curve, accuracy, confusion matrix, ROC curve)

## a. ANN Results

| | before optimization | After optimization |
|---|---|---|
| **Loss curve** |  |  |
| **Roc curve** |  |  |
| **Accuracy** | 0.9472222222222222 | 0.9944444444444445 |

**confusion matrix**

before optimization

| | | Predicted | |
|---|---|---|---|
| | | 0 | 1 |
| Actual | 0 | 1 | 8 |
| | 1 | 68 | 1363 |

After optimization

| | | Predicted | |
|---|---|---|---|
| | | 0 | 1 |
| Actual | 0 | 1 | 8 |
| | 1 | 0 | 1431 |

# b.SVM Results

| | before optimization | After optimization |
|---|---|---|
| **Roc curve** |  |  |
| **Accuracy** | 0.9881944444444445 | 0.9944444444444445 |

**confusion matrix**

before optimization:

| | | Predicted | |
|---|---|---|---|
| | | 0 | 1 |
| Actual | 0 | 3 | 6 |
| | 1 | 19 | 1412 |

After optimization:

| | | Predicted | |
|---|---|---|---|
| | | 0 | 1 |
| Actual | 0 | 1 | 8 |
| | 1 | 0 | 1431 |

# II. IMAGE DATASET

# 1. Project Introduction

**a. Dataset Name :**

Brain Tumor Classification (MRI)

b. **Number of classes and their labels:**

2 classes:{0: " no_tumor ",1: " pituitary_tumor "}

c. **Dataset Images Numbers and size**
   (The total number of images in dataset and the size of each.)

1222 image (200px * 200px)

d. **Training, Validation and Testing**
   (The number of images used in training, validation and testing.)

977 image for training , 245 image for validation and testing.

# 2. Implementation Details

## a. Extracted Features

**In preprocessing phase we convert each image into 40000 feature (it`s pixels 200*200).**

## b. Cross-validation

(Is cross-validation is used in any of implemented models? If yes, specify the number of fold and ratio of training/validation)

**NO.**

## c. Artificial Neural Network (ANN)

### ℘ Hyper-parameters

(Specify all the hyper-parameters (initial learning rate, optimizer, regularization, batch size, no. of epochs…)  with their specified value in implementation)

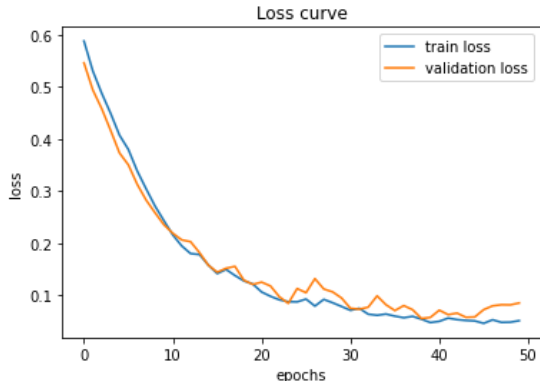| Before optimization | After optimization |
|---|---|
| Initaial learning rate: 0.001 | Initaial learning rate: 0.001 |
| Optimizer:Adam | Optimizer:Adam |
| Regularization: 0.0001 | Regularization: 0.0001 |
| batch size: 20 | batch size: 60 |
| no. of epochs:50 | no. of epochs:100 |
| No. of layers:3 without input layer | No. of layers:3 without input layer |
| (layers) [units : Activation function] (6: sigmoid,6: sigmoid,1: sigmoid) | (layers) [units : Activation function] (6: sigmoid,6: relu,1: sigmoid) |

# d. Support Vector Machine (SVM)
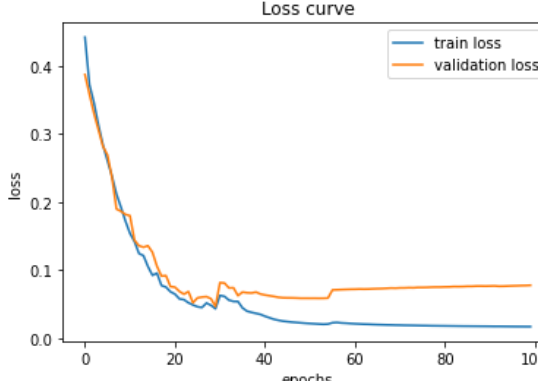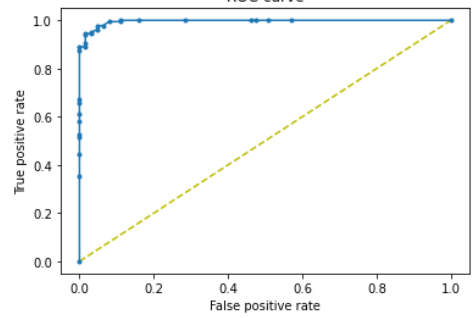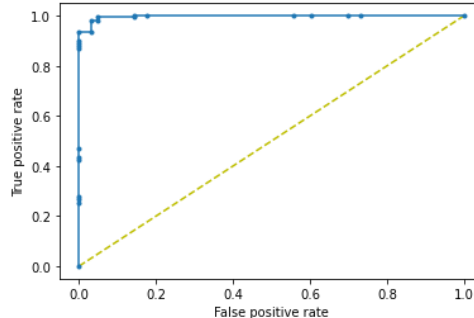
## ℘ Hyper-parameters

(Specify all the hyper-parameters (optimizer, regularization, …)  with their specified value in implementation)

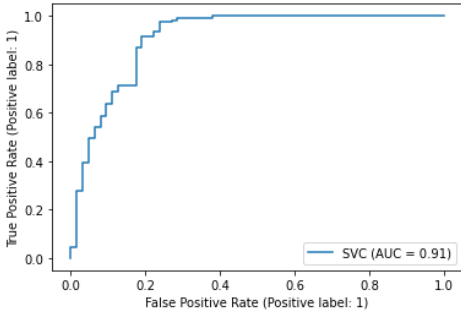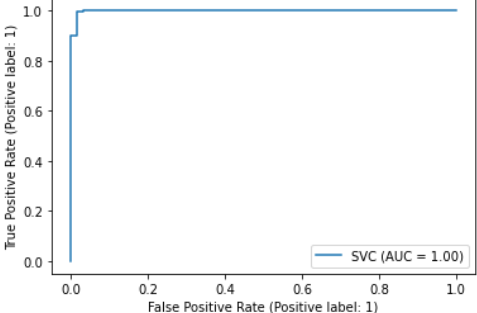| Before optimization | After optimization |
|---|---|
| kernel="sigmoid" | kernel="poly" , degree=2 |
| coef0=0.0 | coef0=20 |
| Regularization:1.0 | Regularization:1.0 |

# 3. Models Results

**For each model you should show all these results for your model on testing data** (loss curve, accuracy, confusion matrix, ROC curve)

## a. ANN Results:

| | before optimization | After optimization |
|---|---|---|
| **Loss curve** |  |  |
| **Roc curve** |  |  |
| **Accuracy** | 0.9673469387755103 | 0.9836734693877551 |

**confusion matrix**

before optimization:

| | | Predicted | |
|---|---|---|---|
| | | 0 | 1 |
| Actual | 0 | 59 | 4 |
| | 1 | 4 | 178 |

After optimization:

| | | Predicted | |
|---|---|---|---|
| | | 0 | 1 |
| Actual | 0 | 60 | 3 |
| | 1 | 1 | 181 |

# b.SVM Results:

| | before optimization | After optimization |
|---|---|---|
| Roc curve |  |  |
| Accuracy | 0.8816326530612245 | 0.9836734693877551 |

**confusion matrix**

before optimization:

| | | Predicted | |
|---|---|---|---|
| | | 0 | 1 |
| Actual | 0 | 49 | 14 |
| | 1 | 15 | 167 |

After optimization:

| | | Predicted | |
|---|---|---|---|
| | | 0 | 1 |
| Actual | 0 | 59 | 4 |
| | 1 | 0 | 182 |