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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

|  |  |  |  |
| --- | --- | --- | --- |
|  | ID | Name | Grade |
|  | 201900065 | أحمد علاء الدين السيد مرتضى |  |
|  | 201900085 | احمد محمد احمد عثمان |  |
|  | 201900083 | احمد محمد ابراهيم محمد |  |
|  | 201900452 | عبدالله احمد حسن سلامه |  |
|  | 201900059 | احمد عبد المنجي عبد الموجود ابراهيم |  |
|  | 201900074 | احمد عيسى محمود احمد |  |
|  | 201900095 | احمد محمد محمد علي |  |

Delivered to:

**Dr. Wessam El-Behaidy**

**Eng. Islam Gamal**

**Eng. Muhammed Kamal**

I. NUMERICAL DATASET

1. Project Introduction

* 1. **Dataset Name**

Mobile App Statistics (Apple iOS app store)

* 1. **Number of classes and their labels**

(Specify number of classes and their labels.)

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

* 1. **Dataset Samples Numbers**

(The total number of samples in dataset)

7198 record

* 1. **Training, Validation and Testing**

(The number of samples used in training, validation and testing.)

5759 record for training , 1439 for validation and testing.

1. Implementation Details
   * 1. **Extracted Features**

11 features.

* + 1. **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.**

* + 1. **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:4 without input layer |
| (layers) [units : Activation function] (3: tanh,1: swish) | (layers) [units : Activation function] (8: sigmoid,6: relu,8: relu,1: sigmoid) |

* + 1. **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 = 40 | kernel="sigmoid" |
| C=10e+10 | coef0=2.5 |
| Regularization:1.0 | Regularization:1.0 |

1. Models Results

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

* 1. **ANN Results**

|  |  |  |
| --- | --- | --- |
|  | **before optimization** | **After optimization** |
| **Loss curve** |  |  |
| **Roc curve** |  |  |
| **Accuracy** | 0.7194444444444444 | 0.9993055555555556 |
| **confusion matrix** | |  |  |  |  | | --- | --- | --- | --- | |  | | Predicted | | | 0 | 1 | | Actual | 0 | 8 | 1 | | 1 | 403 | 1028 | | |  |  |  |  | | --- | --- | --- | --- | |  | | Predicted | | | 0 | 1 | | Actual | 0 | 8 | 1 | | 1 | 0 | 1431 | |

* 1. **SVM Results**

|  |  |  |
| --- | --- | --- |
|  | **before optimization** | **After optimization** |
| **Roc curve** |  |  |
| **Accuracy** | 0.9881944444444445 | 0.9902777777777778 |
| **confusion matrix** | |  |  |  |  | | --- | --- | --- | --- | |  | | Predicted | | | 0 | 1 | | Actual | 0 | 2 | 7 | | 1 | 10 | 1421 | | |  |  |  |  | | --- | --- | --- | --- | |  | | Predicted | | | 0 | 1 | | Actual | 0 | 0 | 9 | | 1 | 5 | 1426 | |

II. IMAGE DATASET

1. Project Introduction

* 1. **Dataset Name:**

Brain Tumor Classification (MRI)

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

2 classes:{0: “ no\_tumor ”,1: “ pituitary\_tumor ”}

* 1. **Dataset Images Numbers and size**

(The total number of images in dataset and the size of each.)

1222 image (200px \* 200px)

* 1. **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

* + 1. **Extracted Features**

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

* + 1. **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.**

* + 1. **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) |

* + 1. **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)

* 1. **ANN Results:**

|  |  |  |
| --- | --- | --- |
|  | **before optimization** | **After optimization** |
| **Loss curve** | **Chart  Description automatically generated with medium confidence** | **A picture containing graphical user interface  Description automatically generated** |
| **Roc curve** | **A picture containing graphical user interface  Description automatically generated** | **A picture containing shape  Description automatically generated** |
| **Accuracy** | 0.9673469387755103 | 0.9877551020408163 |
| **confusion matrix** | |  |  |  |  | | --- | --- | --- | --- | |  | | Predicted | | | 0 | 1 | | Actual | 0 | 59 | 4 | | 1 | 4 | 178 | | |  |  |  |  | | --- | --- | --- | --- | |  | | Predicted | | | 0 | 1 | | Actual | 0 | 62 | 1 | | 1 | 2 | 180 | |

* 1. **SVM Results:**

|  |  |  |
| --- | --- | --- |
|  | **before optimization** | **After optimization** |
| **Roc curve** |  |  |
| **Accuracy** | 0.8816326530612245 | 0.9836734693877551 |
| **confusion matrix** | |  |  |  |  | | --- | --- | --- | --- | |  | | Predicted | | | 0 | 1 | | Actual | 0 | 49 | 14 | | 1 | 15 | 167 | | |  |  |  |  | | --- | --- | --- | --- | |  | | Predicted | | | 0 | 1 | | Actual | 0 | 59 | 4 | | 1 | 0 | 182 | |