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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. 59

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I. NUMERICAL DATASET

1. Project Introduction

* 1. **Dataset Name**

# (Human Activity Recognition with Smartphones)

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

(6

WALKING, WALKINGUPSTAIRS, WALKINGDOWNSTAIRS, SITTING, STANDING, LAYING)

* 1. **Dataset Samples Numbers**

(10299 rows 564 columns)

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

(8239 2060  2060 )

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

(561 features were extracted for each x, y and z

their names: mean, Standard deviation, median, max, min, energy, simple moving average ,iqr, entropy, arcoeff, correlation,

the dimension of resulted features)

* + 1. **Cross-validation**

**With CV = 10**

**[0.97281553 0.94174757 0.89320388 0.96990291 0.97378641 0.98543689 0.96893204 0.97184466 0.95631068 0.97667638]**

* + 1. **Artificial Neural Network (ANN)**
* **Hyper-parameters**
* optimizer is “adam”
* batch size=64
* epochs=10
* kernel initializer is 'normal'
* loss is sparse categorical cross entropy
* metrics is accuracy
* validation split is 0.2
* verbose is 1

**Support Vector Machine** **(SVM)**

* **Hyper-parameters**

**C-parameter is 0.1**

**gamma=0.001**

**Kernel is linear**

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**

Accuracy 🡪 98%

Confusion Matrix

Graphical user interface, application, Teams

Description automatically generated

Loss Curve

Chart, line chart

Description automatically generated

**ROC Curve**

Chart, line chart

Description automatically generated

Chart, line chart

Description automatically generated

Chart, line chart

Description automatically generated

Chart, line chart

Description automatically generated

Chart, line chart

Description automatically generated

* 1. **SVM Results**

**Confusion Matrix**

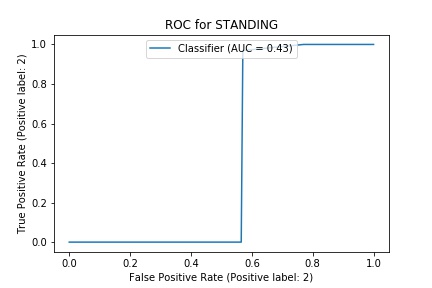
Calendar

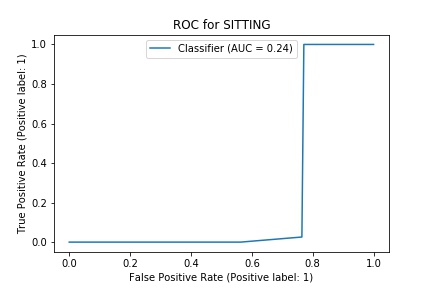
Description automatically generated

**ROC :**

Graphical user interface

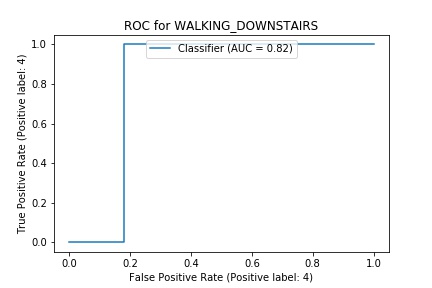
Description automatically generated with medium confidence





Chart

Description automatically generated



Chart

Description automatically generated

**Learning Curve:**

Chart

Description automatically generated with medium confidence

**Accuracy**

**99%**

II. IMAGE DATASET

1. Project Introduction

* 1. **Dataset Name**

Fashion MINST

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

Number of Classes 10

0-T-shirt/top

1. Trouser
2. Pullover
3. Dress
4. Coat

5-Sandal

6-Shirt

7-Sneaker

8-Bag

9Ankle boot

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

(The total number of images in dataset=70000, and it’s divided for 60000 training and 10000 for testing , all classes have the same number of images)

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

**ANN**: The number of images used in training=48000, validation=12000 and testing=10000.

**SVM:** The number of images used in training=60000 and testing=10000

2. Implementation Details

* + 1. **Extracted Features**

N/A

* + 1. **Cross-validation**

CV=5

48000 training, 12000 validation

* + 1. **Artificial Neural Network (ANN)**
* **Hyper-parameters**

Inintial learning rate=0.01

Optimizer=adam

batch size=32

no. of epochs=30

* + 1. **Support Vector Machine** **(SVM)**
* **Hyper-parameter**
  + Kernel**=**Linear
  + Random\_state=20
  + Tol=1e-5
  + C=1

3. Models Results

* 1. **ANN Results**

**Accuracy=88.8%**

**Confusion Matrix**

**A picture containing diagram

Description automatically generated**

**Loss Curve**

**Chart, line chart

Description automatically generated**

**ROC**

**Class:0**

**Chart, line chart

Description automatically generated**

**Class:1**

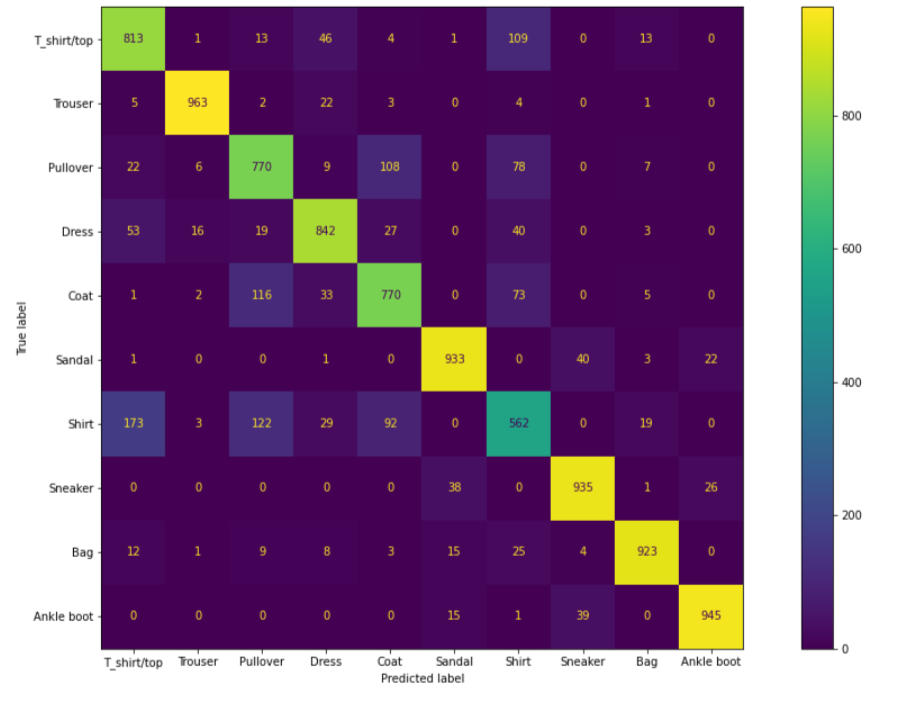
**Chart, line chart

Description automatically generated**

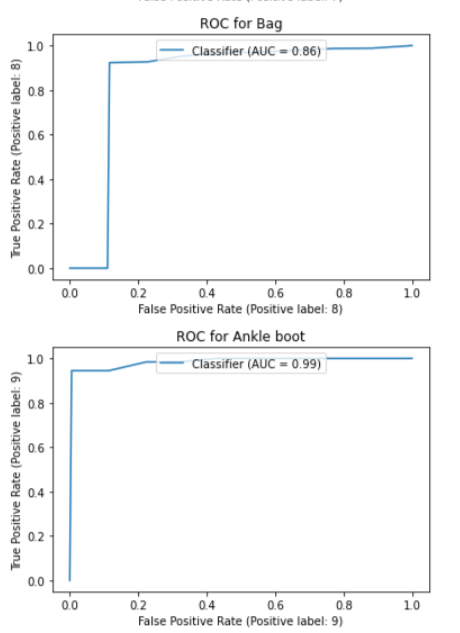
* 1. **SVM Results**

**Accuracy: 84.56%**

**Confusion matrix:**

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Roc Curve:

Class 8 & 9

Learning Curve