

README

Project 3: Real-Time 2D Object Recognition Spring 2024

CS 5330 Northeastern

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Group Member Names:

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Links/Urls:

This is a link the video demo (it is also in the report):

- https://drive.google.com/file/d/1T4pmPGcWS7J1XhQ85cRmawAxwepCQfyq/view?usp=drive_link
-

Operating System & IDE:

- MacOS
 - Visual Studio Code
-

Time Travel Days:

- 3
-

Executing the Program:

Step 1: Run Executable

To execute the program all the user has to do is run the following executable and follow the prompts.

```
./object_rec
```

This requires your iPhone be connected to computer

Step 2: Train-Classic Features (add objects to classic features database)

The program can add items to two different databases and has two different training modes. Pressing:

```
t
```

This will generate a classic feature vector and add an object to `feature_vectors.csv` (the classic features database)

The user will see the following prompt:

```
*****  
Entering Training Mode: Classical Feature Vectors  
*****  
  
What is the label of this item? Please enter the name:
```

Enter the label of the object in the command and press `enter`.

An image frame will inform the user that the object has been added to the database.

`press any key`

Step 3: Train-DNN Embeddings (add objects to DNN database)

The program can add items to two different databases and has two different training modes. Pressing:

```
d
```

This will generate a DNN embedding feature vector and add an object to `dnn_feature_vectors.csv` (the DNN embeddings database)

The user will see the following prompt:

```
*****  
Entering Training Mode: DNN  
*****  
  
What is the label of this item? Please enter the name:
```

Enter the label of the object in the command and press `enter`.

An image frame will inform the user that the object has been added to the database.

`press any key`

Step 4: Classification Mode-Classic Features

The program can classify objects using two different databases and has two different classification modes. Press:

```
c
```

This will classify an object using classic features.

The user will see the following prompt:

```
What is the true label?
```

Here the user enters the true label of the object. This is needed because programs it's classification accuracy and produced a confusion matrix.

Enter the label of the object in the command and press **enter**.

An image frame will inform the user of the classification result.

If the image is not in the database the user will be informed with text overlaying a frame to add the object to the database.

press any key

Step 5: Classification Mode-DNN

The program can calssify objects using two different databases and has two different classification modes. Press:

```
p
```

This will classify an object using DNN embeddings.

The user will see the following prompt:

```
What is the true label?
```

Here the user enters the true label of the object. This is needed because programs it's classification accuracy and produced a confusion matrix.

Enter the label of the object in the command and press **enter**.

An image frame will inform the user of the classification result.

If the image is not in the database the user will be informed with text overlaying a frame to add the object to the database.

press any key

Step 6: Exiting

The user can run the program as many times as they wish and switch between modes. The program track all classification in a confusion matrix.

To exit press:

```
q
```

The user will see the following prompt:

```
Do you want to display the confusion matrix?
```

This is the confusion matrix for the classic feature classification. If the user wants to display the results enter:

```
yes
```

Press **enter**. (anything other than **yes** will be regarded as **no**).

If yes is selected the user will see this:

```
This is the order of the rows and cols:

cap chess_peice coin eraser pen spoon thule_key

0 0 0 0 0 0 0
0 0 0 0 0 0 0
0 0 1 0 0 0 0
0 0 0 0 0 0 0
0 0 0 0 0 0 0
0 0 0 0 0 0 0
0 0 0 0 0 0 0
0 0 0 0 0 0 1
```

Next, the user will see the following prompt:

```
Do you want to display the dnn confusion matrix?
```

This is the confusion matrix for the DNN embedding classification. If the user wants to display the results enter:

```
yes
```

Press **enter**. (anything other than **yes** will be regarded as **no**).

If yes is selected the user will see this:

```
This is the order of the rows and cols:
```

```
chess_peice coin eraser spoon thule_key
```

```
0 0 0 0 0
0 2 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
```

Program terminates.