ubicomp-gear

Github: https://github.com/Scraylex/ubicomp-gear

Task 2

Picked Classifier: LightGBM --> Gradient Boosting Random Forest

Random Forest Classifier is chosen for its robustness against overfitting, feature importance assessment. It also works good even with a small amout of data choosing the correct parameters.

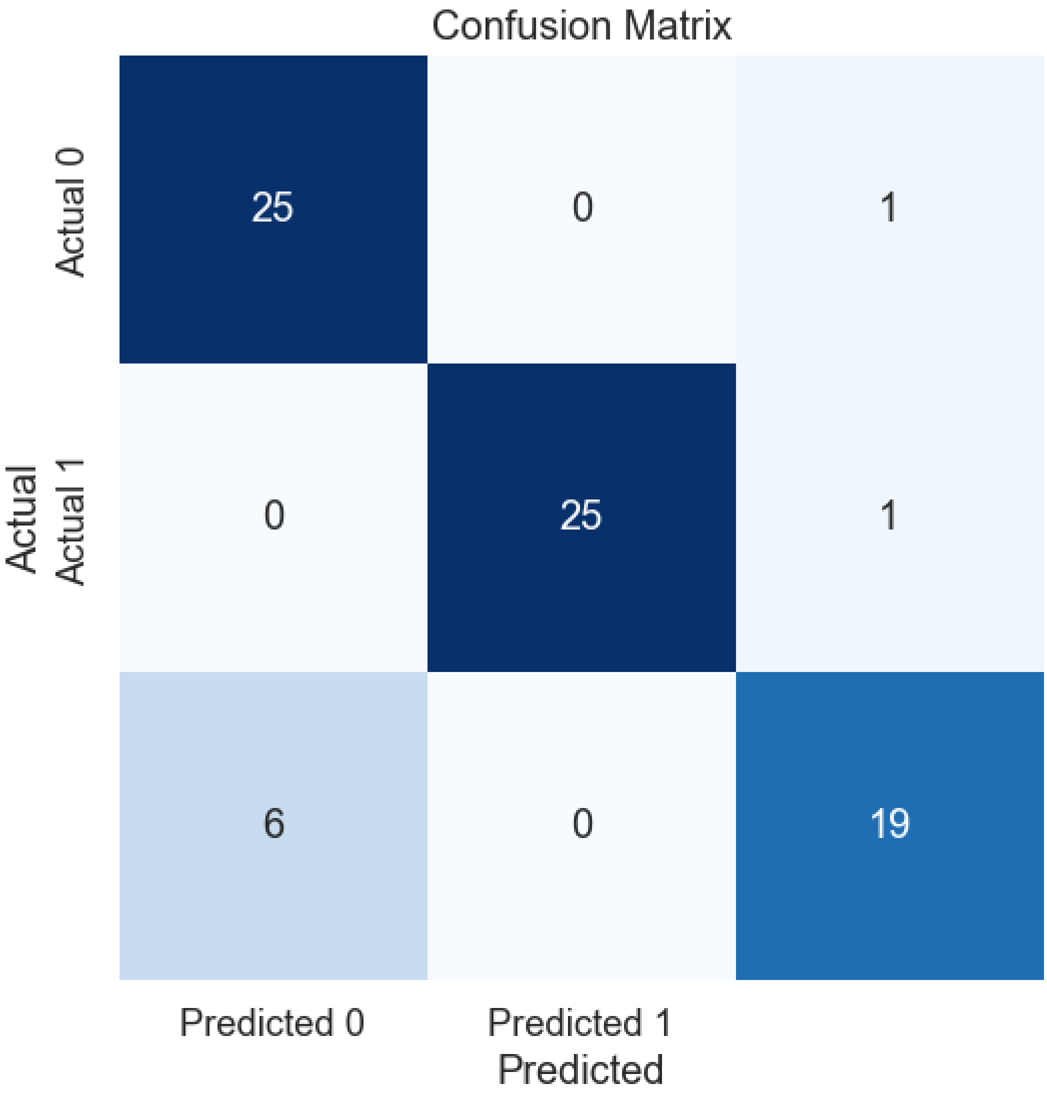
Admittedly LightGBM is probably overkill for the amout of data provided but it provides a nice and speedy framework for processing the data and adjusting the hyper parameters.

Choosen Parameters:

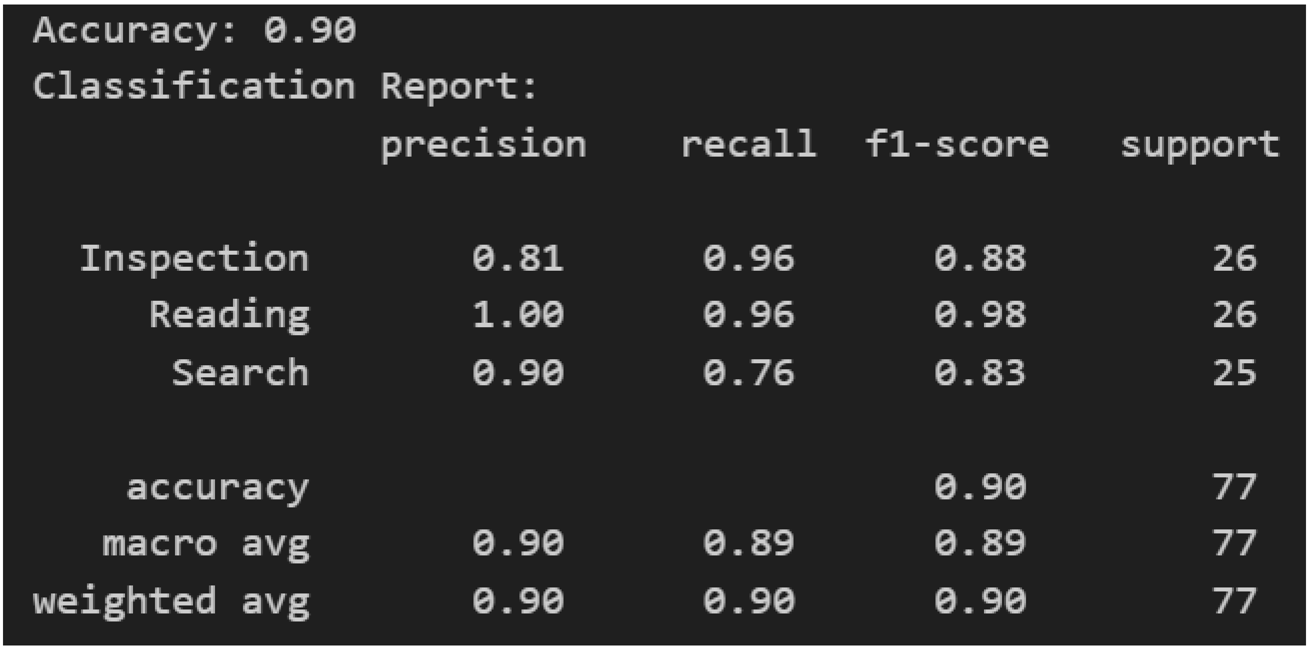
- Scaling: True
- Features: xDir, yDir, fixDensPerBB
- Epochs: 10
- Learning Rate: 0.005
- Tree Depth: -1

It is interesting to note that lightGBM prefers low training iterations with a relatively normal learning rate. Also interesting is the small number of features required. Scaling is usually a good thing to normalize the outliers. With so little data, features and classes the tree does not need depth and the default amout of leaves is also sufficient.

Confusion Matrix:



Classification Report:



```
Accuracy: 0.90
Classification Report:
              precision    recall  f1-score   support

  Inspection       0.81      0.96      0.88        26
     Reading       1.00      0.96      0.98        26
      Search       0.90      0.76      0.83        25

    accuracy                           0.90        77
   macro avg       0.90      0.89      0.89        77
weighted avg       0.90      0.90      0.90        77
```

Task 3

Due to time constraint it was opted to not elaborate much further on possible context actions.

The basic implementation of a gaze sending coroutine, a model serving python server and a UI element displaying the classification result is provided.

Requirements:

Python Server:

- Flask
- LightGBM
- Pickle
- All Gaze transformation requirements

Unity App:

- Newtonsoft Json
- MRTK3

General:

- ngrok

This application was tunnel over ngrok. It is required to put the correct URI in the GazeDataFromHL2Example.cs script