Principles and Design of IoT Systems (PDIoT) [INFR11150/INFR11239]

Peer Reviewers Details

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A. Setup instructions

1. On a scale of 1 to 5, how easy was it to follow the setup instructions provided by the team? (1 - very easy, 5 - very hard)

1

2. On a scale of 1 to 5, how easy was it to install the apk of the app on your device? (1 - very easy, 5 - very hard)

1

3. Comment on how it can be improved?

More information about what to do in case of disconnection

B. Any additional setup

1. Were there any additional setup for the app (for example creating an account on a website or changing settings on your phone?)

Default usage is as a guest, there is an option to create an account using email.

2. Describe these steps and how easy it was to follow them. Add any comments on how you would improve them.

There is a profile section, which is easily accessible and creation of the profile was straightforward as well. One improvement could be to use a subject id instead of a personal email, depending on the usage area of the app.

C. App usability

1. Comment on the functional usability of the app. Focus on the following: ease of navigation, working components such as buttons, sensor connections, any dropdowns or graphs within the app.

Application was easy to use. No noticeable latency in the app. The user doesn't need to press a lot of buttons to be able to use the app, which is great. Sensor connection is stable. "View weekly data" button doesn't seem to give any results, wasn't possible to test this during a short period. Even though this isn't a big issue, user has to wait couple of second before being able to see the "current activity" when the main dashboard page is accessed after another page even though the prediction is continuing in the background while in another page. Step counter graph is not too informative, couldn't see when and how it increases.

2. Rate the interface usability of the app: was the place to click intuitive? How easy was it to get to the page showing live classification? Were the other features easy to find?

One UI issue is that in the profile section, "Hi, user" window goes over the logout button. "View your daily stats" window in the main dashboard page looks like a button, might be misleading in some cases. Apart from these points the app had a user friendly UI with nice colours. On the prediction side of things, while the "essential features" is selected, it seems like the app is predicting "Sitting/Standing" but the duration of the sitting activity is the only one that is increasing. When the "all features" is selected, the model seems to predict activities that cannot be seen on the historical data part which is under the shown prediction. Might have been better to change this chart according to the algorithm selected.

D. Real-time classification

1. For the list of activities implemented (find the list in the group's submission material), record the classification result for each activity - a column for each student. If the app you are testing implements multiple models (for example, one model which classifies a subset of activities and one model which classifies all activities), then create a table for each of the models.

Essential Features:

Activity Name	Try 1 - student A	Try 2 - student B	Try 3 - student C
Sitting/Standing	Sitting/Standing	Sitting/Standing	Sitting/Standing

Walking	Walking	Walking	Walking
Running	Running	Running	Walking
Lying down	Lying down	Lying Down	Lying down

All Features:

Activity Name	Try 1 - student A	Try 2 - student B	Try 3 - student C
Sitting	Standing	Desk Work	Desk Work/Standing
Sitting bent forward	Sitting bent forward	Sitting bent forward	Desk Work
Sitting bent backward	Sitting bent backward	Sitting bent backward	Sitting bent backward
Lying down right	Lying down right	Lying down right	Lying down right
Lying down left	Lying down left	Lying down left	Lying down left
Lying down on back	Lying down on back	Lying down on back	Lying down on back
Lying down on stomach	Lying down on stomach	Lying down on stomach	Lying down on stomach
Desk work	Desk work	Desk Work	Desk work
Walking	Walking	Walking	Walking
Running	Running	Running	Running
Descending Stairs	Movement	Movement	Descending Stairs
Climbing Stairs	Climbing Stairs	Climbing Stairs	Climbing Stairs
Movement	Movement	Movement	Movement
Standing	Desk Work	Desk work	Desk Work

2. Comment on the perceived accuracy of the real time classification. What do you notice that can be improved?

> For “All Features” model, “Sitting” is getting confused with “Standing” and “Desk Work” a lot. On a similar sense “Standing” is getting confused with “Desk Work” a lot. Two of the student’s test for “Descending Stairs” is getting confused with “Movement”.

E. Offline classification

You will have been emailed the test dataset along with your assigned group’s materials.

Use the evaluate_model.py script provided by your assigned group to run their model on the unseen test dataset.

1. Paste the classification report here:

Essential Features:

	precision	recall	f1-score	support
0	1.00	0.97	0.99	285
1	0.88	1.00	0.94	58
2	1.00	1.00	1.00	55
3	1.00	1.00	1.00	231
accuracy			0.99	629
macro avg	0.97	0.99	0.98	629
weighted avg	0.99	0.99	0.99	629

All Features

	precision	recall	f1-score	support
0	0.48	0.40	0.43	58
1	0.65	1.00	0.79	53
2	1.00	0.76	0.86	58
3	1.00	1.00	1.00	58
4	1.00	1.00	1.00	58
5	1.00	1.00	1.00	58
6	1.00	1.00	1.00	57
7	0.70	0.83	0.76	58
8	1.00	0.97	0.98	58
9	0.96	1.00	0.98	55
10	0.98	1.00	0.99	52
11	1.00	0.98	0.99	54
12	0.92	0.97	0.94	58
13	0.85	0.59	0.69	58
accuracy			0.89	793
macro avg	0.90	0.89	0.89	793
weighted avg	0.90	0.89	0.89	793

For the sake of easier reading in both the confusion matrix and the classification report above, we present the class labels extracted from the evaluation script:

Essential features:
{'Sitting/Standing' : 0, 'Walking at normal speed' : 1, 'Running' : 2, 'Lying Down' : 3}

All features:

```
{
    'Sitting' : 0,
    'Sitting bent forward' : 1,
    'Sitting bent backward' : 2,
    'Lying down right' : 3,
    'Lying down left' : 4,
    'Lying down on back' : 5,
```

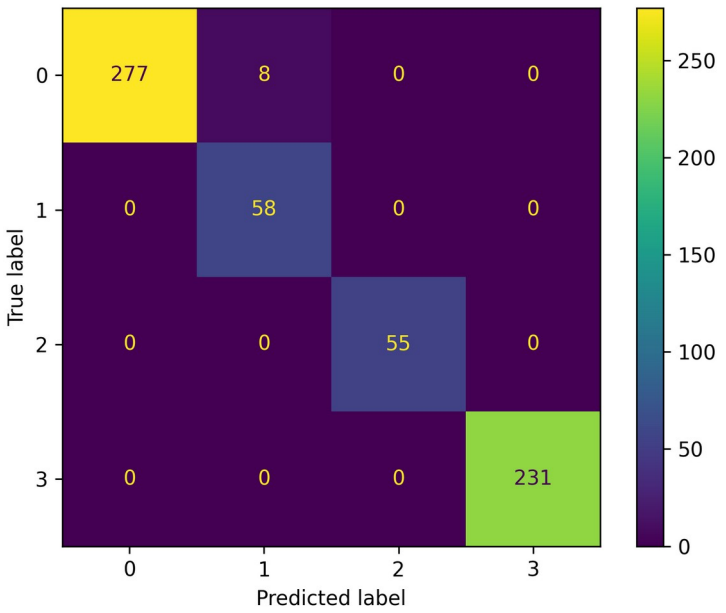
'Lying down on stomach' : 6,
'Desk work' : 7,
'Walking at normal speed' : 8,
'Running' : 9,
'Descending stairs' : 10,
'Climbing stairs' : 11,
'Movement' : 12,
'Standing' : 13
}

2. Paste the breakdown of classes and their corresponding metrics here:

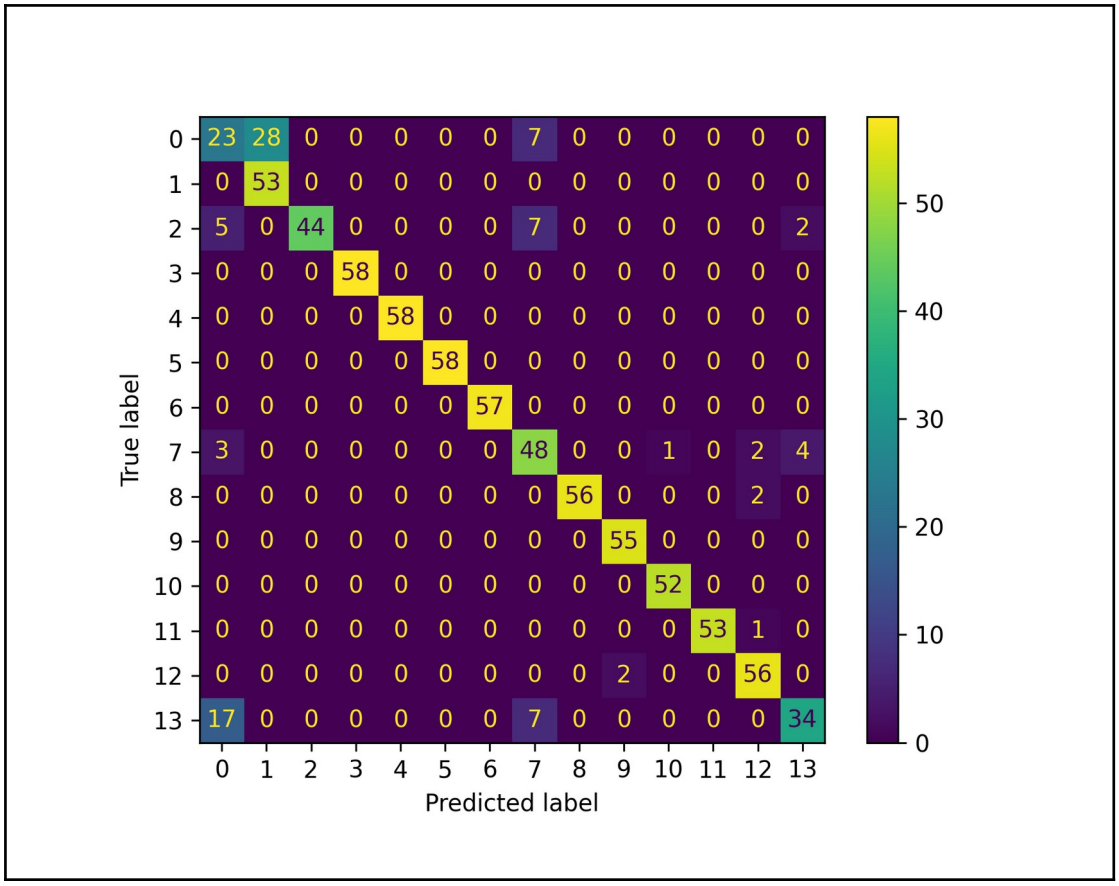
None provided

3. Paste the confusion matrix (or matrices) here:

Essential Features



All Features



4. Did you have any issues running the offline classifier(s)?

Models location was not specified in line with the folder structure provided, required manual relocation of Models directory

5. How does the performance of the offline classifier(s) compare to what you saw in real time on the app?

The offline and real-time performances match for the “Essential Features” model which perform almost perfectly. For the “All Features” model, problems mentioned in part D.2 can be visible on the confusion matrix of this model as well except “Descending Stairs” activity is classified perfectly on offline test. The rest works reasonably in both offline and real-time testing.

F. Overall experience

1. Comment on your overall experience using the application.

After following the installation guide, which was easy to follow, there were no hard to use or confusing parts of the app. Nice application overall.

2. Comments on how you would improve this application.

Putting figures to be able to see predicted models might be beneficial and make the app more user friendly.