Assignment towards a technical interview

Purpose

The purpose of this assignment is to allow us to get a miniaturized version of real-world interaction of work back-and-forth in order for both sides to be able to feel (with all limitations of this exercise) how it would be to work together.

We'd like the work on the assignment and the communication (if at all) during the assignment to serve as a shared context for both sides for a technical deep dive interview which we will conduct after we check your submission, provide you with feedback and decide that we're satisfied enough to move on to a technical interview with you.

What to focus on

- Deliver results that satisfy requirements
- Getting things done with consideration to priority and time estimation
- Focusing on the bigger picture and putting most emphasis, resources and efforts on what's important to deliver based on your understanding of the bigger picture.
- Explainability

What to do when you…

- **are not familiar with a term or a concept?** Look it up? Learn! Ask!
- **need clarifications?** Contact us by chat/phone/email and ask!

How much time should I spend on this?

1-2 hours is reasonable. Not because this is sufficient time for a perfect solution but because it is enough time for a reasonable initial end-to-end solution. Also, we'd like to see what you come up with in this time frame knowing we'd like an end-to-end working system and answers and explanations and knowing we know you will need to make hard decisions on what goes in and what doesn't.

Having said that -- you can use anything you want and spend on this as much time as you want and submit it when you want. However, we'd appreciate you didn't linger with it beyond 1 week from now.

The assignment

You are being given a dataset (https://github.com/mmalekzadeh/motion-sense/) that includes time-series data generated by accelerometer and gyroscope sensors (attitude, gravity, userAcceleration, and rotationRate). A total of 24 participants in a range of gender, age, weight, and height performed 6 activities in 15 trials in the same environment and conditions: downstairs, upstairs, walking, jogging, sitting, and standing. With this dataset, we aim to train a classifier that can classify multivariate time series such generated by devices similar to those that generated the time series in the dataset into a series of activities: specifically to classify activities into: downstairs, upstairs, walking, jogging, sitting, and standing.

You should provide a self-contained reproducible research deliverable (a Jupyter notebook would be much appreciated) that demonstrates and explains how you designed your classifier (including feature engineering, selection, etc.) trained your classifier and how you evaluate your classifier and how to use your classifier to classify a newly given time series.

Requirements

Please document your assumptions and decisions alongside your code. Please show results, discuss them and explain the results and your conclusion. Also, please suggest some future directions.

1. We need to be able to execute your code and reproduce it consistently. As a result, we ask you to make sure you do it using Python 3.7 or higher using standard libraries which can be easily installed using PIP and/or Conda. Alternatively, you may use Google Colab with a Python 3 runtime.
2. Your work should be able to execute with no errors/exceptions. Please make sure you test your work and validate it works on at least one of the required setups before you submit your assignment.
3. Put your emphasis on process and workflow: from analyzing your dataset to evaluating your results: end-to-end solution. Consider that your work should be self contained and self explainable.

Provide as much value as possible within the time limitation that you allocate to produce your exercise and deliver an end-to-end solution that demonstrates your ideas even if not everything is perfect.

Please write things you'd do if/when more time/resources are available and what value you expect to gain from such future steps.

Good Luck