UDACITY

< Return to Classroom

Activity Aware Pulse Rate Algorithm

REVIEW

CODE REVIEW

HISTORY

Meets Specifications

Congratulations on completing this project.
The code and reasoning showcased in your work shows a good understanding of the concepts in the lessons.
Keep up the good work as you proceed. All the best!

Code Quality

- Scripts have an intuitive, easy-to-follow structure with code separated into logical functions.
- Naming for variables and functions follows the PEP8 style guidelines.

You did very well with your PEP8 style. I would like to share with you some PEP8 main checks I encourage to do when developing code:

- Indentation: Use 4 spaces per indentation level.
- Line break should be before operators
- Imports should be on separate lines
- Inline comments: Avoid using inline comments unless they provide useful information
- Docstring format per function
  Further Reading
- PEP 8 standards for naming convention can be incorporated for better traceability
  https://www.python.org/dev/peps/pep-0008/
- You can use autopep8 to automate the conversion of codes to PEP 8 compliant

- You can use autopep8 to automate the conversion of codes to PEP 8 compliant https://pypi.org/project/autopep8/

- Comments are used to clearly describe tricky or opaque pieces of code.
- Each function has a docstring.
- The module containing the algorithm has a docstring describing the algorithm.

You have added sufficient amount of comments to your code.

- You can also refer to: https://www.pythonforbeginners.com/basics/python-docstrings

- Algorithm parameters are passed as function arguments.
- Default values for algorithm parameters should be set.
- Use module constants or function parameters instead of magic numbers.
- Makes use of vectorized operations (e.g., with `numpy`) when doing so would make the code easier to read or noticeably faster.

Good job here, passing algorithm parameters as function arguments, default values are set, used module constants and making use of vectorized operations

Algorithm Specifics

- Use the 2nd ppg signal in the third column of the troika data matrix. If you are using the provided starter code to parse the data files, then this happens automatically.

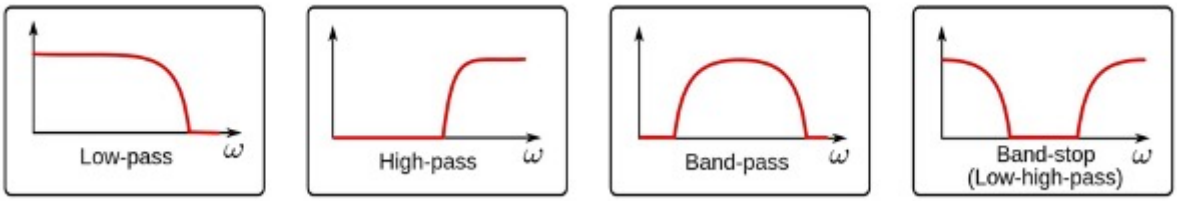
The troika data matrix contains two ppg signals. One of them is much cleaner and you have rightly used the second one.

- The PPG and accelerometer signals should be bandpass filtered using a reasonable passband and filter design.
- The accelerometer channels should be aggregated in a meaningful way (e.g., into a magnitude signal).

Excellent work you converted the 40 to 240 BPM range to Hz correctly as this is a valid range for heartrate! 🙂
comment: In this project we made use of bandpass filters. However, there will be cases where you will require other kinds of filters. Therefore, I would like to share with you this simple tutorial but yet useful to understand the basic filters you could implement. Everything is explained from an embedded systems

perspective and in particular the Arduino platform where code is usually written in C language. The filters

that are explained in the tutorial are the following:



- Reference values and estimates are appropriately paired (eg. using nearest neighbor or interpolation technique).
- Mean absolute error is computed correctly.

The reference heart rate produces a value every 2 seconds except for the last 8 seconds of the dataset. Nicely done here

- The mean absolute error at 90% availability is less than 10 BPM.

Your mean absolute error at 90% availability is less than the required BPM.

- The algorithm should run on the test subject without errors.
- The algorithm should produce a pulse rate estimate and a confidence value at least every 2 seconds.

Great work👏, your algorithm run on the test subject without errors and algorithm produce both an estimate and a confidence value at least every 2 seconds.

Project Write-up

- The Project Write-up describes how to run the code.

Good work. You have explained the steps in detail on how to run the codes , what are the constituents of the codes / functions etc.

The Project Write-up describes:

- what activities were performed in the dataset.
- features of the sensor that was used.
- the quantity of data in the dataset.
- short-comings of the dataset.

The Project Write-up includes the activities were performed in the dataset., features of the sensor that was used., the quantity of data in the dataset and the short-comings of the datasets. Your write-up is clean and straight forward
Highlights:

- The activities were rest, jog, and run at various speeds on a treadmill.
- The data came from a wrist-wearable that included two PPG signals and a 3-axis accelerometer all sampled at 125 Hz.
- There were 12 sessions of data from 11 subjects. Each session was 5 minutes long.
- Common short-comings of the dataset would be that the subjects in this dataset were performing a set of fixed actions, under supervised study staff, and were not in a free-living context. It is a small dataset with only 11 subjects and the leave-one-subject-out error variance is high.

The Project Write-up describes:

- how the algorithm works, including a description of the physiology.
- an intuitive explanation of why the confidence algorithm produces a higher number for better estimates.
- insightful caveats and failure-modes of the algorithm.

Your write-up is clean and straight forward. The explanations are clear on how the algorithm works with insightful caveats and failure-modes. Another issue could arise due to noise, noise is always a problem that we need to handle, that is why we use filters. In this case, we use a basic filter. However, for more robust systems you can find Kalman filters or even particle filters. For instance, you can check this paper where a particle-filter approach is recommended to reduce ppg signal noise.

The Project Write-Up describes

- the algorithm performance and how it was computed.
  *It discusses the performance generalizability to other datasets.

You conveyed the information properly and simply with a discussion on generalizability, and mentioned that when performing other activities not in the dataset, the error is unknown and have guessed what the signal might look like and how their algorithm might behave. Excellent work here!

The Clinical Conclusion describes:

- the trends are observed in the data (women, men, compared)
- the a possible reasoning for what is seen in the data
- at least 1 technique or type of data source to clarify the current data
- the validation/or not of the trend seen in resting heart rates.

You have outstanding clinical conclusions You included all possible details.

You have done an awesome job ✌️ in clinical conclusion section.
✅ the trends are observed in the data (women, men, compared)
✅ the possible reasoning for what is seen in the data
✅ at least 1 technique or type of data source to clarify the current data
✅ the validation/or not of the trend seen in resting heart rates.
It conveys all the information in detail and demonstrates that you have understood this topic very well.

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