

Bonus Assignment

This assignment is hard. It's meant to be a way for you to distinguish yourself in this class, and to show off your skills in python, data manipulation, and visualization. It's also the only way you can achieve an A+ in the course, and is worth up to 5% of your final grade, though it's expected that of the few who attempt the assignment most will only get partial grades. For this assignment, there is no help provided by the teaching staff, because of bandwidth constraints, but you are welcome to discuss with your peers and share information on how to accomplish the tasks (but no code sharing, please!). Impress me!

In preparing the MADS curriculum I had a discussion with a colleague about the value of dashboards and information visualization. Dashboards are now ubiquitous in any consumer-facing analytics system, yet knowledge of their effectiveness, utility, or even ideas towards design patterns for building dashboards are limited. In this bonus assignment, you will explore the creation of a dashboard for the bulk of fitness data I've put in your coursera resources/bonus folder. This folder is made up of ~200 files which are in the Flexible and Interoperable Data Transfer, and include temporal, geographic, and sensor-based measurement data related to activity.

As you know, I already have a couple of dashboards at my disposal, and I've included a copy of my [strava dashboard](#) for a single activity, and my [garmin dashboard](#) for a single activity as appendices in this assignment. What I want you to do is to design me a new dashboard, all within the Jupyter notebook environment. I have ~~four~~ **three** requirements for this dashboard:

1. It should be based on one or more well articulated design principles. I expect a short description of how you designed the dashboard to align with some design principles.
2. You must use some Jupyter widgets to add interactivity. You might find the following links useful:
 1. <https://ipywidgets.readthedocs.io/en/latest/examples/Widget%20List.html#>
 2. <https://towardsdatascience.com/bring-your-jupyter-notebook-to-life-with-interactive-widgets-bc12e03f0916>
 3. <https://medium.com/plotly/introducing-jupyterdash-811f1f57c02e>
3. You must take advantage of the three dimensions of the data - temporal, geographical, and analytical - in your dashboard.

Frequently Asked Questions

1. **Q. How do I work with FIT data?**

A. We've installed the [python-fitparse](#) library for you to manipulate the data. The following code example will parse all of the datafiles and print out the mean heart rate and time, you might find it handy to start with this.

```
import pandas as pd
import numpy as np
from fitparse import FitFile

datafiles=!!ls bonus/*.fit

for datafile in datafiles:
```

```
with FitFile(open(datafile, 'rb')) as fitfile:

    df=pd.DataFrame([record.get_values() for record in fitfile.get_messages('record')])

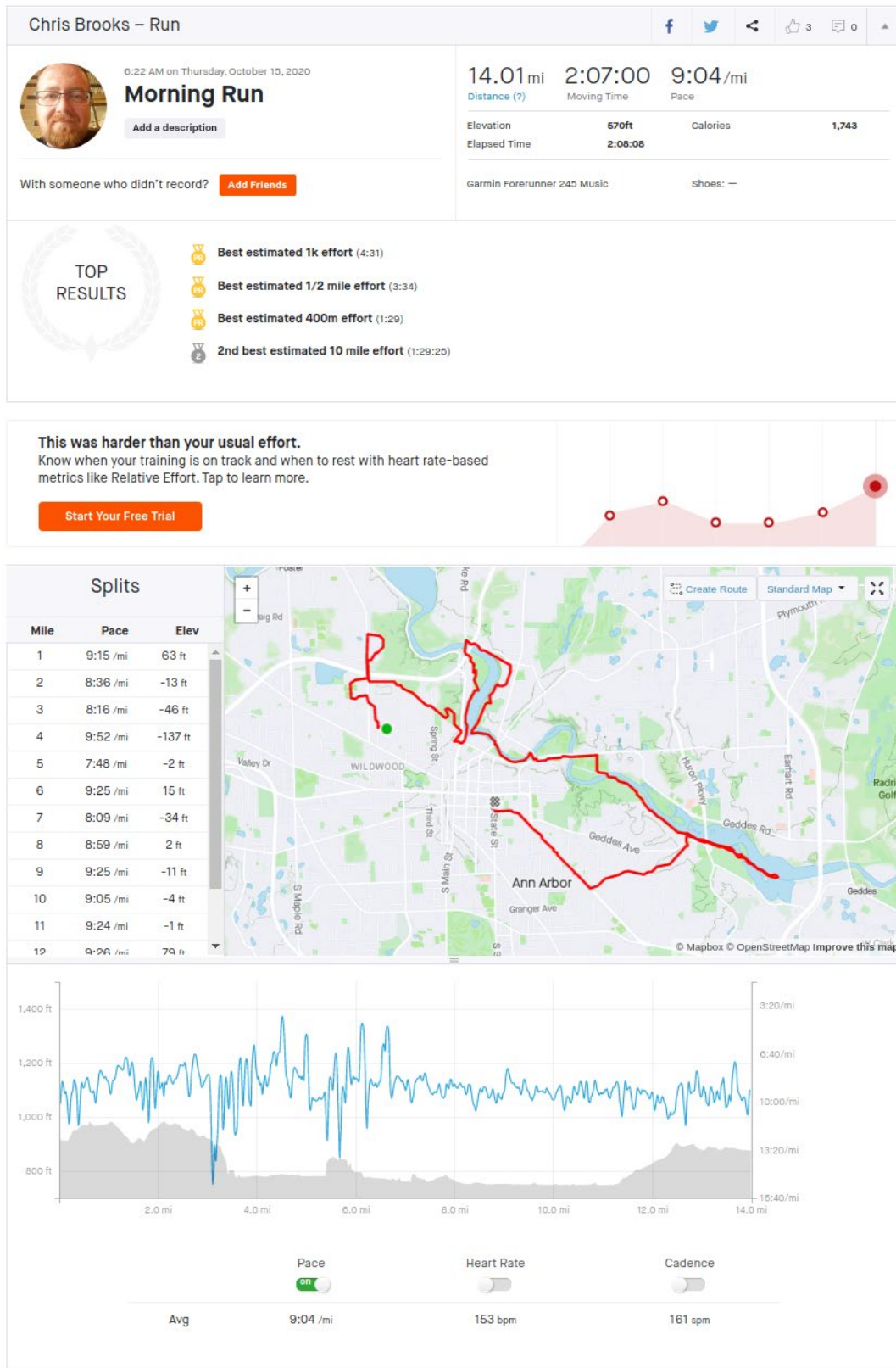
    if "timestamp" in df and "heart_rate" in df and len(df['heart_rate'].dropna())>0:

        print(f"Mean heart rate for activity on {df['timestamp'].iloc[0]} was {np.nanmean(df['heart_rate'])}.")
```

2. Q. How do I submit the bonus?

A. Email it directly to Chris at brookschi@umich.edu by the deadline, **which is November 23rd at 11:59 PM EST**. Please include your notebook, datafiles (other than the fit files), and a PDF or something easy for Chris to read!

Appendix 1: Strava Dashboard Example



Appendix 2: Garmin Connect Dashboard Example

connect

Dashboard

Daily Summary

Challenges

Calendar

News Feed

Activities

Health Stats

Training

Gear

Insights

Reports

Connections

Groups

Badges

Personal Records

Goals

Ann Arbor Running

Event Type: Unassigned

Course

Goal

14.01 mi

2:08:08

9:09 min/mi

1,136 ft

1,743 C

Map

Google

Slower

Faster

Time

Distance

Elevation

1,743

0

1,000

500

0

Pace

9:09

7:30

6:00

4:30

3:00

1:30

0:00

Heart Rate

170

160

150

140

130

120

110

100

90

80

70

60

50

40

30

20

10

0

Run Cadence

170

160

150

140

130

120

110

100

90

80

70

60

50

40

30

20

10

0

Power

100

90

80

70

60

50

40

30

20

10

0

Cadence

180

170

160

150

140

130

120

110

100

90

80

70

60

50

40

30

20

10

0

Ground Time

2:00

1:50

1:40

1:30

1:20

1:10

1:00

0:50

0:40

0:30

0:20

0:10

0:00

Vertical Oscillation

10.00

9.00

8.00

7.00

6.00

5.00

4.00

3.00

2.00

1.00

0.00

Form Power

100

90

80

70

60

50

40

30

20

10

0

Leg Spring Softness

10.00

9.00

8.00

7.00

6.00

5.00

4.00

3.00

2.00

1.00

0.00

Stats

Laps

Time in Zones

Distance

14.01 mi

Distance

Nutrition & Hydration

1,743 C

Calories Burned

-1,743 C

Calories Net

1235 mi

Est. Sweat Lost

-mi

Fluid Consumed

-1235 mi

Fluid Net

Training Effect

5.0 Overreaching

Aerobic

0.4 No Benefit

Anaerobic

Heart Rate

153 bpm

Aug 16

166 bpm

Max HR

Timing

2:08:08

Time

2:08:04

Moving Time

2:08:08

Elapsed Time

9:09 min/mi

Aug Pace

9:08 min/mi

Aug Moving Pace

7:14 min/mi

Best Pace

Elevation

1,136 ft

Elev Gain

1,187 ft

Elev Loss

731 ft

Min Elev

1,062 ft

Max Elev

Running Dynamics

161 spm

Aug Run Cadence

168 spm

Max Run Cadence

1.09 m

Aug Stride Length

Help

Status

Facebook

Instagram

Twitter

Statement of Privacy

Terms of Use

Security

Connect is powered by Garmin - Copyright © 1996-2020 Garmin Ltd. or its subsidiaries - Version: 4.36.0.17, 20.21.2.0

Photos

Click to add photos to your activity.

Notes

How was your run?

Add a comment

Garmin Forerunner 245 Music

Software: 1.0.0.0

Elev Corrections: Enabled

Summary Data: Original

Power

Stryd Power (Deprecated, Read Desc. in Store)

StrydTeam

Garmin

atma paradigm 4.5 (Atma Paradigm)

Charge Gear

Activity Tracking Accuracy