MathWorks Fitness Tracker Challenge

HackRice 14

Why?

- Complete this exciting challenge and you can win MathWorks special prizes.
- All submissions will receive a certificate of participation.
- First 3 places will receive a special certificate showing their place in the competition.
- Selected submissions will be featured on our website!
- Learn valuable tools and skills used by millions of engineers and scientists around the world.

What?

Fitness trackers are a relatively new and exciting technology used for tracking fitness data as you live your everyday life. The technology used in these devices is low-tech and can be recreated from home. ***In this challenge, you will use MATLAB® and MATLAB Mobile® to make your own fitness tracker.***
Using sensor data collected with your phone, the goal is to create a model to turn this data into usable results to inform someone about their workout's effectiveness. This usable information could include any sort of fitness data such as calories burned, steps taken, or flights climbed. Your task is to figure out what information you want to output and how to make a model to output this information. If possible, these models should utilize machine or deep learning techniques. Once you have a model and results, you will need to present your findings in an easy-to-understand manner.

Evaluation criteria (rubric)

Fitness Tracker MATLAB Model	Points (70)
Creativity - Innovative, creative, and original work	10
Difficulty and Mastery - Level of MATLAB knowledge demonstrated in executing the tasks	10
Functionality - Error-free and runs without issues	10
Readability - Clean, organized and easy to comprehend	10
Data Visualization - Clear and insightful graphics	10
Model Making - Transitioned between model ideas into a viable model implementation	10
Advanced Model Making - Use of Machine or Deep Learning Techniques in model	10

Presenting Results - Report, Presentation or Video	Points (30)
Creativity - Interesting delivery methods, innovative and informative	10
Quality - Technical execution of material and attention to detail	10
Concept - Engaging, coherent and appropriate	10
Clarity - Message is clear and well-communicated	10

When?

You have until Sunday 9/22 at 9:00 am to submit your work.

How?

The challenge in a nutshell:

1. Pick a fitness-related insight you want to track (calories burned, steps taken, flights climbed, etc.)
2. Determine which sensors on your phone, accessible through MATLAB Mobile® (https://www.mathworks.com/help/matlabmobile/ug/sensor-data-collection-with-matlab-mobile.html) can help you track that output (accelerometers, position, orientation, etc).
3. Develop a mathematical model and algorithm to extract that information from sensor data.
4. Develop simple yet informative visualizations for a customer of your fitness tracker to consume this information easily.
5. Share your work using HackRice14 Devpost.
    a. Your code.
    b. A document (MS Word, PDF, PPT or similar) explaining your thought process.
    c. A short video presenting your work (optional).

Resources to get started:

Create a MathWorks account (if you don't have one already) and access your free license: https://www.mathworks.com/academia/tah-portal/rice-university-40580441.html

Fitness Tracker Workshop Files and Resources
https://github.com/armandogarcia17/HackRice14_MATLAB/tree/master

Access free training: https://matlabacademy.mathworks.com/
Some relevant training includes.

- MATLAB Onramp: https://matlabacademy.mathworks.com/details/matlab-onramp/gettingstarted
- Machine Learning Onramp: https://matlabacademy.mathworks.com/details/machine-learning-onramp/machinelearning
- Machine Learning with MATLAB: https://matlabacademy.mathworks.com/details/machine-learning-with-matlab/mlml
- MATLAB for Data Processing and Visualization: https://matlabacademy.mathworks.com/details/matlab-for-data-processing-and-visualization/mlvi
- App Building Onramp https://matlabacademy.mathworks.com/details/app-building-onramp/orab
- Explore Data with MATLAB Plots https://matlabacademy.mathworks.com/details/explore-data-with-matlab-plots/otmledp

Join and collaborate with our community:

- MATLAB Central: https://www.mathworks.com/matlabcentral/
- MATLAB Answers: https://www.mathworks.com/matlabcentral/answers/index
- Additional resources in File Exchange: https://www.mathworks.com/matlabcentral/fileexchange/

Tips and tricks

1. It's easier to develop your code in the online or desktop versions of MATLAB. Only use the mobile version to collect sensor data and test your code.
2. Why start from scratch when you can use the sample code provided during the workshop (https://github.com/armandogarcia17/HackRice14_MATLAB/tree/master) as a starting point?
3. Leverage MATLAB Apps (https://www.mathworks.com/discovery/matlab-apps.html). You can do so much with little to no coding, and **most Apps will generate the code for you!**
   Some Apps to look into include, Statistics and Machine Learning Toolbox Apps
   https://www.mathworks.com/help/stats/referencelist.html?type=app&listtype=cat&category=index&blocktype=all&capability=&s_tid=CRUX_lftnav
4. Need help with visualizing your output data? Look at all the options MATLAB offers
   https://www.mathworks.com/help/matlab/creating_plots/types-of-matlab-plots.html
   And these plots also generate the code for you!

Good luck!