EMERGING TECHNOLOGIES I

MIS 284N | Fall 2021

Project Milestone 6

Overview: In this sixth milestone, we'll update our stored model using step counts taken using our microbit. We will construct realistic but synthetic data to demonstrate that this update works. You'll also get some time to make progress on your Milestone 7 deliverable.

Step 0: Before you start this Milestone, you should have an end-to-end working program, from the microbit, through the Raspberry Pi, and up to the Android app. You should be able to take weather data from the openweathermap API and make predictions on the Raspberry Pi, to which you can compare your actual step count to determine whether you met your goal or not on a given day. You should have a single Android app that the user starts on the mobile device and a single python program that needs to be launched on the Raspberry Pi. *If this is not the case, see the TA or instructor before proceeding.*

Step 1: The model that we used in Milestone 5 has the form:

$$Y = W_0 + W_1 * X_1 + W_2 * X_2 + W_3 * X_3$$

Where Y is the (predicted) number of steps. W_0, W_1, W_2, and W_3 are the weights we gave you from the model we trained offline, and X_1, X_2, and X_3 are the high temperature, low temperature, and humidity, retrieved from the openweathermap API. Design a function in your Raspberry Pi's Python program that personalizes the model (i.e., the weights) based on your own measured values. Our expectation is that an individual's values may be much more predictable than the class's in aggregate, yet, as discussed in class, it may be more efficient to start from a model trained on the entire class. As a hint, you can take a look at the code we used to train the offline model:

https://colab.research.google.com/drive/1ZOeIypEX7L2uocHqUg_Zd_wkkTXRmP0W?usp=sharing

Your implementation should compute new weights each day based on that day's information (i.e., predicted step count, actual step count, and weather) and then use these weights to make subsequents days' predictions.

Step 2: Design a mechanism to demonstrate that your model updates "work". This will involve using some synthetic data (both steps and weather). Create this synthetic data, and create a function in python that we can invoke as part of the demo to show that you successfully update the model weights and generate "different" predictions. For instance, you could create a csv of 30 (or more!) new (synthetic) daily data points. You could then "execute" a month and use terminal print outs to show what the original model would have predicted each day and what your continuously updated model predicts instead.

Step 3: If a user wants to improve, i.e., increase their daily step counts gradually, is your approach a good mechanism to use for setting goals? Why or why not? If not, what would be a better way to generate a "goal" that would encourage the user to improve?

Step 4: Where are you on your progress for Milestone 7? Take a few minutes to reflect with your partner(s) and discuss your plans for completing it on time.

What to submit

Via Canvas, submit a writeup that addresses the following:

(1) briefly (one paragraph or less) how did you approach Step 1?

(2) your response to the questions embedded in Step 3

(3) briefly (one paragraph or less) describe (again) your plans for Milestone 7 and briefly update us as to your progress and/or plans.

During TA office hours on Thursday, December 2, demonstrate Step 2.