Motiv Data Scientist/Algorithm Engineer Interview Assignment

Thank you for your interest in Motiv's Data Science Department! We are committed to hiring top-tier algorithm engineers and data scientists. Rather than a stressful interview process with math and coding problems on a whiteboard, we take a different approach. Instead, we provide an opportunity to develop a hopefully small and fun algorithm prior to the in-person interview. We provide the data, a description of the data, and a problem statement and leave the fun part to you! Our motivations for this approach are as follows:

- Successful completion of the assignment proves the candidate is capable of independent contribution at the capacity expected by Motiv.
- Allows the candidate to preview the nature of work encountered on the job.
- Reduce interview stress. This approach tests a candidate's resourcefulness and vocational competence rather than rote mathematical knowledge. We allow the candidate to apply his/her current knowledge and if necessary encourage utilization of additional resources (textbooks, internet, white papers, etc..) to complete the problem.
- Moves the coding portion of the interview from the whiteboard to the computer. Who codes on a whiteboard anyways?
- Create a framework and discussion points for the interview. Many of the technical questions will be in reference to your solution. Our hope is that the time spent on the assignment will allow for a more interesting technical discussion similar to a design review.
- You and Motiv equally benefit by experiencing what it means to be part of the Motiv team in a faux work scenario.

The Data:

We have provided ten *.csv files of data. Each line of data has several time-series elements separated by the ',' character. Each new-line represents the next set of data in the time-series. The data elements on each line in order from left to right are:

1. UTC. The data is sampled roughly at 50Hz. Feel free to assume all data was uniformly at 50Hz, but please be prepared to discuss the ramification of this assumption.
2. Acceleration in g's for the x-axis of an accelerometer. Values will be positive or negative.
3. Acceleration in g's for the y-axis of an accelerometer. Values will be positive or negative.
4. Acceleration in g's for the z-axis of an accelerometer. Values will be positive or negative.
5. Activity label. This element will either be blank or contain either "walk" or "run". Any element with a blank label is considered to be neither walking nor running.

The Problem:

Please build a simple classifier that attempts to classify walking and running segments. The non-labeled segments (not walking and not running) can be considered class-less and do not need their own class. The classifier should output its class predictions every 50 samples (roughly 1Hz). Please ensure your system is causal (i.e. you can use the most current sample as well as any number of previous samples to generate the current prediction). Please note the data set likely does not contain the same amount of examples for each activity. Please code this solution in Python or Matlab and send a .zip with your solution prior to the interview.

As part of the interview be prepared to generate a block diagram of the algorithm's architecture and explain how you decided on that approach. Also, please be able to execute the solution at the interview on your own machine in case we don't have the right environment set up on our machines. Be sure to generate accuracy metrics and be prepared to discuss their values and what they mean. Please keep your solution as simple as possible. While complex solutions are interesting and fun, our team always strives to deliver the best combination of simplicity and accuracy as the complexity of these algorithms can negatively impact the product experience in terms of battery life, computational latency, etc… Feel free to ask questions via email at ati@mymotiv.com. Above all, please have fun with this assignment because if you do then Motiv would be an even more fun place to work!

Thank You and Good Luck,

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