

sdmay19-37: Are Cross Country Courses Avoiding Hills?

Report 1

January 14th - February 2nd

Team Members

Connor Smith — *Ground Truth Engineer*
Thomas Chambers — *Ground Truth Engineer*
Ryan Hilby — *Data Handling Engineer*
Jacob Feldman — *Data Handling Engineer*
David Kirshenbaum — *Data Analysis Engineer*
Andrew Mumm — *Data Analysis Engineer*

Summary of Progress this Report

We kicked off this semester's work with a meeting with our advisor/client, Dr. Hornbuckle. At this meeting, we restructured our team to better orient ourselves for the tasks to be completed this semester. One team is tasked with formalizing and verifying the studies we have conducted so far to answer the central question to this project while also developing the course rating algorithm that will be the ultimate deliverable for the project. The other team is tasked with completing the software development. Both subteams met this week leading to significant progress being made on the rating algorithm as well as the backend design for handling the massive quantities of LIDAR elevation data. We also discovered a new source of historical course information from a high school XC coach that we plan on physically surveying once weather conditions improve.

Pending Issues

While Connor, Thomas, and Ryan have developed rough prototypes in MATLAB of their subtasks in the algorithm development, more testing is needed before they can be brought together into a single product.

Past Week Accomplishments

- Connor
 - Researched and analyzed medical articles about running energy consumption on inclines/declines
 - Developed a cost weighting methodology for elevation changes
 - Discussed rolling hills/big hills classification approaches with Thomas and Ryan
- Thomas
 - Contacted Laura and Aaron from Gilbert school district and received a few course pictures
 - Used pictures to locate course region on Google Maps
 - Began planning for rolling hills identification.
- Ryan
 - Discussed rolling hills/big hills classification approaches with Thomas and Connor
 - Started work on detecting normal and big climbs within XC course
- Jacob
 - Preprocessed elevation data into a format that can be easily uploaded to the database David set up/is setting up
 - Created a plan with Andrew and David to tackle the Big Data™ problem.
- David

- Set up a relational database on AWS for storing elevation values in Iowa. There will be a table for each county and hold longitude, latitude, and elevation values in each row.
 - Andrew
 - Worked on setting up cloud functions in aws so that we can extract elevation data with ease and it will be very scalable
 - Collaborated with David and Jacob on how we are going to store and manage our data.
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Plans for Upcoming Reporting Period

- Connor
 - Continue testing my cost weighting formula
 - Contact IAHSAA about district XC meet maps
 - Formalize past ground truth verification study results
 - Thomas
 - Continue making contact with cross country coaches/officials
 - Create a prototype of rolling hill detector that can be calibrated with the right values.
 - Ryan
 - Continue working on hill classification
 - Jacob
 - Work with David to get the processed data into our database, so that our web app can access it easily.
 - David
 - Go back to working on the front-end and maybe continue helping set up AWS stuff if needed.
 - Andrew
 - Going to work on connecting the aws lambda functions to the database we setup.
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Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Connor Smith	Cost weighting research and implementation	6	6
Thomas Chambers	Searching for old courses	3	3
Ryan Hilby	Started work on hill classification	4	4
Jacob Feldman	Preprocessing elevation data for uploading to our database.	8	8
David Kirshenbaum	Set up AWS and relational database	5	5
Andrew Mumm	Cloud functions setup	6	6

