Proposal for Semester Project

Patterns & Trends in Environmental Data / Computational Movement Analysis Geo 880

Semester:	FS24
Data:	What type of data are you focussing on?
Title:	The title of your project
Student 1:	Daniel Cellerino
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Abstract

Research Questions

Research Question 1: On which terrain levels (flat, moderate, steep) does Daniel gain or lose time compared to the average speed for these sections across different runs on the same route?

Research Question 2: How does the temperature, precipitation and wind on the day of the run affect Daniel's overall speed on the same route over different years?

Results / products

Research Question 1:

For the first research question we anticipate that Daniel's performance will vary significantly across different terrain levels. Specifically, we expect:

- Daniel will likely maintain a more consistent and higher average speed on flat sections, with minimal time deviation from the average across different runs. We expect that Daniel will get faster over time, since he gets more experienced in running.
- On moderate terrain, there may be a slight reduction in speed compared to flat sections, with some variability depending on specific conditions during each run.
- The steep sections are expected to show the greatest variability in speed and the most significant time deviations. Daniel may lose more time in these sections compared to the average, particularly on runs with less favorable conditions (weather).

We anticipate to identify specific sections where Daniel can focus his training to improve performance.

Research question 2:

- For the second research question we expect to find that higher temperatures may correlate with slower overall speeds due to increased physical stress. Conversely, moderate, cooler temperatures might be associated with faster speeds.
- Runs on days with precipitation (rain, snow) are expected to show a decrease in overall speed due to slippery surfaces and bad vision.
- Strong headwinds could slow down Daniel's runs, while tailwinds might help increase his speed.

We anticipate that adverse weather conditions will generally correlate with slower run times, while more favorable weather conditions will support faster overall speeds.

Data

We will use movement data recorded by Daniel on Strava over several years. From this data, we will focus on runs that Daniel has done on the same route in different years. We will divide the route into sections based on three terrain levels (flat, moderate, steep) and compare the average speed in these sections across different runs. The terrain levels we will conclude by mapping the route on arcGIS and adding a layer with terrain information from Swisstopo.

The weather data with information on temperature, wind and precipitation we will get from the archive of Swiss Meteo.

Analytical concepts

R concepts

Risk analysis

Questions?