Task 5:

Sending commands at the right time to a BVIP can enhance navigation. Therefore, we will explore additional information that could further improve navigation for a BVIP.

Method to Estimate Speed

One method is to estimate speed. This can be achieved by calculating the distance between two GPS locations and noting the time elapsed between these points. The Haversine formula is useful for this purpose, and conveniently, a Haversine library is available in Python for such calculations.

Accuracy of the Haversine Formula

The Haversine formula is particularly accurate for long distances. Ensure that your calculations for two GPS locations are not for excessively short distances. Helpful will a threashold like check every 4 seconds the speed. Additionally, include the current speed in your output.

Important Speed Check

Crucially, implement a check: if the speed is zero, no commands should be sent. Commands should resume once the speed increases above 0.

Visualizing Results with a Python Script

To visualize your results, use the Python script generate_video_walk.py. This script requires two command-line arguments: the first for the path to an input video or camera, and the second for the output path where the generated video will be stored. You can introduce a third argument which defines the path to the GPS tracked coordinates, corresponding to the captured video. Then these coordinates should be used to define route, map matching and speed estimation.

Information to Display on Video

The new video should display the following information in the top left corner:

- The current GPS location.
- The next instruction from VALHALLA.
- The transformed direction command: Go left, go right, or stay centered.
- The estimated time for the route (VALHALLA) and the elapsed time.

- The current speed.

Input Video Options

For the input video, you may use our walk video: https://faubox.rrze.uni-erlangen.de/getlink/fiYA8f53RWvbZphjG4zr22/IMG_5562 or capture your own video with a corresponding GPS track. This will allow you to generate a personalized output video. Consider introducing stops in your video to demonstrate how the speed calculation adjusts.

Code Delivery

Please deliver your code by Thursday, 7th December 2023, between 18:00 and 20:00. Good luck. Sending commands at the right time to a BVIP can enhance navigation. Therefore, we will explore additional information that could further improve navigation for a BVIP.

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Information to Display on Video

The new generated video should display the following information in the top left corner:

- The current GPS location (longitude and latitude) .
- The next instruction from VALHALLA.
- The transformed direction command: Go left, go right, or stay center.
- The estimated time for the route (VALHALLA) and the elapsed time.
- The current speed.

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