MTRN4010.2025 / Project2, part A1.

This part of the project is based on Optimization (topic seen in week 3)

The relevance of this part of Project2 is 7 marks (out of 25).

(We suggest: this component of the project should be solved before your tutorial session in week 8).

You are required to implement an optimization process for estimating the biases of the 3D gyroscopes.

Data: angular rates measured during an interval of time, sampled at a sampling rate of approx. 200Hz. Duration of interval of time 4 seconds.

During the interval of time, the platform was always moving (so, there is no way we can apply the calibration approach we applied in Project1).

We have the following data, to infer the unknown parameters (the biases in gyroscopes' measurements):

- We are given the initial attitude.
- We are given the measured attitude values at sporadic times.
- We are given the noisy (and biased) measurements provided by the gyroscope (measurements taken at ~ 200HZ)

You are required to use the provided data to estimate the gyroscopes' biases that were present during that experiment.

Your approach must be based on optimization, using the tool ***fminsearch***, in MATLAB.

Simulated synthetic data is generated by program "***GenerateSyntheticDataProject2_A1.p***" (Read example code "***Project2_partA1_ExampleReadData.m***", to see how to read the data)

The data also includes the "ground truth" (the actual values of the unknown biases), so that you can compare with your result.

Specifications about accuracy and processing time.

- Accuracy: Tolerance= ***0.15 degrees/second*** for each of the biases' components.
- Average processing time: Less than ***30 seconds***, in the laboratory (203/204) computers.

Additional mandatory specifications:

- You program must use all the provided measurements of attitude.

Your program must print the result (estimated biases) and the "unknown" ones, both expressed in degrees/second.

You will also print the processing time (in seconds).

If your program does not satisfy those specifications, it will be considered unsatisfactory, and no marks will be awarded.

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