Problem Statement

The goal is to create a method that automatically detects maneuvers in orbital data. This can be achieved using either heuristic or machine learning (ML) approaches. The task requires identifying potential maneuvers, like engine burns or orientation adjustments, using only the semi-major axis (SMA) variation over time and without explicit maneuver data. Reference graphs and a table with known maneuvers will be provided to assess the method's accuracy. Note that this provided data is not true data used to build the model.

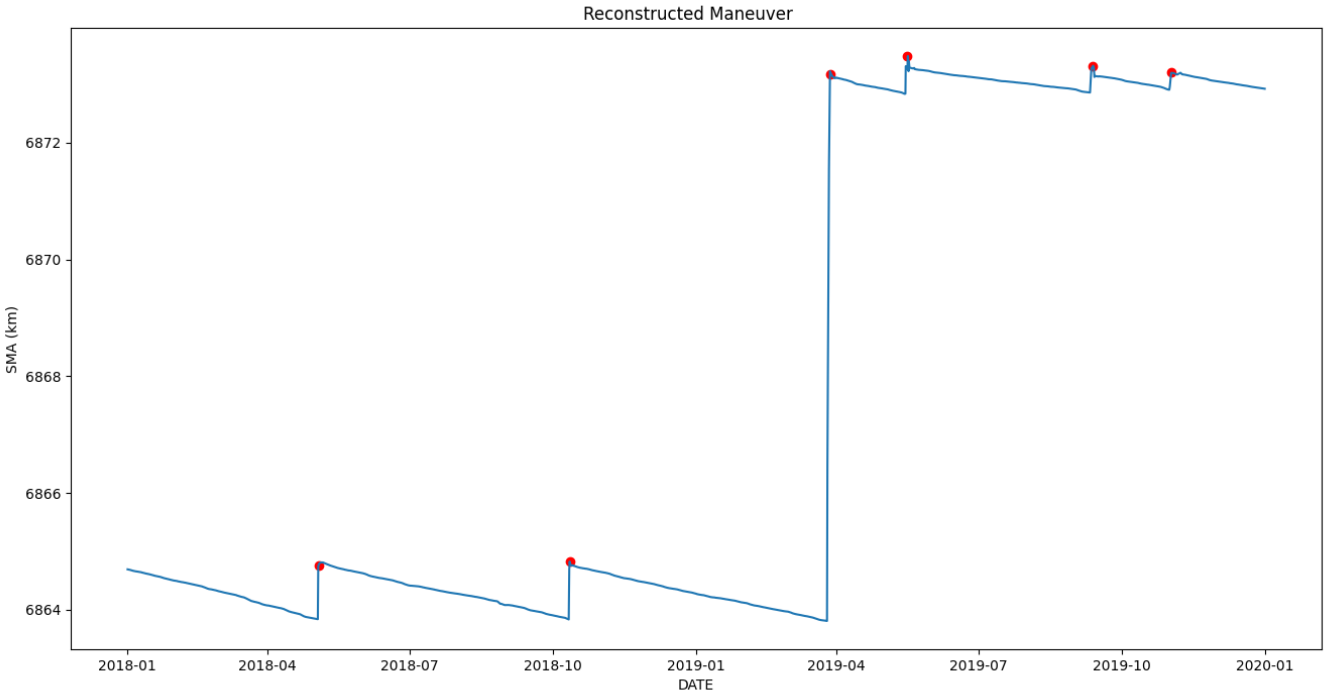
a) Which method— heuristic or machine learning— would you choose for developing your maneuver detection method, and why?

b) Develop Python code (or any programming language you're familiar with, but preferably Python) that implements the chosen heuristic or machine learning (ML) approach for detecting maneuvers in orbital data. The code should include modules for data preprocessing, feature extraction, maneuver detection, and result visualization.

Data:

The link provided contains the CSV file of SMA and DateTime data (https://drive.google.com/file/d/1BvQRvWXdbpXpOaSahEMovATmKQuQilQa/view?usp=sharing)

Reference Graph and Table:



Spotted dots are reference maneuvers; respective dates are in the corresponding table.

Date	2018-05-03	2018-10-11	2019-03-27	2019-05-17	2019-09-11	2019-11-01

Notes:

1. List assumptions made, if any.
2. Create a comprehensive document summarizing the methodology, results, and analysis.
3. Upload answers as a PDF with a strict four-page limit; kindly attach the Python code.