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DATASET FOR SPACECRAFT COLLISION AVOIDANCE MANEUVER WITH AI

Abstract

With the number of Debris and operational satellites in space increasing exponentially, the risk of collision with these bodies is also on the rise. Manually averting these collisions requires expertise. Collision Avoidance Maneuver (CAM) Planning involves detailed procedures before each maneuver. To automate and optimize this task, an AI model can help assist the satellite operator in performing a maneuver on the basis of risk of collision, feasibility of maneuver, cost and time taken. AI should learn from a vast dataset of maneuvers performed when the risk of collision is high. However, the dataset of past maneuvers is not easy to find because either it is not open source or because data is not diverse or in abundance. The paper presents a procedure of generating such a dataset and explains its characteristics. For each Conjunction Data Message (CDM), the dataset provides an optimal maneuver for Collision Avoidance. Calculation of this optimized maneuver is based on the type of orbit of the two colliding space objects, probability of collision, maneuver cost, spacecraft application, and probability of future conjunctions post CAM, subject to operating satellite constraints. The data detailed in this paper has the potential to be used to create robust AI based applications for enhanced efficiency of satellite collision avoidance maneuver planning..