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Sequential Pattern Mining for Maintenance Prediction Modeling for Military Helicopters

Ashley Ulricson, Ian C. Mickle, and Isabella T. Sanders

Department of Systems of Engineering
United States Military Academy
West Point, New York 10996

Corresponding author's Email: ashley.ulricson@gmail.com

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Abstract: Aircraft in the 160th Special Operations Aviation Regiment (SOAR) are regularly grounded due to scheduled and unscheduled maintenance that can last upwards of 60 days. When an aircraft is scheduled for maintenance, soldiers must file a DA Form 2407-E on the computer to record the components that need to be fixed. The form consists of a drop-down that includes all the Work Unit Codes associated with components of the aircraft that need repairs. There are thousands of codes which often results in many workers selecting the 00 or 02 WUCs which translates to the entire aircraft being broken. Therefore, many forms are submitted for aircraft repairs but cleaning and applying the data can be difficult. The current system is overall inefficient and expensive resulting in more unscheduled maintenance due to an inability to predict when and what parts might break. Parts can take weeks to order and arrive resulting in a longer downtime for pilots and their aircraft. We propose the use of Sequential Pattern Mining (SPM) as a new approach to predictive maintenance that examines patterns and predicts when and which parts are most likely to fail based on historic data. We applied SPM to a case study with the 160th. Through SPM we analyze the collected maintenance data to compare what WUCs occur most often and simultaneously with others. These conclusions will allow the 160th to preemptively order and replace parts to decrease maintenance cost and time, therefore increasing efficiency and mission readiness.

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