ABSTRACT

The oil and gas industry is one of the main pillars of global economic growth, with pipeline systems serving as vital infrastructure for transportation. Anomaly detection in operational data of natural gas pipelines is crucial to prevent potential losses and environmental risks. This study adopts the Robust One-Class Support Vector Machine (OCSVM) method to improve anomaly detection accuracy, particularly in handling contaminated data or outliers. This method is designed to identify normal patterns in data more reliably, thereby minimizing the impact of outliers. Experimental results show that the Robust OCSVM model successfully detected 117 anomalies out of a total of 8,759 data points, with a Mean Squared Error (MSE) of 0.400891. A comparison with other anomaly detection methods, such as Isolation Forest, indicates that Robust OCSVM has better sensitivity in detecting anomalies, although with a higher error metric. These findings highlight the importance of selecting the appropriate detection method to enhance efficiency and safety in managing gas transportation systems.

Keywords: *Anomaly Detection, One-Class Support Machine, Robust Optimization, Outlier*