

# **PENERAPAN METODE *SUPPORT VECTOR MACHINE* PADA *MACHINE LEARNING* UNTUK PREDIKSI KEGAGALAN MESIN MELALUI STRATEGI *PREDICTIVE MAINTENANCE***

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## **Abstrak**

Deteksi kegagalan mesin secara akurat memungkinkan produsen untuk mengidentifikasi potensi kerusakan dalam proses produksi guna menghindari *downtime* yang disebabkan oleh keausan alat yang tidak terduga atau kualitas benda kerja yang tidak dapat diterima. Penelitian ini memanfaatkan Dataset dari *UCI Machine Learning Repository* untuk memprediksi kegagalan mesin dan mengkategorikannya. Studi ini memiliki dua tujuan utama, yaitu mengeksplorasi serta mengimplementasikan algoritma *Support Vector Machine* SVM pada *machine learning* dalam prediksi kegagalan mesin dan mengembangkan menjadi sebuah sistem berbasis web. Hasil dari implementasi algoritma *Support Vector Machine* (SVM) pada klasifikasi biner menunjukkan performa mencapai *precision* 0,960086 dan *recall* 0,920848 untuk kelas 0 (*non-failure*), serta *precision* 0,923918 dan *recall* 0,961698 untuk kelas 1 (*failure*) dengan *F1-score* di atas 0.93, untuk kedua kelas, serta nilai MCC sebesar 0.8833 yang mengindikasikan korelasi kuat antara prediksi dan label aktual. Pada klasifikasi *multi-class* menunjukkan performa yang sangat baik dengan akurasi, *precision*, *recall* dan *F1-score* mencapai 1 pada masing masing kelas. Penelitian ini menyimpulkan bahwa *machine learning* dapat diterapkan secara efektif dalam *predictive maintenance*.

**Kata Kunci:** *Predictive Maintenance, Machine Learning, Support Vector Machine (SVM)*

# ***APPLICATION OF THE SUPPORT VECTOR MACHINE METHOD IN MACHINE LEARNING TO PREDICT MACHINE FAILURES THROUGH A PREDICTIVE MAINTENANCE STRATEGY***

## ***Abstract***

*Accurate machine failure detection enables manufacturers to identify potential damage in the production process to avoid downtime caused by unexpected tool wear or unacceptable work piece quality. This study utilizes a dataset from the UCI Machine Learning Repository to predict and categorize machine failures. This study has two main objectives, namely exploring and implementing the Support Vector Machine SVM algorithm in machine learning in predicting machine failures and developing it into a web-based system. The results of the implementation of the Support Vector Machine (SVM) algorithm in binary classification show a precision of 0.960086 and a recall of 0.920848 for class 0 (non-failure), and a precision of 0.923918 and a recall of 0.961698 for class 1 (failure), with an F1-score above 0.93 for both classes, and an MCC value of 0.8833. The results indicate a strong correlation between predictions and actual labels. Multi-class classification demonstrates excellent performance, with accuracy, precision, recall, and an F1-score reaching 1 for each class. This study concludes that machine learning can be effectively applied in predictive maintenance.*

*Keywords: Predictive Maintenance, Machine Learning, Support Vector Machine (SVM)*

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