

# Natural Computing: Project Proposal

Tom Akkerman  
s4740092

Lea Nugteren  
s4626451

Niek Derksen  
s4363779

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## 1 Introduction

In the current 4.0 industry, Predictive maintenance (PdM) has been a common business goal for lowering maintenance costs and ensuring long-term operational management. The aim of the PdM is to anticipate the next failure so that preventative maintenance can be done before the failure occurs [2, 4, 1]. Much research has already been done on machine learning approaches for PdM. Both Zonta et al. [4] and Carvalho et al. [2] have written systematic literature reviews of machine learning-based predictive maintenance. Nevertheless, we have found a fairly new and unused dataset that has yet to be covered in these reviews. The data that will be used are found through UCI [3]. Matzka [3] used this synthetic data to evaluate explainability of AI. We will try to use it to compare different ensemble learning techniques.

## 2 Research objective

The objective of this research is to investigate how to build the best ensemble classifier for the data set. Our predictions will be compared with the original research [3] but also, if possible, with other studies [4, 2]. To do this multiple ensembles with different kinds of classifiers as well as combinations of different classifiers will be investigated. The apparent significant features for classifying will be further used to build a diverse ensemble.

## 3 Methods

Firstly, different mono-classifier ensembles will be studied. Examples of this would be random forest, k-means, and support vector machine. The different classifiers will be researched to get a better understanding of important features of the dataset and what the focus of the classifiers is. Also, different ensemble builders will be investigated on their effectiveness. Ultimately, this prior study will be used to build a diverse multi-classifier ensemble. The goal is to have this reach a better score than the mono-classifier ensembles.

## References

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