1. By end of July complete an up to date literature review of prior work on **machine learning or expert systems (consider various terminology)** on **industrial air compressors**.  Identify **suitable rules**.

* Previous work – restrict to last 15 years – in particular last 5 years
* Expert systems / machine learning – come up with list of different terminologies
* Industrial air compressors – narrow scope to just this

Literature Review

# Adaptive Clustering

(Petković et al. 2012) presented a method for feature identification

# (Cortés et al. 2009)

(Cortés et al. 2009) presented the paper *“Optimization of operating conditions for compressor performance by means of neural network inverse”*.

In this paper an artificial neural network method was applied to a gas turbine’s compressor. It was therefore different to an air compressor as the fluid being compressed was a fuel-air mixture with a different pressure and temperature requirement than normally expected from an air compressor. The compressor type is given as “axial”.

An artificial neural network was first developed with an input layer (10 neurons), a hidden layer (12 neurons) and an output layer (four neurons). The inputs for developing this model were obtained by experimental measurement of 59,049 samples. The outputs were then calculated using a thermodynamic model. Once the neural network was created an inverse neural network was developed. The compressor cooler temperature drop was then optimised with respect to efficiency using the Nelder–Mead simplex method. An advantage of this method was noted to be the low time required to find the ideal cooler temperature drop for a given efficiency (<0.5 s). This would allow the method to be used for on-line operation.

# (Yu et al. 2007)

(Yu et al. 2007) presented the paper *“Neural-network based analysis and prediction of a compressor's characteristic performance map”*.

Cortés, O., Urquiza, G. & Hernández, J. a., 2009. Optimization of operating conditions for compressor performance by means of neural network inverse. *Applied Energy*, 86(11), pp.2487–2493. Available at: http://dx.doi.org/10.1016/j.apenergy.2009.03.001.

Petković, M. et al., 2012. On-line adaptive clustering for process monitoring and fault detection. *Expert Systems with Applications*, 39(11), pp.10226–10235.

Yu, Y. et al., 2007. Neural-network based analysis and prediction of a compressor’s characteristic performance map. *Applied Energy*, 84(1), pp.48–55.