Dissolved Gas Analysis Based Regression Rules from Trained ANN for Transformer Fault Diagnosis

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Abstract : Dissolved Gas Analysis (DGA) has been widely used for fault diagnosis in a transformer. Artificial neural networks (ANN) have high accuracy but are regarded as black boxes that are difficult to interpret. For many problems it is desired to extract knowledge from trained neural networks (NN) so that the user can gain a better understanding of the solution arrived by the NN. This paper applies a pedagogical approach for rule extraction from function approximating neural networks (REFANN) with application to incipient fault diagnosis using the concentrations of the dissolved gases within the transformer oil, as the input to the NN. The input space is split into subregions and for each subregion there is a linear equation that is used to predict the type of fault developing within a transformer. The experiments on real data indicate that the approach used can extract simple and useful rules and give fault predictions that match the actual fault and are at times also better than those predicted by the IEC method.