Fault Diagnosis with LSTM on Compressed Time-Series

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Time-series data is widely used in fault diagnosis of wind turbines. Long-term temporal dependencies in the turbofan engine degradation simulations play an important role in forming classifiable features. Long short-term memory (LSTM) neural networks are popular in such applications for their ability to encode time-dependent information recurrently. In LSTMs, each time-step in the data is processed independently and sequentially, which can be computationally expensive to train for very large datasets. By using stochastic compression on the dataset, random matrices satisfying the restricted isometry property allow data to be mapped to a lower dimension. In this presentation, we analyze the turbine failure classification problem and examine LSTM performance on the original dataset compared to the compressed version. Results show using compressed data can increase computational efficiency while retaining classification accuracy.

Keywords: Compression, LSTM, Wind turbines