NASA Turbofan engine degradation

Matthew Melendez

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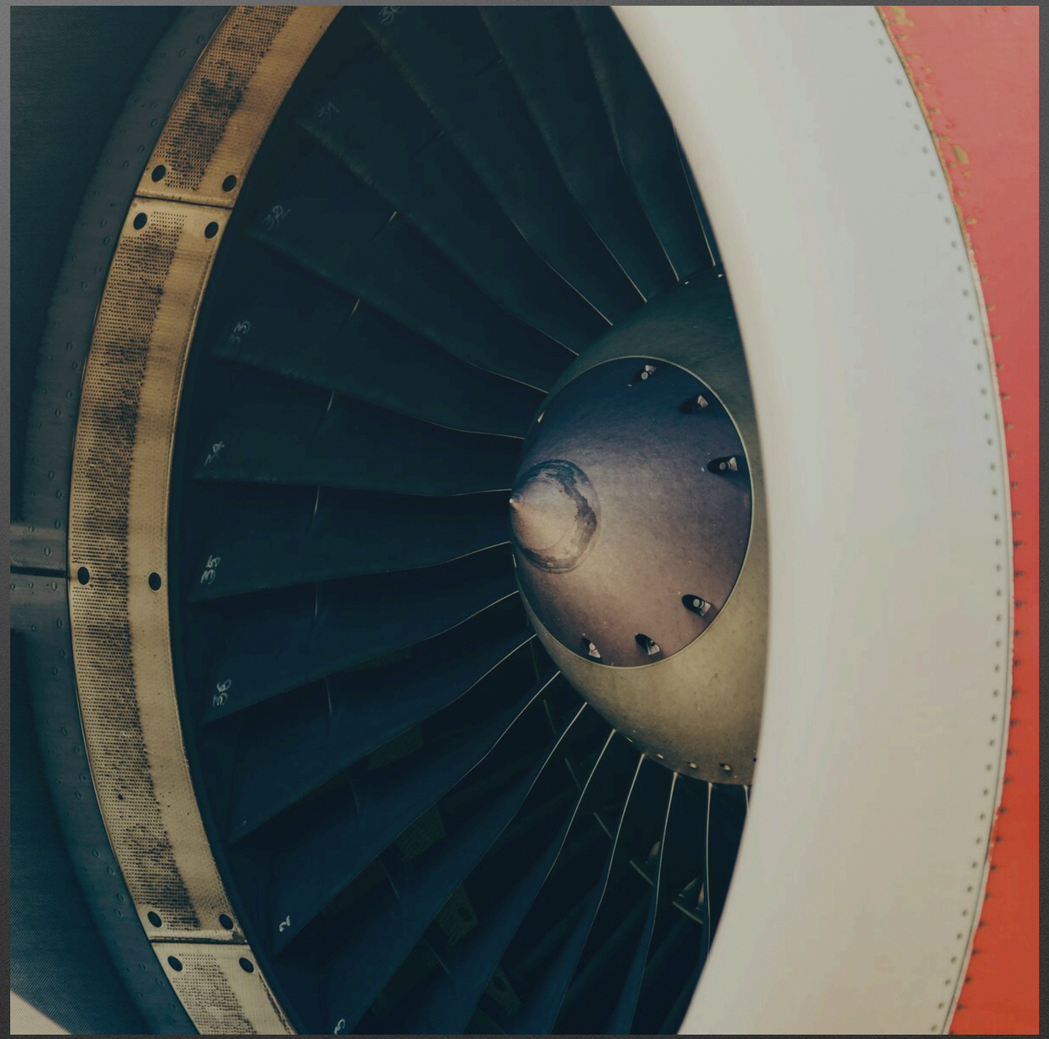
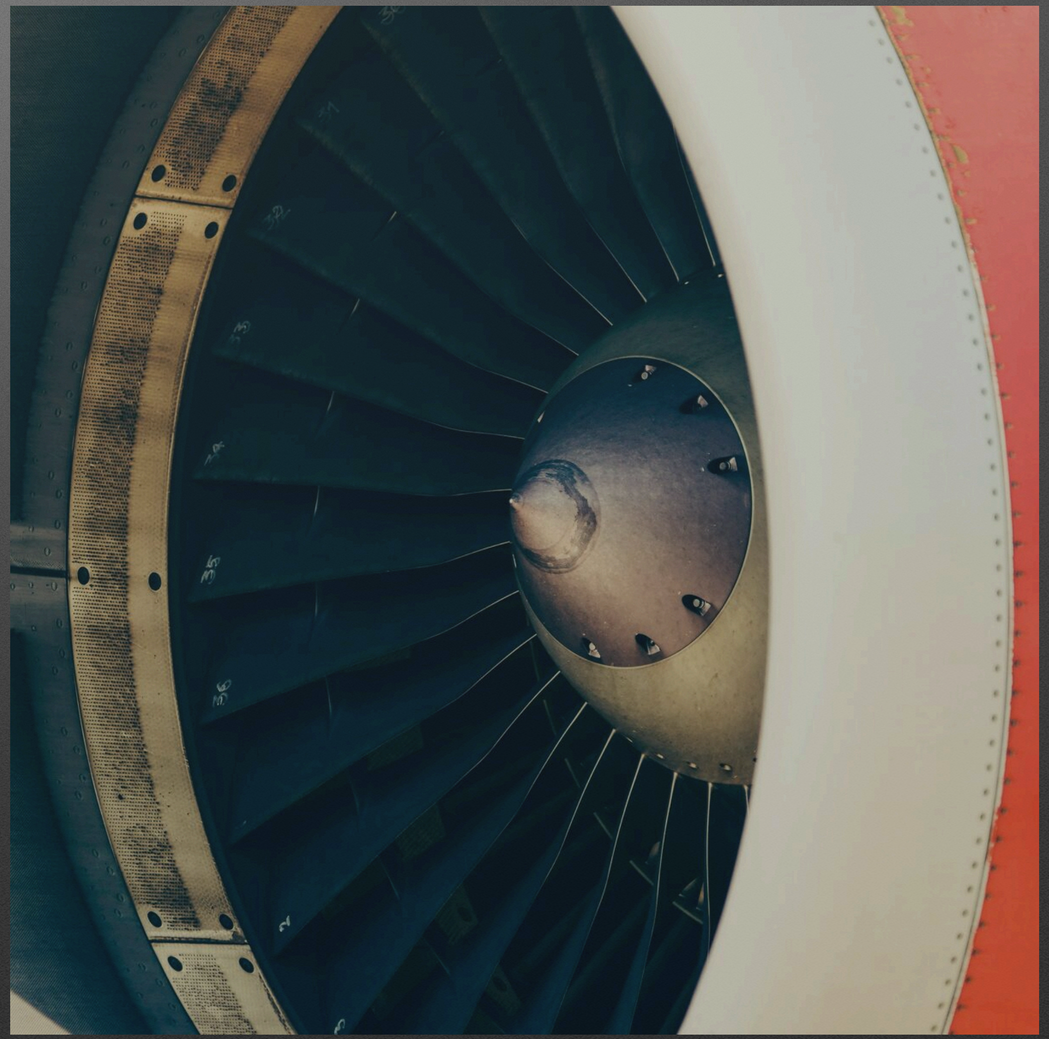
Dataset

- NASA simulated multivariate time series data from different engines
- Training Data
  - Each engine is operating normally then develops a fault at some point during the series
  - Each engine starts at unknown degrees of wear and tear
  - Three unknown operational settings
- Test Data
  - Similar to training data except hasn’t failed yet
  - Know the RUL

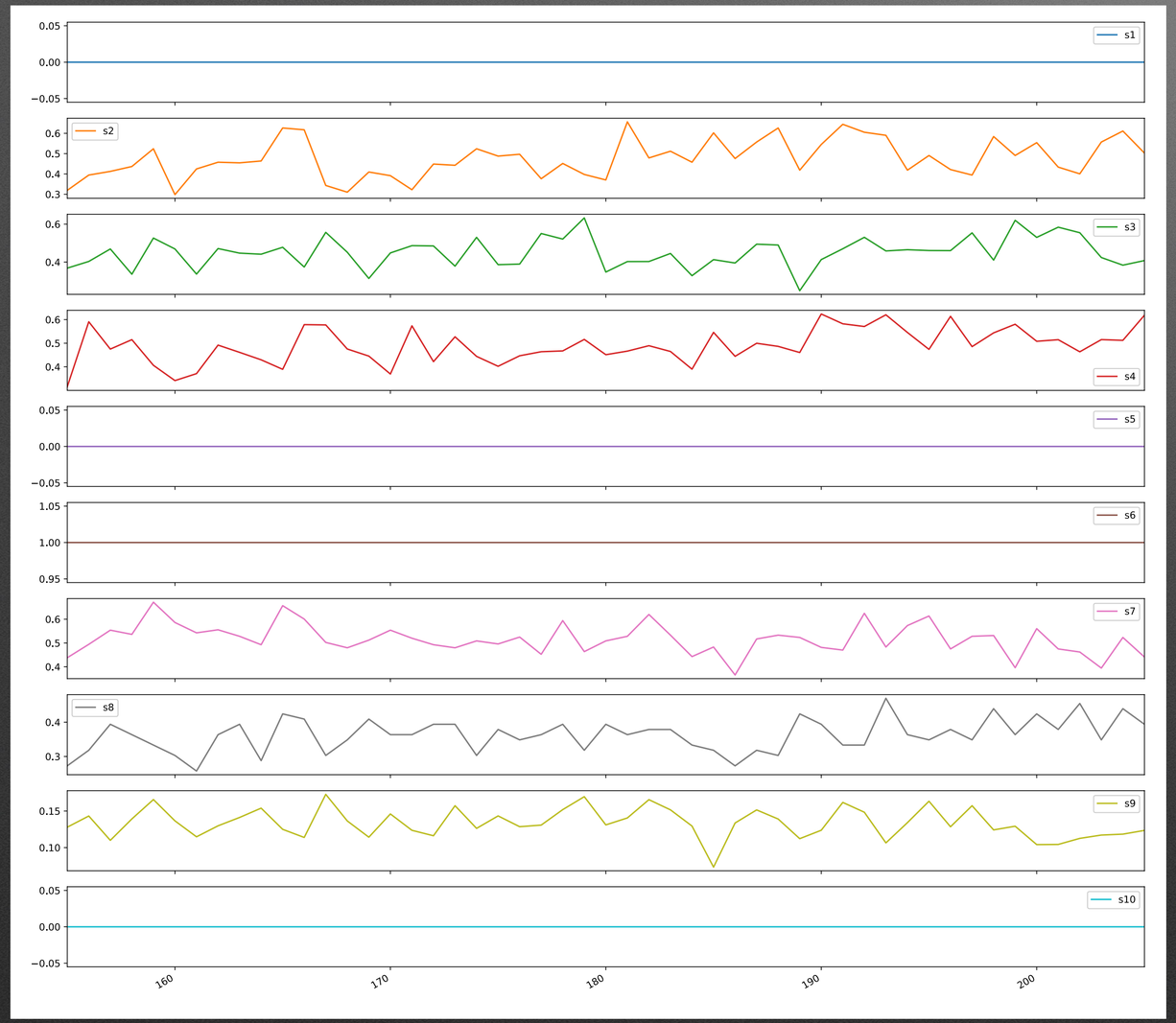


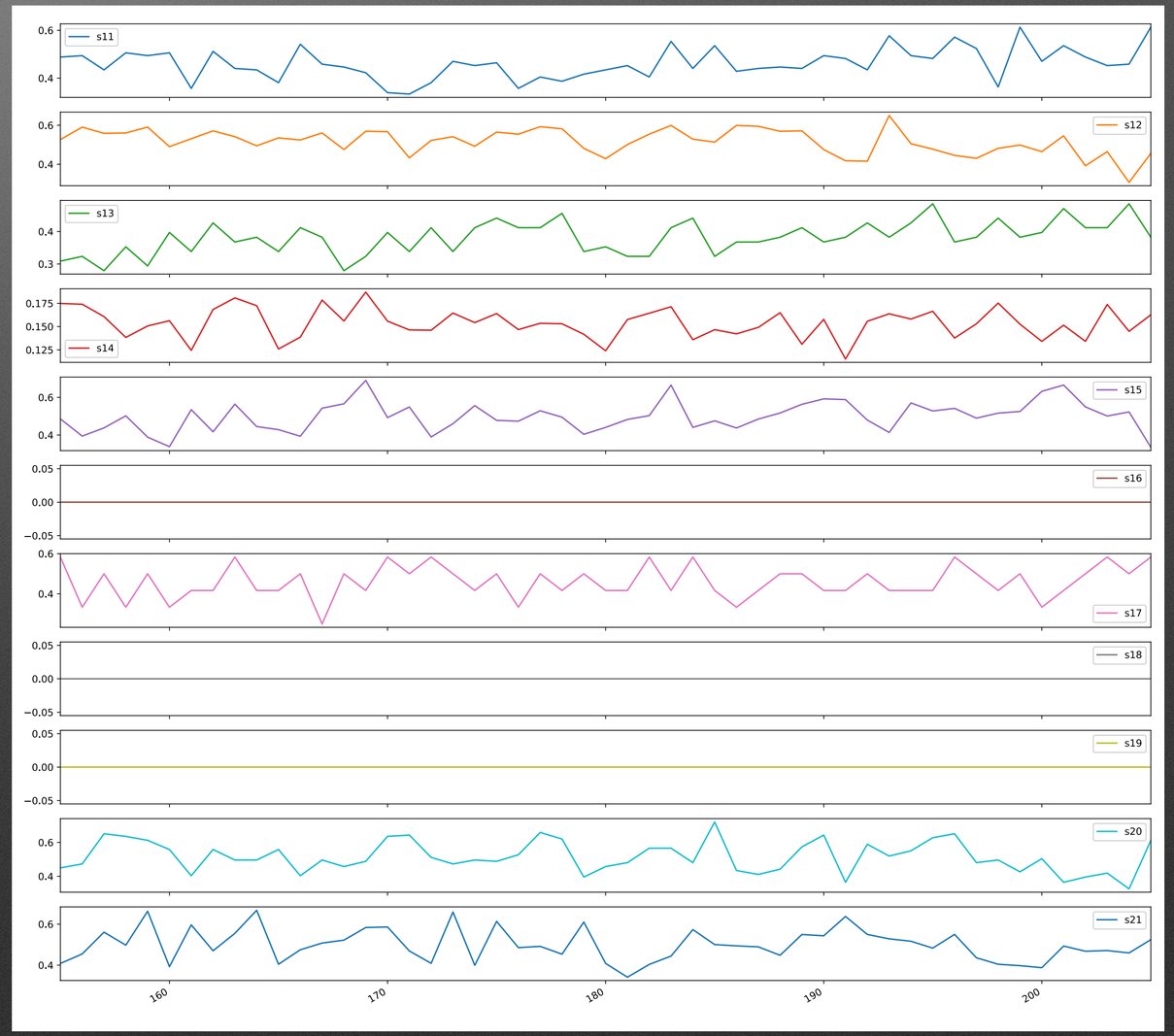
Problem

- Is an engine going to fail within x_number of cycles?
  - Chose 30 cycles
- Binary Classification



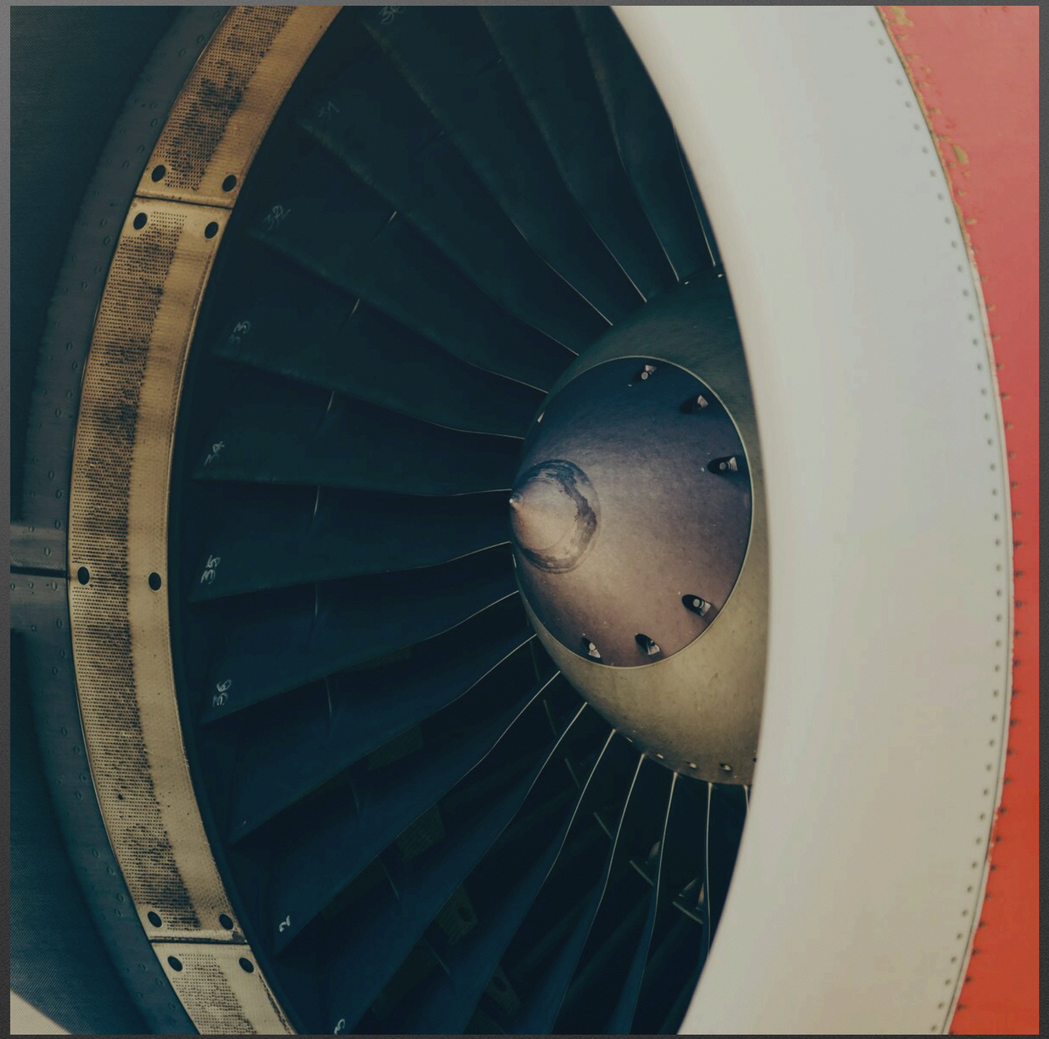
EDA and Model Selection





Model

- Sequential
  - LSTM
  - Window Size = 50 cycles
  - Dropout Layer
  - Final Dense Layer with Sigmoid Activation



Results

Layers	Units	Optimizer	Accuracy	Recall	F-1 Score
2	100, 50	Adam	0.957	0.840	0.913
2	140, 70	Adam	0.935	0.800	0.870
2	100, 50	Adagrad	0.925	0.760	0.844
2	100, 50	SGD	0.860	0.560	0.683

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3	100, 50, 25	Adam	0.989	0.961	0.980
3	100, 50, 25	Adagram	0.957	0.890	0.915
3	100, 50, 25	SGD	0.849	0.520	0.650

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4	150, 100, 75, 50	Adam	0.946	0.920	0.902
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Results

Engine	Accuracy	Recall	F-1 Score
1	0.989	0.961	0.980
2	0.898	0.737	0.789
3	0.959	0.800	0.889
4	0.882	0.792	0.757

Next Steps

- Get better results for other engines
  - Change LSTM Structure
  - Hyper Parameter Tuning
- Deploy Model

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