Outliers detection using LSTM NN

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Problem statement

It is difficult to imagine our daily life without the transportation of goods or public transport, the scope of this business is based on vehicle, and In case of failure driver observe it post factum.
For many industries, vehicle technical condition is a critical case.

The solution of this issue may be in regular technical inspection, but this procedure is quite expensive.

In my work, I will research the possibility of detecting non-typical system operation based on aggregated telemetric data.

Objective and Tasks

Objective

Research LSTM NN to ability of it to identify non typical values

Tasks

1. Research LSTM NN
2. Prepare data for training and validation
3. Prepare prototype
4. Analyze result
5. Conclusion

Object and subject of research

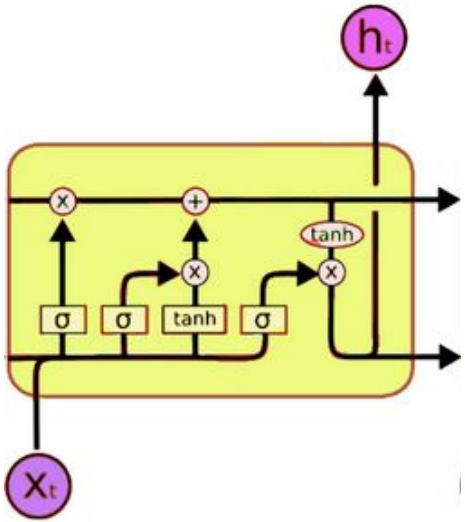
The object of my research is LSTM NN and the ability of it to identify outliers based on multiple interrelated inputs

Data Sample Characteristic

Data represented as several timelines of independent equipment observation such as

1. Ignition status - binary (on\off)
2. Engine Load - %
3. Coolant Temperature - C
4. Intake manifold absolute pressure - kPa
5. Engine RPM
6. Vehicle Speed - km/h
7. Intake Air Temperature - C
8. Mass flow rate of air entering a fuel-injected internal combustion engine g/sec
9. Throttle position %
10. Direct Fuel Rail Pressure - kPa
11. Exhaust Gas Recirculation Commanded
12. Exhaust Gas Recirculation Error
13. Fuel Level %
14. Barometic Pressure - kPa
15. Control Module Voltage - V

Chosen Method Description



LSTM is variety of RNN architecture which is well suited to making predictions based on time series data, since there can be lags of unknown duration between important events in a time series (long-term dependency problem)

A common LSTM unit is composed of:

1. Cell
2. input gate
3. output gate
4. forget gate

Cell state is kind of like a conveyor belt

Gates are a way to optionally let information through. They are composed out of a sigmoid neural net layer and a pointwise multiplication operation.

Plan of Research

48	Research LSTM NN
49	
50	Prepare data for training and validation
51	Prepare prototype
52	Analysis of the result, conclusions and preparation of the report

Questions ?