Project Report
ME 504 - Deep Learning for Physical Systems
Ist Semester, 2020-21

Predicting Failure (leakage) Time for Gas Pipelines from Historical Data

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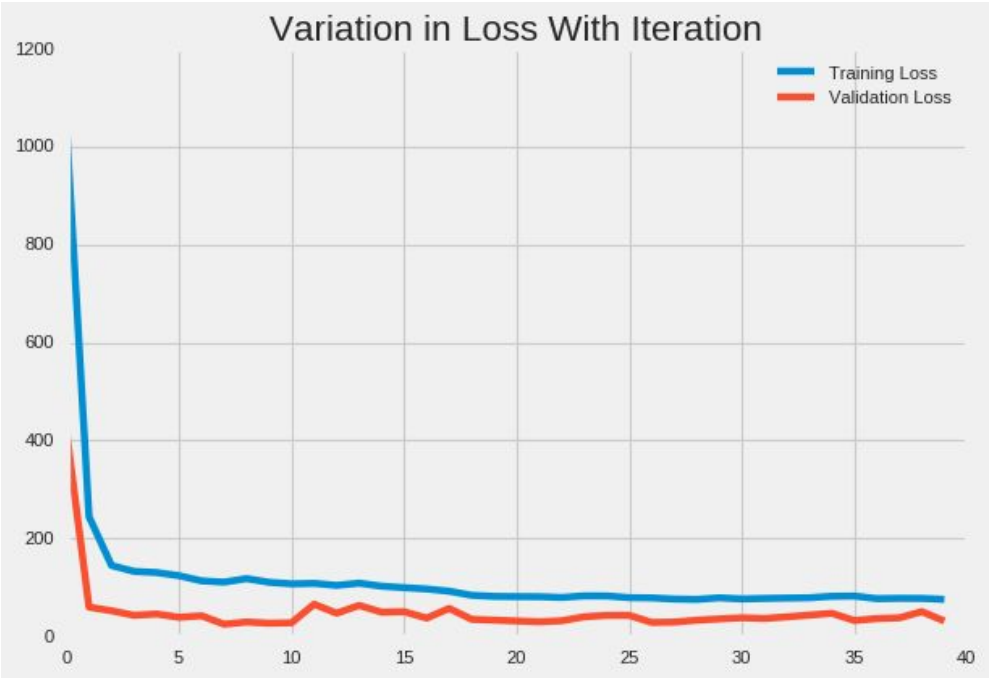
Objective

To develop a Neural network model to predict gas pipelines' (primary) failure time based on input parameters like pipe material, pipe diameter, fitting material, type of pipe joint and coupling type, using historical data. (Using data Filed as per CFR codes, USA)

Results and conclusion

We were able to predict the service time.
We have used Mean square error to evaluate the model's performance.
For the USA, our model achieved
Mean square error (Validation) - Below 35 (for around 30 epochs)



Novelty

Embedding layer - For translating high-dimensional vectors into low-dimensional spaces to represent the categorical inputs and also an overfit control.
Batch normalization - For faster training and to make the behaviour of the gradient stable.
L2 Regularization - Reduces the possibility of overfitting by keeping weights small.

References

- https://machinelearningmastery.com/how-to-reduce-overfitting-in-deep-learning-with-weight-regularization/
- https://stackoverflow.com/questions/36952763/how-to-return-history-of-validation-loss-in-keras
- https://datascience.stackexchange.com/questions/51280/default-value-of-learning-rate-in-adam-optimizer-keras
- https://keras.io/api/optimizers/
- https://www.kaggle.com/binovi/mechanical-fitting-failure-data
- https://www.youtube.com/watch?v=_DpsRVHVeR4&list=PLgJhDSE2ZLxbuDYAn_AF-wHVOYIhqujT-