Development of a Prediction Model for Pipeline Failure Probability based on Learnings from Past Incidents and Pipeline Specific Data using Artificial Neural Network (ANN)

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Objective

The objective of the project is to develop a knowledge-base from past incident and pipeline specific data using natural language processing (NLP) predictive model to assess pipeline failure using artificial neural network.

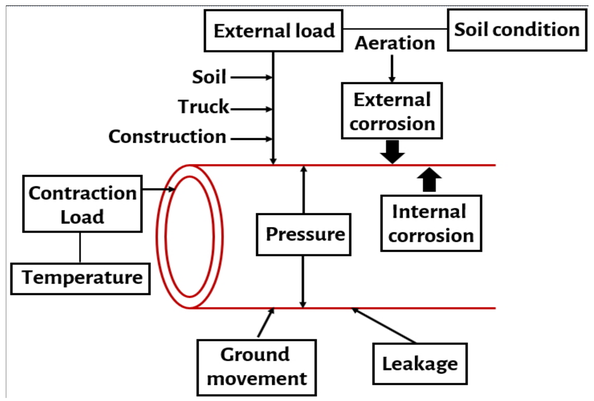

Figure 1. Schematics of pipeline failure causes

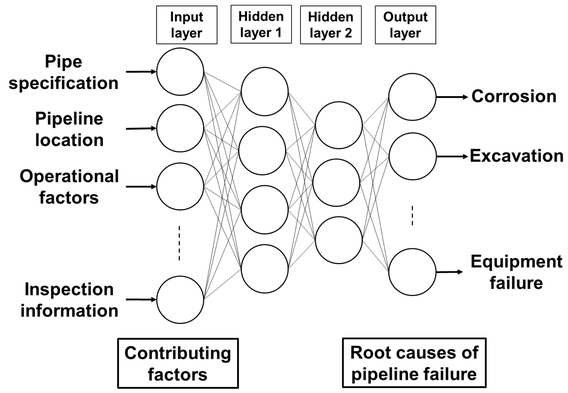

Figure 2. Schematic structure of ANN model for pipeline failure predictions

Project Approach/Scope

- **Employ natural language processing (NLP) to enhance understanding of cause interactions by analyzing narrative comments of database and incident reports**
- **Develop artificial neural network (ANN) model to predict failure probability and consequences based on failure causes interactions**

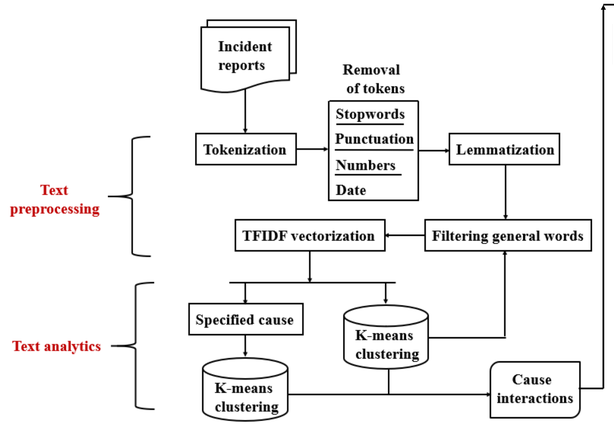

Figure 3. NLP workflow

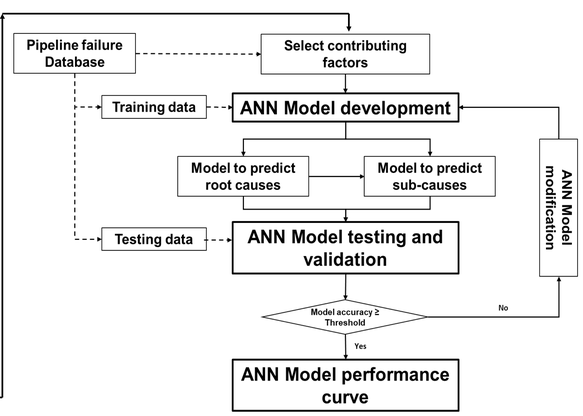

Figure 4. ANN modeling flow

Expected Results or Results to Date

- **Developed preliminary NLP-based solutions to process massive text data in narrative comments and perform clustering analysis based on unsupervised learning**
- **Currently incorporating analytical techniques to the current NLP work and developing ANN model to gain predictive capabilities**

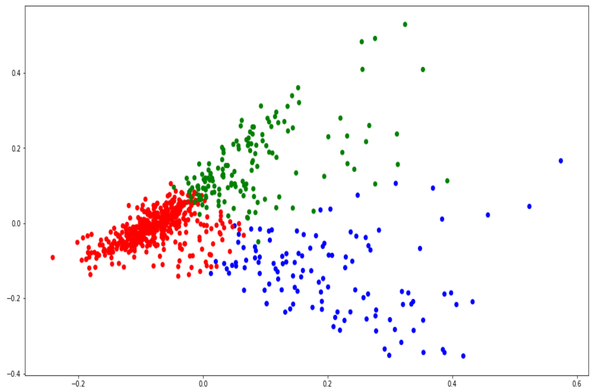

Figure 5. Clustering of text data with K-means technique

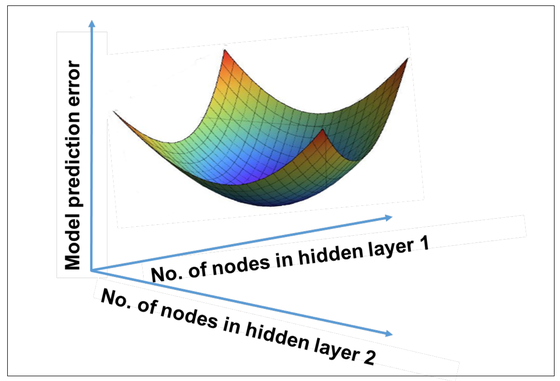

Figure 6. Expected ANN model optimization result

Acknowledgments

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References

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