Weekly Progress Report

Name: Relli Praveen

Domain: Data Science and Machine Learning

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Week Ending: 03

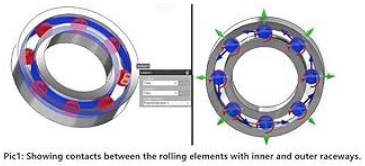
1. Overview:

In the fourth week, our focus remained steadfast on advancing our understanding of data science and machine learning (DS&ML) concepts, with particular emphasis on predictive maintenance for manufacturing equipment. We continued to delve deeper into DS&ML methodologies, honing our skills in preprocessing, analysis, modelling, and deployment. Additionally, we remained vigilant in our exploration of different service delivery models and deployment options, recognizing their impact on project effectiveness and scalability of our project.

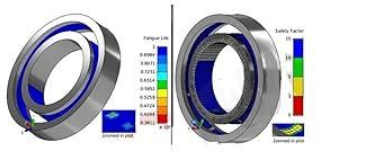
II. Achievements:

1. Further Enhanced DSML Framework Understanding:
    - Continued exploration of documentation and resources related to popular DS&ML frameworks, gaining deeper insight into their functionalities.
    - Successfully tackled more advanced tasks within the chosen DS&ML framework, demonstrating increased proficiency and comprehension of complex operations.

2. Continued Contributions to Predictive Maintenance Project:
    - Maintained momentum in contributing to the "Predict Lifetime of a Bearing in Manufacturing Industry" project, focusing on analysing operational data and refining predictive models.
    - Deepened understanding of the dataset structure and its nuances, leveraging insights to improve model performance.
    - Explored advanced techniques in feature engineering and model optimization, aiming to enhance predictive accuracy and efficiency.



Pic1: Showing contacts between the rolling elements with inner and outer raceways.



Pic2: Through stress life fatigue analysis, it shows that the high precision bearing has longer fatigue life and higher safety factor.

2. Data Science and Machine Learning Project Contributions:

Name of the project :- Predict life time of a bearing in manufacturing industry

The project focuses on predicting the remaining operational cycles before failure for bearings in the manufacturing industry. The dataset comprises operational data from engines experiencing degradation leading to failure, with each row representing a single operational cycle and each column denoting different variables, including operational settings and sensor measurements.

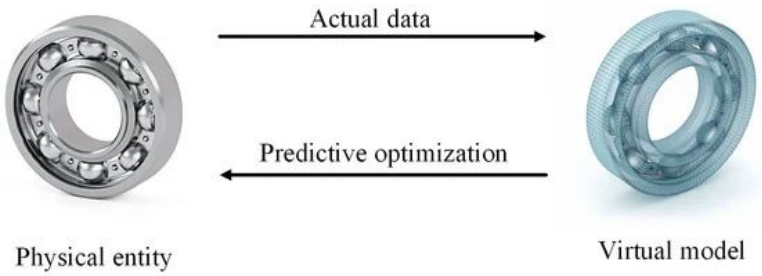
The competition objective is to accurately predict the remaining operational cycles before failure for engines in the test set, with provided true remaining useful life (RUL) values. The dataset is divided into four sets (FD001, FD002, FD003, FD004), each with varying numbers of trajectories, conditions, and fault modes. The data file is in zip-compressed text format and includes 26 columns of numerical data.

3. Learning Data Science and Machine Learning:

1. USC_TIA Documentation:
    - Leveraged project-specific documentation for reference and troubleshooting, enhancing familiarity with USC_TIA.
    - Engaged in relevant webinars and online tutorials to broaden understanding and proficiency in utilizing USC_TIA effectively.

2. Additional Learning Resources:
    - Continued utilization of project-specific documentation for reference and troubleshooting purposes, ensuring comprehensive understanding of project requirements.
    - Deepened understanding through participation in relevant webinars and online tutorials, consolidating knowledge and skills in DS&ML methodologies.

3. Data Science and Machine Learning Resources:
    - Enrolled in online courses such as "Introduction to Data Science" to reinforce foundational DSML skills.
    - Actively participated in DSML coding challenges on platforms like Kaggle and forums like Stack Overflow, applying learned concepts to real-world scenarios and refining problem-solving abilities.



III. Challenges:

1. Ongoing USC_TIA Integration Challenges:
    - Continued to face challenges in integrating USC_TIA with existing systems, particularly regarding compatibility issues.
    - Collaborated closely with the integration team to identify and address integration challenges, ensuring seamless integration and functionality.
2. Persistent Python Project Complexity:
    - Faced ongoing complexity in understanding the intricacies of feature engineering for predicting bearing lifetimes.
    - Continued to seek guidance and support to overcome these challenges, leveraging collaborative efforts to enhance comprehension.

IV. Learning Resources:

1. Continued Utilization of Learning Resources:
    - Persisted in utilizing project-specific documentation for reference and troubleshooting, ensuring thorough understanding of project requirements.
    - Remained actively engaged in relevant webinars and online tutorials, consolidating knowledge and skills in DS&ML methodologies.
2. Data Science and Machine Learning Resources:
    - Continued engagement with online courses and DS&ML coding challenges, reinforcing foundational skills and applying learned concepts to practical scenarios.

V. Additional Comments:

The fourth week represented a continuation of our journey towards mastery in data science and machine learning, with notable progress made in advancing our understanding and contributions to the predictive maintenance project. Despite persistent challenges, our commitment to collaboration and continuous learning has propelled us forward, positioning us for further success in the weeks ahead. We remain eager to refine methodologies and drive towards accurate predictions of bearing lifetimes in manufacturing settings.