Weekly Progress Report
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Domain: Predictive Maintenance / Industrial Manufacturing
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I. Overview:

Week 4 marked the final stage of the project with a strong focus on deployment, documentation, and deriving actionable insights. Final models were evaluated and packaged for real-time inference simulations. Dashboards and reporting tools were created to present the results clearly.

II. Achievements:

1. Turbofan Engine RUL Prediction

- Finalized the attention-based LSTM model after performance comparison across FD001–FD004.
- Simulated real-time RUL predictions and integrated alert triggers based on thresholds.
- Developed a simple dashboard using Plotly Dash to visualize predictions and cycles.
- Documented model training, evaluation, and inference pipeline in a structured Jupyter notebook.

2. Mining Process Quality Prediction

- Completed deployment simulation using a streaming dataset setup.
- Designed a real-time batch inference pipeline with preprocessed input flow.
- Built visual analytics using Power BI to highlight changes in silica concentration over time.
- Compiled a full summary report covering all model insights and feature behaviors.

III. Challenges:

1. Stream Handling

- Setting up a simulated streaming environment required preprocessing buffers and controlled batch injection logic.

2. Final Documentation

- Ensuring clarity and reproducibility in the final notebooks and reports took considerable effort, especially aligning with business objectives.

IV. Lessons Learned:

- Gained hands-on experience deploying ML models in simulated real-time settings.
- Developed practical visualization skills using both Dash and Power BI.
- Understood the significance of stakeholder-friendly reports and summaries.
- Strengthened confidence in end-to-end machine learning project delivery.

V. Final Summary:

- The turbofan engine model achieved strong RMSE scores and reliable alerts for maintenance scheduling.
- The mining process model successfully identified key influencing variables and performed consistently under simulated conditions.
- The entire project cycle — from problem understanding to deployment and reporting — has been executed efficiently, resulting in a valuable learning experience and production-ready prototypes.

VI. Additional Comments:

The completion of this project provided deep insights into industrial predictive modeling, deployment challenges, and real-world data handling. The technical and business-oriented outputs are aligned with initial goals, making the project a success.