Predictive Maintenance

Phase 2 submission

College code: 9605

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Technology: AI

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Phase-3

Tittle : Artificial intelligence project development precitive maintenance

Introduction :

Predictive maintenance leverages advanced analytics and machine learning algorithms to forecast equipment failures before they occur. Data visualization plays a crucial role in this process by providing insights into equipment health, performance trends, and potential failure patterns.

Importance of Data Visualisation in precitive Maintenance:

Inside Generation

Data visualization techniques allow maintenance teams to gain insights from vast amounts of sensor data collected from machinery and equipment. Visual representations such as charts, graphs, and heatmaps help in identifying anomalies and patterns indicative of potential failures.

Decision Analysis :

Visualizing maintenance data empowers decision-makers to prioritize maintenance tasks effectively. By visually highlighting critical equipment and impending failure scenarios, maintenance schedules can be optimized to minimize downtime and maximize asset utilization.

Performance Monitoring:

Real-time monitoring dashboards provide a visual overview of equipment performance metrics. Trends and deviations from normal operating conditions can be easily identified, enabling proactive interventions to prevent breakdowns.

Root Cause Analysis :

When failures occur, data visualization aids in root cause analysis by visually correlating multiple variables such as temperature, pressure, and vibration levels. This helps in understanding the underlying factors contributing to equipment failures and devising preventive measures.

Common Data Visualisation Techniques:

Time Series Plot:

Displaying sensor data over time helps in tracking equipment health and identifying trends or recurring patterns indicative of potential failures.

Histograms and Box Plots:

These visualizations are useful for understanding the distribution of sensor readings and identifying outliers that may signify abnormal equipment behavior.

scatter Plots:

Scatter plots visualize the relationship between two variables, enabling the detection of correlations and anomalies in equipment data.

Heatmaps:

Heatmaps provide a spatial representation of equipment health across different components or geographical locations, allowing for quick identification of hotspots and areas requiring attention.

Conclusion:

In conclusion, data visualization is an indispensable component of predictive maintenance systems, enabling maintenance teams to harness the power of AI and big data analytics to optimize equipment reliability and performance. By visually interpreting complex data patterns, organizations can proactively manage their assets, minimize downtime, and drive operational excellence.

Program:

Python

Copy code

```
Import matplotlib.pyplot as plt

Import pandas as pd


# Sample dataset (replace with actual maintenance data)

Data = {

  'Timestamp': ['2024-05-01', '2024-05-02', '2024-05-03', '2024-05-04', '2024-05-05'],
```

```
    'Sensor1': [20, 22, 25, 18, 21],
    'Sensor2': [15, 16, 14, 17, 18],
    'Sensor3': [30, 32, 28, 31, 29]
}

Df = pd.DataFrame(data)
Df['Timestamp'] = pd.to_datetime(df['Timestamp'])

# Plotting time series data for sensors
Plt.figure(figsize=(10, 6))
Plt.plot(df['Timestamp'], df['Sensor1'], label='Sensor 1')
Plt.plot(df['Timestamp'], df['Sensor2'], label='Sensor 2')
Plt.plot(df['Timestamp'], df['Sensor3'], label='Sensor 3')
Plt.xlabel('Timestamp')
Plt.ylabel('Sensor Reading')
Plt.title('Sensor Readings Over Time')
Plt.legend()
Plt.grid(True)
Plt.show()
```

This program generates a time series plot visualizing the readings of three sensors over a period of time.

Output:

The output is a time series plot displaying the readings of three sensors over time, allowing for visual inspection of trends and anomalies in the data.