Week 12 – Go-Live and Project Finalization

Introduction:

After the pilot deployment and preliminary user input, the SmartFactoryAI project's last phase concentrates on thorough system testing, validation, and performance analysis. In order to guarantee operational stability, dependability, and preparedness for full production deployment, this step is essential. To evaluate system performance and pinpoint areas for development, the script examines processed sensor data, pilot schedule results, and user input gathered during pilot runs.

Objective:

The primary goals are to verify the accuracy of sensor data, evaluate system stability over time, compare pilot performance to important metrics like work success rate and delay, examine failure patterns, compile user input, and create a comprehensive project report. These procedures aid in verifying the system's resilience and offer practical advice for future expansion and additional optimization.

Methodology:

- **Data Loading:** Saved JSON and CSV files are used to load user feedback datasets, pilot task schedules, and final processed sensor data.
- **Data Integrity Checks:** Heatmaps and summary statistics are used to identify abnormalities and missing values in sensor data.
- **Temporal Stability Analysis:** To look at stability trends across temperature, vibration, rpm, pressure, humidity, and voltage, sensor feature means and standard deviations are calculated every day.
- **Comparison of Pilot and Final Performance:** Job success rate and average delay, two important pilot metrics, are computed and displayed to compare performance, with placeholders for data from final production.
- **Failure Trend Analysis:** To find long-term patterns in equipment dependability, weekly failure numbers are combined and shown.
- **Analysis of User Feedback:** Word clouds are used to summarize feedback remarks, and satisfaction scores are averaged per operator and shown.

- **Operational Metrics Dashboard:** Key performance metrics are compiled into a visual dashboard for convenient tracking.
- **Report Creation:** Results and suggestions for future enhancements are compiled in a written project report.

Results & Observations:

- **Missing Data:** Heatmap depiction confirms that the sensor data shows few missing values, demonstrating excellent data collection across the time frame.
- **Sensor Stability:** The daily mean and standard deviation graphs confirm the sensor's constancy over time by showing steady operating ranges with anticipated little changes.
- **Pilot Performance:** During pilot testing, efficient scheduling and execution were demonstrated by the pilot job success rate of around 96% and the average task delay of about 5 minutes.
- **Failure Trends:** Weekly failure data show steady machine dependability with sporadic spikes but no discernible rising trend.
- **User input:** While average satisfaction ratings differ amongst operators, they often stay above 3.5 on a 5-point scale, signifying satisfying user experiences. Word clouds draw attention to typical feedback themes including UI intuitiveness and system dependability.
- **Operational Dashboard:** Key indicators provide a clear summary of performance and demonstrate a high degree of agreement with pilot goals.
- **Project Summary:** The documentation highlights the pilot phase's effectiveness and makes recommendations for more delay reduction, improved anomaly detection, incorporating real-time feedback, and continuous user interface enhancements.

Summary:

In order to verify system readiness, this last analysis stage combines operator input with the vast sensor and scheduling data from the SmartFactory.AI project. Robust data gathering is confirmed by high data integrity and sensor stability. Pilot performance measurements show that the system successfully handles task delays and has a high success rate. Reliable machinery is shown in the controllable failure trends. Synthesized user feedback identifies areas for improvement and areas where users are satisfied. For operational monitoring, visual dashboards offer actionable insights. All things considered,

this thorough assessment confirms that the system is prepared for full deployment while identifying areas for further development.

Conclusion:

The SmartFactory.AI pilot deployment's last system testing, validation, and documentation are successfully finished by the Week 12 script. The outcomes validate consistent sensor performance, effective task completion, and positive user satisfaction. An established and dependable system foundation is shown by key operational indicators and failure trends. In order to ensure sustainable industrial automation, recommendations are made to further enhance scheduling, anomaly detection, and user engagement. As intelligent manufacturing processes go from pilot assessment to continuous operational excellence and future scalability, this phase represents a significant turning point.

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