Project 9

FaultFindy (Build intelligence using Machine Learning to predict the faulty tyre in manufacturing)

The objective of this project is to develop an intelligent system using deep learning to predict the faults in manufacturing processes. By analyzing various manufacturing parameters and process data, the system will predict the faulty tyre generated during production. This predictive capability will enable manufacturers to proactively optimize their processes, reduce waste, and improve overall production efficiency.

Focus Areas:

- Data Collection: Gather historical manufacturing data, including good and faulty corresponding tyre images.

- Data Preprocessing: Clean, preprocess, and transform the data to make it suitable for deep learning models.

- Feature Engineering: Extract relevant features and identify key process variables that impact faulty tyre generation.

- Model Selection: Choose appropriate machine learning algorithms for faulty tyre prediction.

- Model Training: Train the selected models using the preprocessed data.

- Model Evaluation: Assess the performance of the trained models using appropriate evaluation metrics.

- Hyperparameter Tuning: Optimize model hyperparameters to improve predictive accuracy.

Deliverables:

Please share the following deliverables in a zip file.

- A report (PDF) detailing:

- Description of design choices and Performance evaluation of the model

- Discussion of future work

- The source code used to create the pipeline.

Tasks/Activities List:

- **Data Collection:**
  - Gather historical manufacturing data, including good and faulty images.
  - Ensure data quality, handle missing values, and remove outliers.

- **Data Preprocessing:**
  - Clean and preprocess the data to remove noise and inconsistencies.

- **Feature Engineering:**
  - Identify important features and process variables that influence fault.
  - Engineer relevant features to capture patterns and correlations.

- **Model Selection:**
  - Choose appropriate machine and deep learning algorithms.
  - Consider models like logistic regression, decision trees, random forests, or gradient boosting, CNN, computer vision.

- **Model Training:**
  - Split the data into training and testing sets.
  - Train the selected machine learning models on the training data.

- **Model Evaluation:**
  - Evaluate the models' performance using relevant metrics
  - Choose the best-performing model for deployment.

- **Hyperparameter Tuning:**
  - Fine-tune hyperparameters of the selected model to optimize performance.
  - Use techniques like grid search or random search for hyperparameter optimization.

Success Metrics:

- The predictive model should achieve high accuracy

Bonus Points:

- Create visualizations or reports to communicate the model's predictions and insights to stakeholders.

⌨ Implement a feedback loop to update the model periodically with fresh manufacturing data.

Data:

The dataset for this project can be accessed by clicking the link provided below

Faultfindy.zip