Predictive Maintenance for Automatic Production Systems

CSE 495
Final Presentation

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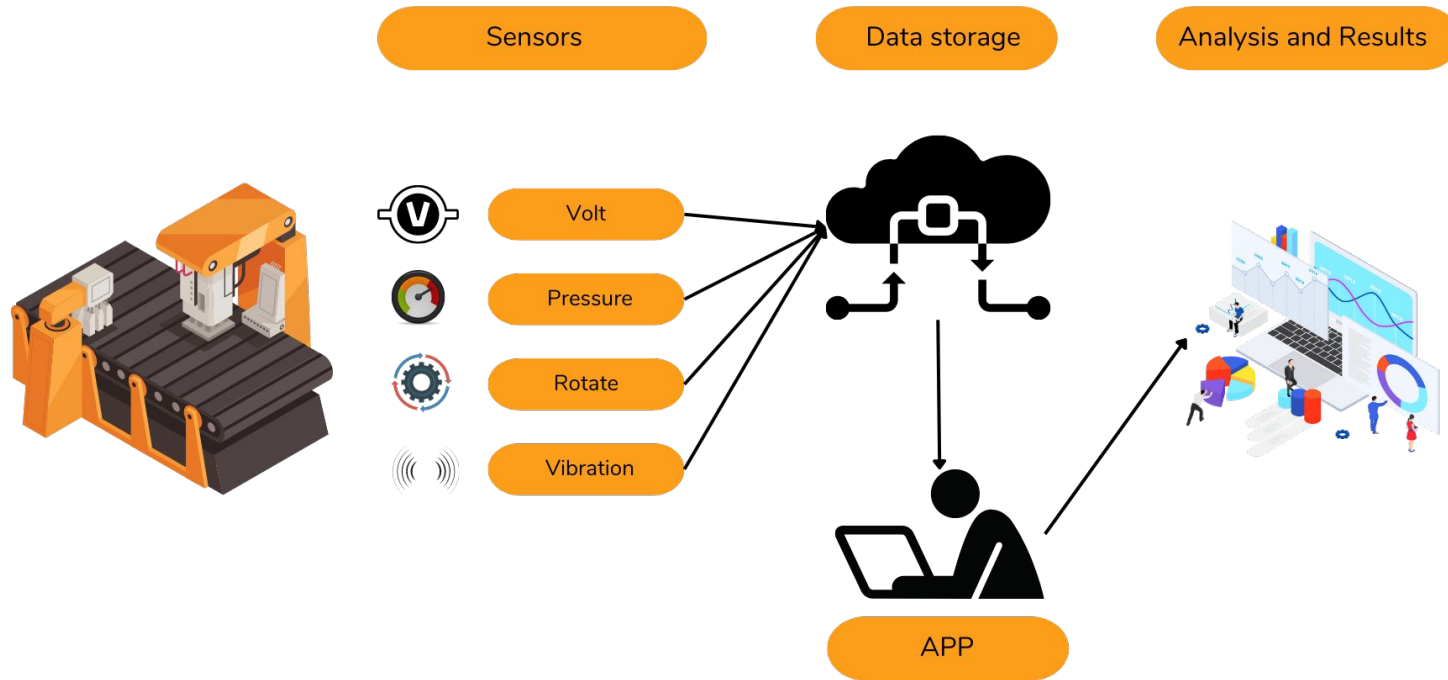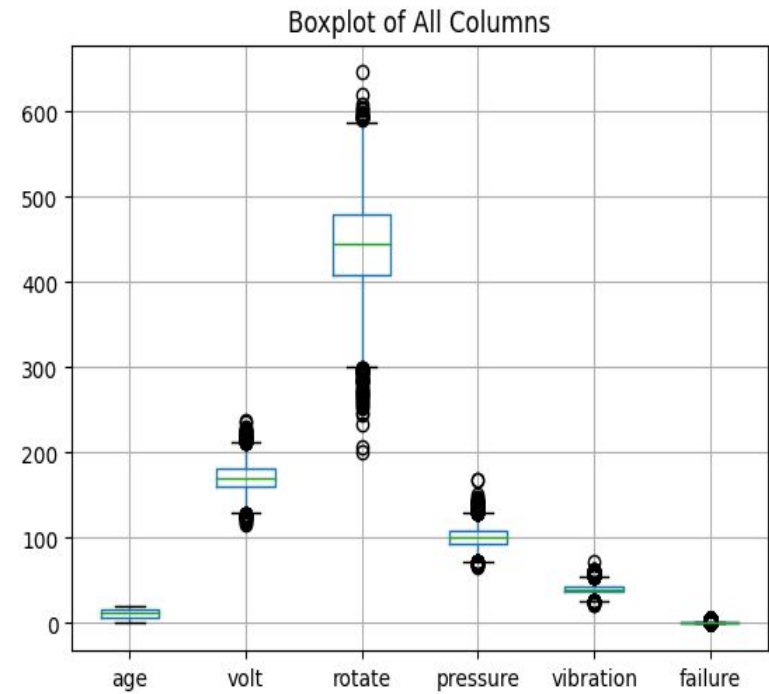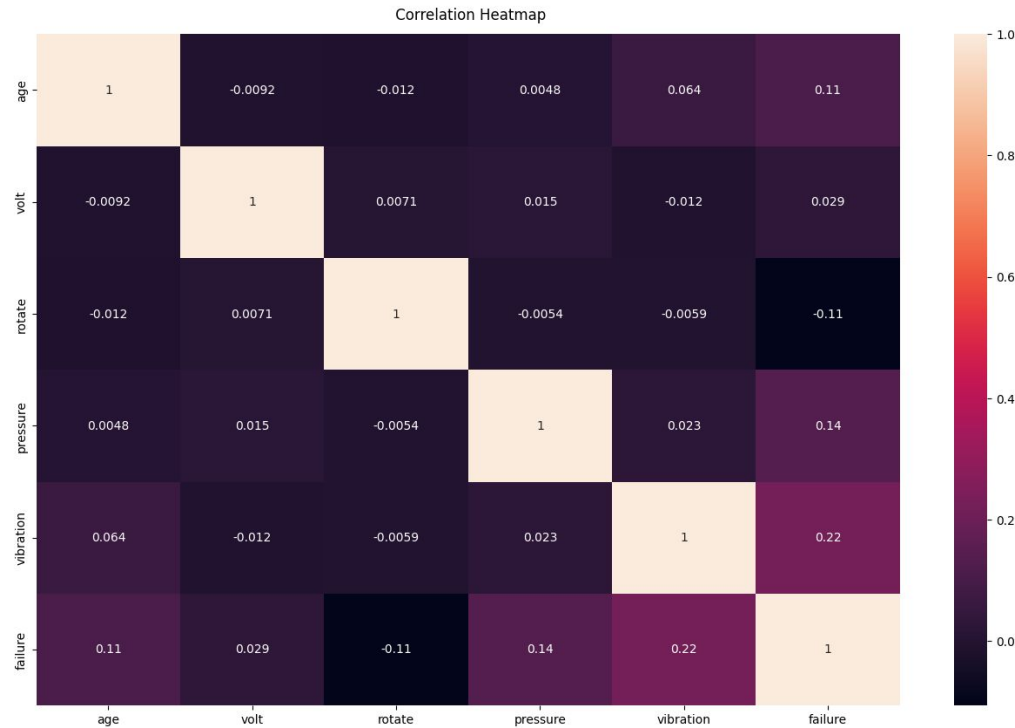
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Project Definition

Preprocessing

Correlation Heatmap

Boxplot of All Columns

Data Processing

- Data Integration

- Outlier Detection

- Label Encoding

- Feature Expansion

```
get_outlier_counts(data , 0.999999995)
✓ 0.0s

age          0
volt         0
rotate       0
pressure     2
vibration    0
failure      0
dtype: int64
```

Classification

Classifier	Accuracy	Precision	Recall	F1 Score
Random Forest	0.8987	0.8411	0.8987	0.8663
SVM	0.9005	0.811	0.9005	0.8534
Logistic Regression	0.8978	0.8385	0.8978	0.8605
Decision Tree	0.8378	0.8454	0.8378	0.8415
KNN	0.9014	0.8557	0.9014	0.862
ANN	0.9006			

Cross-Validation

Model	Cross-Validation Scores	Mean CV Accuracy	Recall	F1 Score
Random Forest	[0.892, 0.885, 0.889, 0.887, 0.891]	0.889	0.8987	0.8663
SVM	[0.896, 0.896, 0.896, 0.897, 0.897]	0.896	0.9005	0.8534
Logistic Regression	[0.894, 0.892, 0.892, 0.896, 0.896]	0.894	0.8978	0.8605
Decision Tree	[0.825, 0.818, 0.829, 0.824, 0.827]	0.825	0.8378	0.8415
KNN	[0.891, 0.892, 0.893, 0.891, 0.893]	0.892	0.9014	0.862

Website

Website
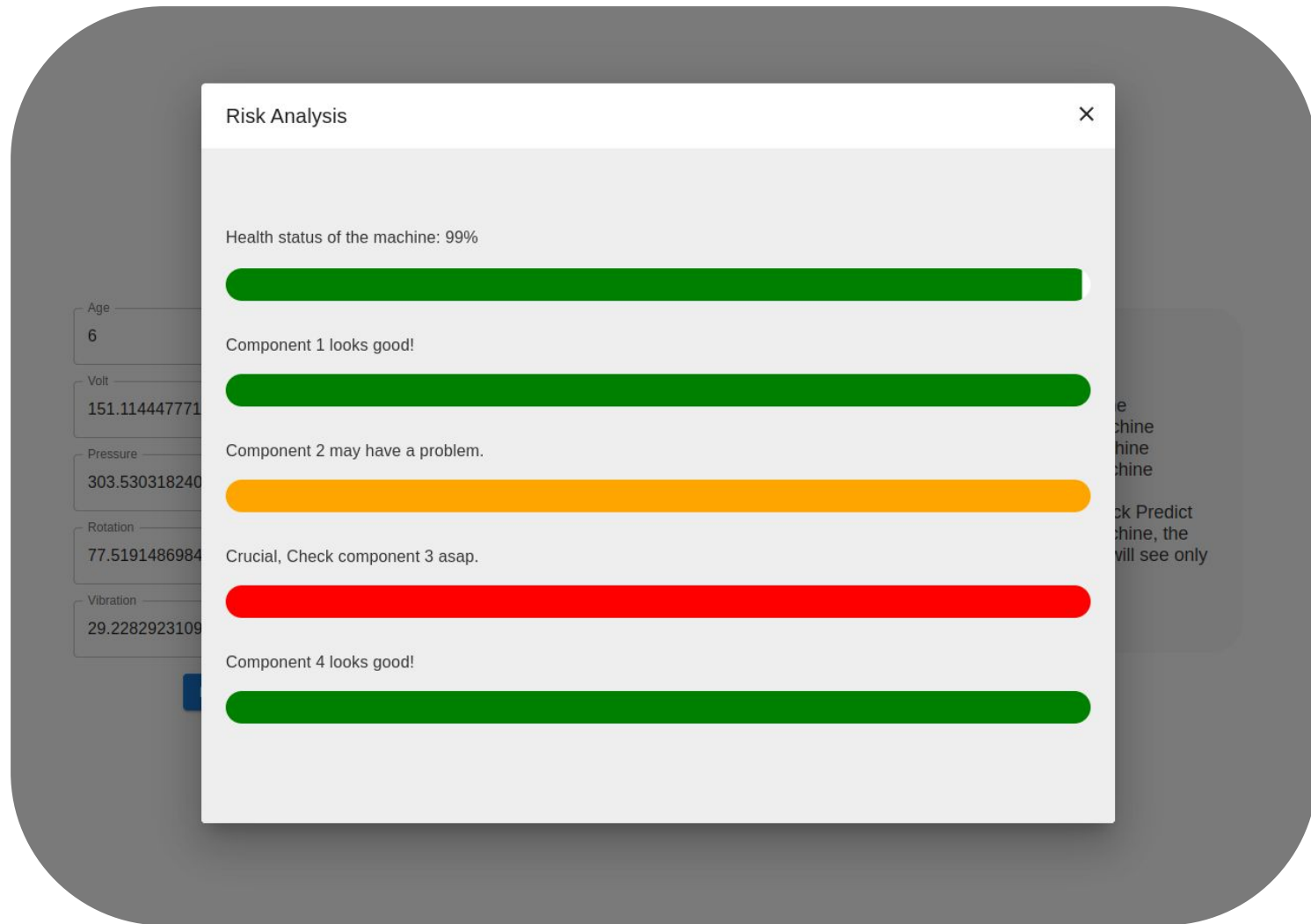
Roadmap

	March				April				May				June			
	Week 1	Week 2	Week 3	Week 4	1st Meeting	Week 2	Week 3	Week 4	Week 1	Week 2	2nd Meeting	Week 4	Week 1	Week 2	Week 3	3rd and Demo
Understanding the project's needs		▬▬														
Planning			▬▬													
Literature Review				▬▬▬▬▬▬												
Data collection					▬▬▬											
Data Processing, modelling and Model Training							▬▬▬▬▬▬▬▬▬▬									
Website Development									▬▬▬▬▬▬▬▬							
Integration the model into the Android app													▬▬			
Evaluation && Approving															▬▬▬	
Report					▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬											

Success Criterias

The success rate of the created model is at least %80

Calculation of analysis results in less than 20 miliseconds

2 file types should be supported to upload the data. (.xlsx - .csv)

Resources

- "Microsoft Azure Predictive Maintenance", ARNAB, "https://www.kaggle.com/datasets/arnabbiswas1/microsoft-azure-predictive-maintenance"

- "Predictive Maintenance using Machine Learning", Medini Kumar Bora, "https://medium.com/@Medini_2020/predictive-maintenance-using-machine-learning-3d8b62d5df8e"

- "Artificial intelligence for fault diagnosis of rotating machinery: A review, "https://www.researchgate.net/publication/326742898_Artificial_intelligence_for_fault_diagnosis_of_rotating_machinery_A_review"

- "Fault Handling in Industry 4.0: Definition, Process and Applications", "https://www.mdpi.com/1424-8220/22/6/2205"

- "An Industry 4.0 Dataset of Contextual Faults in a Smart Factory", "https://www.sciencedirect.com/science/article/pii/S1877050921003148?via%3Dihub"