Machine Predictive Maintenance

Failure Classification

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November, 2022

Project objective:
Deliver a product to Northrup Grumman to predict machine failure
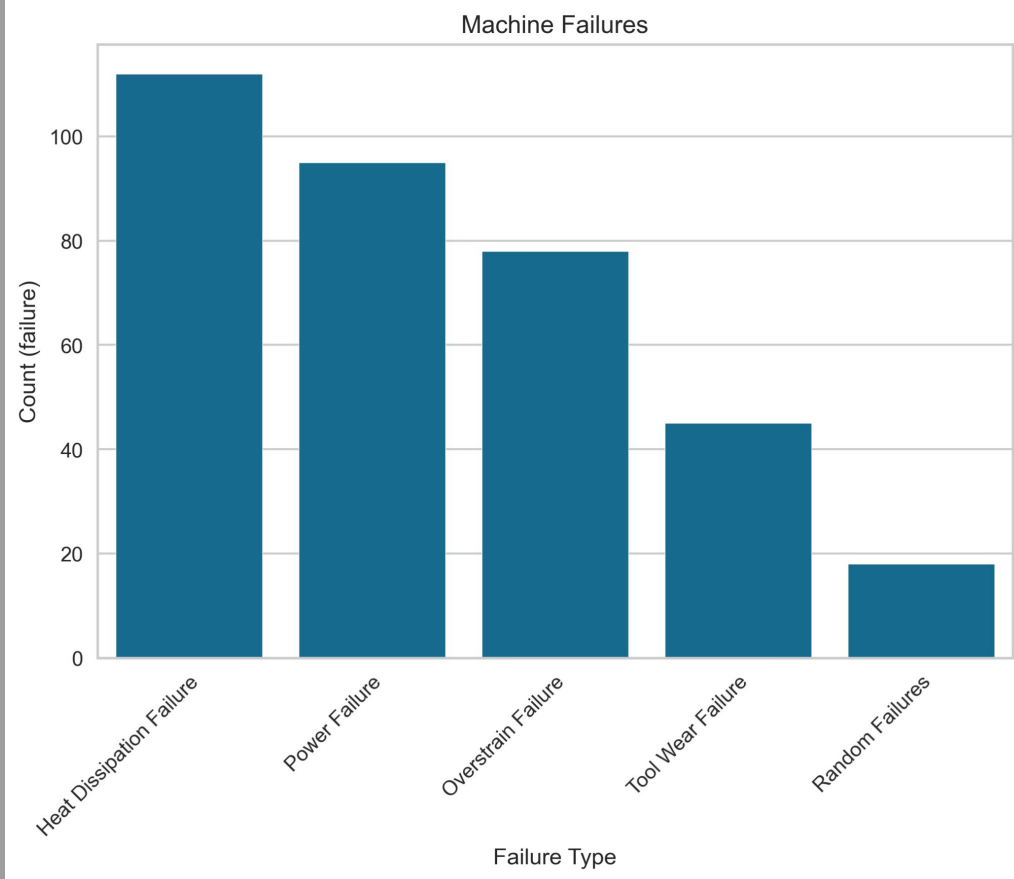
Data

Northrup Grumman

Data

Northrup Grumman

- Contains a data point for each product run through the machine

- 10000 points in dataset

- Includes information on air temp, process temp, rotational speed, torque, tool wear, and failure
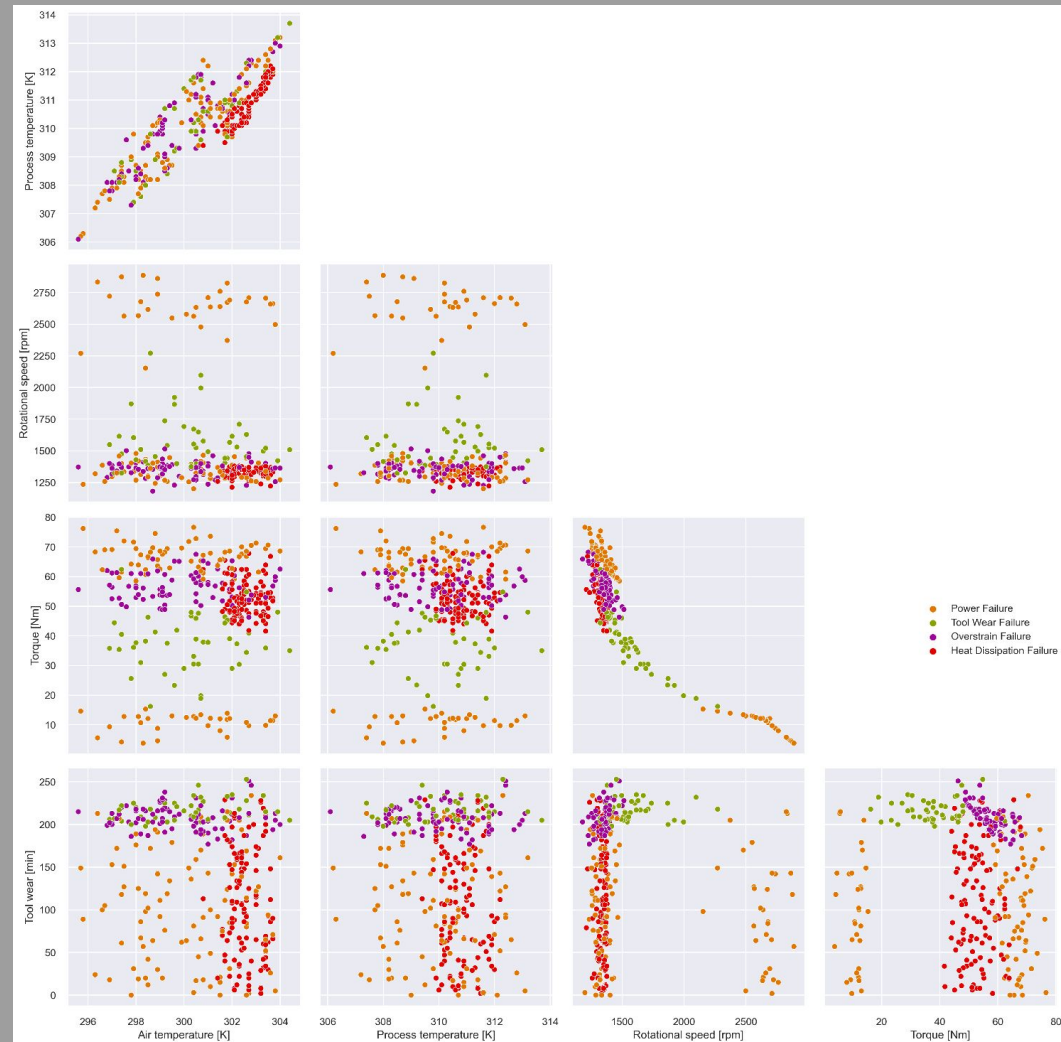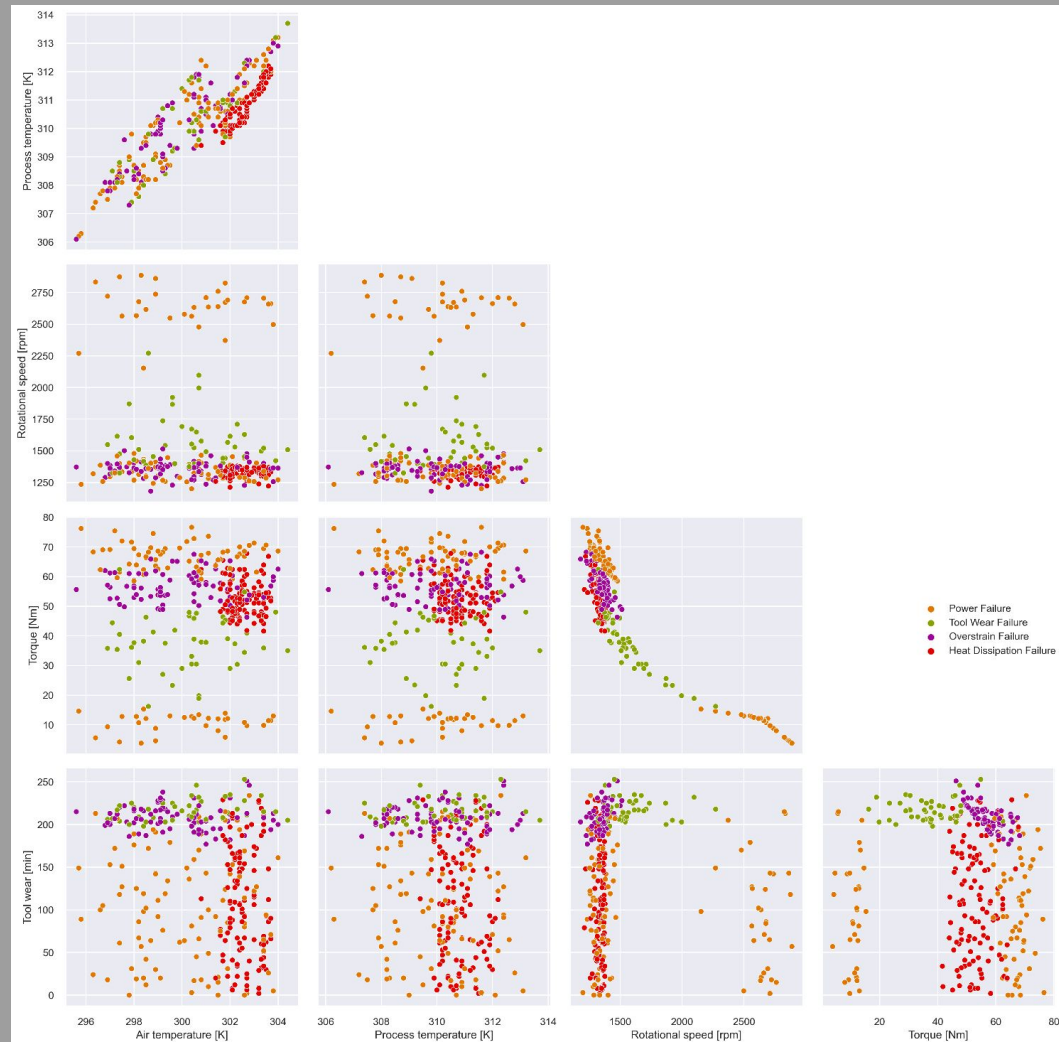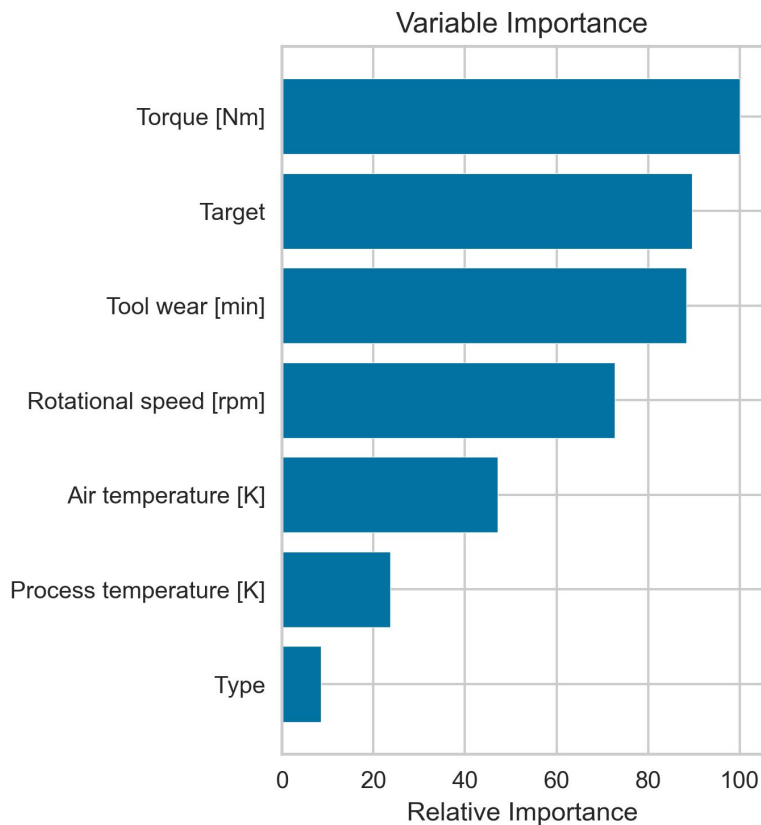
Range

Heat Dissipation, Power Failure, and Overstrain Failure are most common failures

Relationships

Grouping between features show correlation between type of recorded data and type of failure

Relationships

RESULTS

RandomForestClassifier Confusion Matrix

	Heat Dissipation Failure	No Failure	Overstrain Failure	Power Failure	Tool Wear Failure
Heat Dissipation Failure	22	0	0	0	0
No Failure	0	1929	0	0	0
Overstrain Failure	0	0	16	0	0
Power Failure	0	0	2	17	0
Tool Wear Failure	0	0	1	0	8

True Class / Predicted Class

Final Model predicted all values correctly except for 2 instances of power failure and 1 instance of tool wear failure as Overstrain failure

FUTURE WORK

1. Expand Dataset

2. Alternative machines

CONCLUSIONS

- Avoid the following to prevent failure:
    - Torque (power failure): less than 20 Nm or more than 58 Nm
    - Tool Wear (tool wear failure): more than 190 minutes of use
    - Rotational speed (overstrain and heat dissipation failure): less than 1200 rpm

- Final model 99% accurate with 97% precision

THANK YOU