ME781

Course Project

Tool Condition Monitoring in Machining Processes

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Project Objective

- Correlation in process parameters for predicting tool wear, finalizing machining and passing visual inspection
- Comparing the accuracy of several machine learning models by training them on various pre-processed datasets

Problem Definition

1. Our product is a tool wear monitoring system that will check if the tool that we used to machine the workpiece is worn or unworn
2. The product is for companies that hold manufacturing units or third player companies which are into manufacturing
3. They should come to us because we are using the latest technology of machine learning in predicting the tool wear which can be considered as the 4th industrial revolution

Technology Landscape Assessment

Patents - None

Published literature – research studies

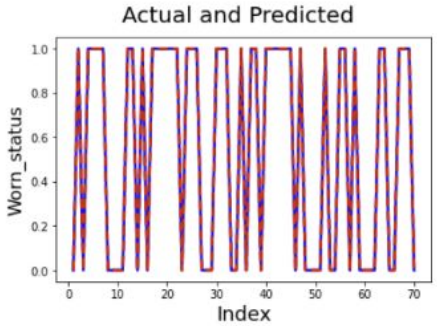
Open libraries - numpy, pandas , matplotlib

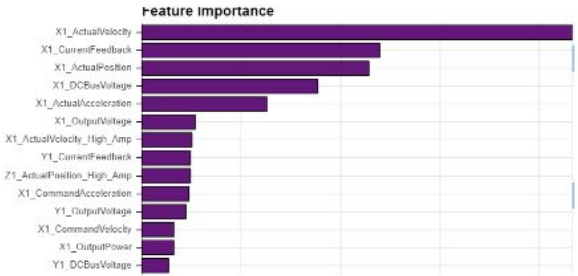
Proprietary libraries - none

Results & Conclusion

Worn Status

Used XgBoost as the classifier for all experiments



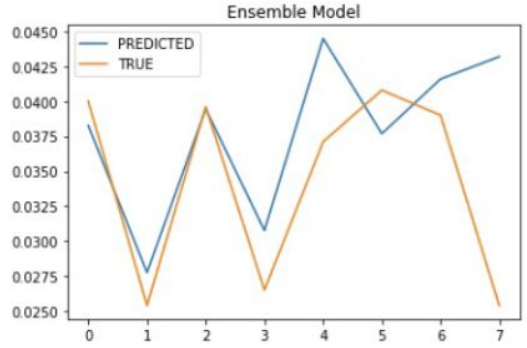


Conclusion

- X-axis and S-axis data have a great influence to tool wears, and the movement of X-axis and S-axis can be a bad affect to tool wear.

Results & Conclusion

```
MRE: [0.16793682]
Text(0.5, 1.0, 'Ensemble Model')
```

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MRE :[0.1822207]
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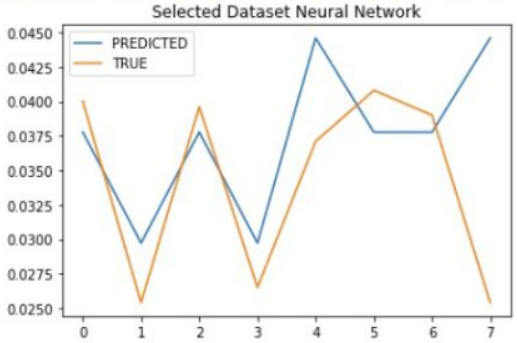

	Original Dataset	Engineered Dataset	Selected Dataset
Linear Regression	0.270	0.254	0.195
KNN Regression	0.177	0.180	0.254
Neural Network	0.463	0.234	0.182

Colab Link

[1] : https://www.researchgate.net/publication/337027741_Tool_condition_monitoring_techniques_in_milling_process_-_a_review

[2] :https://www.hindawi.com/journals/jie/2014/837390/

[3] :https://www.slideshare.net/SajjadAhmadpoor/tool-monitoring

[4] :https://www.kaggle.com/datasets/shasun/tool-wear-detection-in-cnc-mill

[5] :https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4934221/

[6] : Code Task Ihttps://drive.google.com/file/d/

1izfZkOMxR33mCcMCHtbNckILULUq-aXe/view?usp=sharing

[7] : Code Task IIhttps://colab.research.google.com/drive/1hbv2ORQJwyKecAldkU3PZeWs9qO78iYZ?usp=sharing#scrollTo=OhpaNjOUz5-s