Decision Making for Fused Filament Fabrication

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Diagram for the Decision Making



Data Gathering







void defect

1....

Tensile Test



Decision Boundary

The original method of decision making was based on a 3D decision boundary made with support vector machine, which is . dependent on 3 variables.

- Component health index
- Defect location ightarrow
- Defect length \bullet

observations of ignorable defects on training data • observations of impactful defects on training data



Decision Tree With Gini Impurity



Results

Decision Tree Classification Report					
precision	recall	F1-score			
0.57	0.62	0.59			
0.89	0.87	0.88			
		0.82			
0.73	0.49	0.49			
0.83	0.83	0.82			
	Classification precision 0.57 0.89 0.73 0.73	Classification Reportprecisionrecall0.570.620.890.870.730.490.830.83			

Decision Tree Classification Report					
	precision	recall	F1-score		
Ignorable Defect	0.57	0.62	0.59		
Impactful Defect	0.89	0.87	0.88		
Accuracy			0.82		
Macro avg	0.73	0.49	0.49		
Weighted avg	0.83	0.83	0.82		

Decision Boundary

	precision	recall	F1-score
Ignorable Defect	0.83	0.34	0.48
Impactful Defect	0.85	0.98	0.91
Accuracy			0.85
Macro avg	0.84	0.66	0.69
Weighted avg	0.84	0.85	0.82

Conclusions

- three variables.

Classific	ation Repor	t
cision	recall	F1-sc
.83	0.34	0.4
.85	0.98	0.9

The confusion matrices for both the decision tree and the decision boundary methods are very similar in spread. Most difference values are in false positive and false negative. Accuracy scores for both models are very similar. The decision tree is not as visibly comprehensive as the decision boundary for this dataset and problem. The decision tree has a good potential for more than three variables, otherwise, decision boundary can only handle for

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