# Thomas Jones – CS-5530-0005 HW#3

## KNN

The best overall performing model used K =15

Accuracy: 73%

A graph with a line

Description automatically generated

For that model, with k=15;

***Fair*** was classified most correctly with a precision of 91% and a recall of 78%.

***Very Good*** was the most misclassified with a precision of 62% and a recall of 37%

The produced heatmap of the norm of the data shows that 40% (32+8) of the time ***Premium*** was confused with ***Very Good***.

A screenshot of a color chart

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## Naïve Bayes

Accuracy: 59%

***Ideal*** was the classified the most correctly with a precision of 69% and a recall of 87%

***Good*** was the most misclassified with a precision of 39% and a recall of 20%.

***Fair***  was most commonly confused with ***Good*** 62% (55+7) of the time.

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## Linear SVM

The best overall performing model used a C of 10

Accuracy: 67%

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For a value of C = 10

***Ideal*** was best matched with a precision of 71% and a recall of 91%.

***Good*** was the worst matched with a precision of 55% but a recall of only 5%.

***Very Good*** and ***Ideal*** were confused 47% (40+7) of the time.

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## Poly SVM

The best overall performing model used a degree of 3. C was not evaluated here due to time constraints.

Accuracy: 64%

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The best model used a degree of 3

***Ideal*** was the best matched with a precision of 62% and a recall of 96%.

***Very Good*** was the worst matched with a precision of 49% and a recall of 21%

***Ideal*** and ***Very Good*** were confused 59% (58+1) of the time.

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## Radial SVM

The best performing model used a C of 10,000. We could have gone larger but the time necessary to run these models.

Accuracy: 79%

A graph with a line

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Using C = 10,000

***Ideal*** was best matched with a precision of 82% and a recall of 92%

***Very Good*** was worst matched with a precision of 66% and a recall of 62%

***Premium*** and ***Very Good*** were most confused at 19% (10+9).

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## Conclusion

The Radial model provided the highest overall accuracy of 79% as well as the lowest inter-class confusion of 19%, this would be the model chosen.