Capstone Project

Accident Severity Predictor

Predicting Accident Severity

- This is valuable to several stakeholders.
- Drivers can use this information to understand how their driving can contribute to an increased accident severity risk.
- Emergency services can allocate resources based on when they are more likely to be needed.
- Insurance companies can tailor insurance using the predictors.

Data: Information and Cleansing

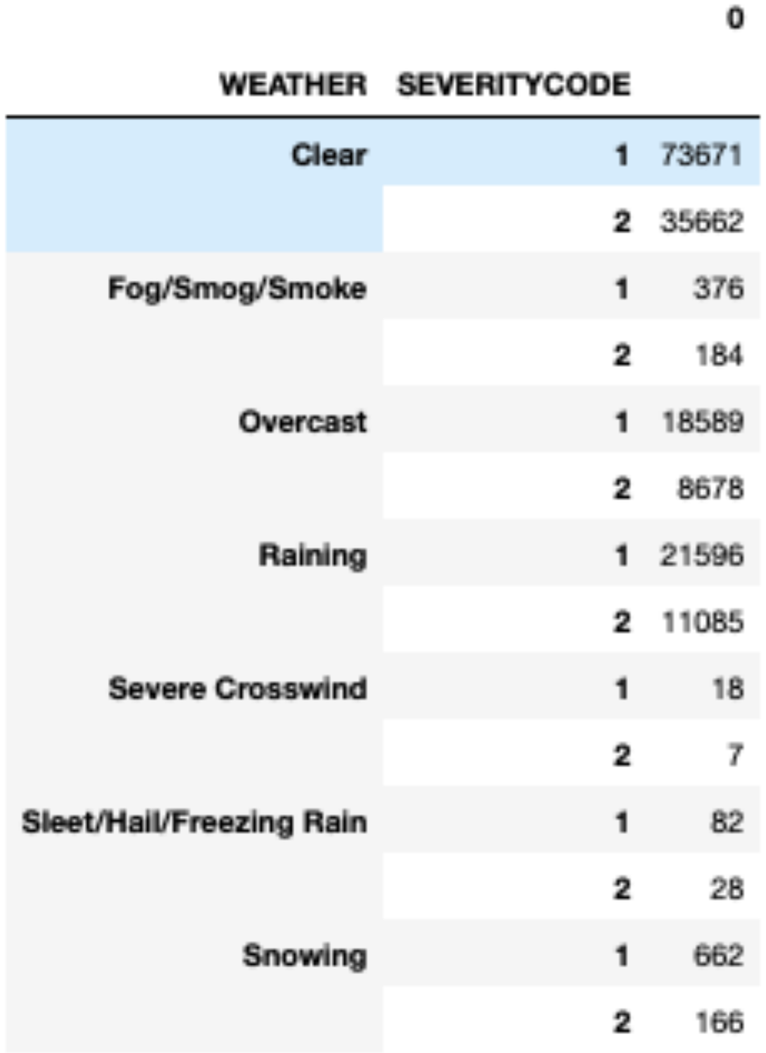
- The data is Seattle traffic accidents from 2004 onwards. The raw dataset had 38 features and slightly over 194,000 rows.
- Many rows have incomplete data as a result the data was unbalance.
- Rows containing null values were removed and categorical data were encoder into numerical values.
- 5 features were selected for the model:
  - Weather
  - Light Condition
  - Speeding
  - Collision Type
  - Vehicle Count

Exploratory Analysis

- Following slides present some exploratory analysis conducted on the data.

- Data was grouped by different features.

Weather Conditions



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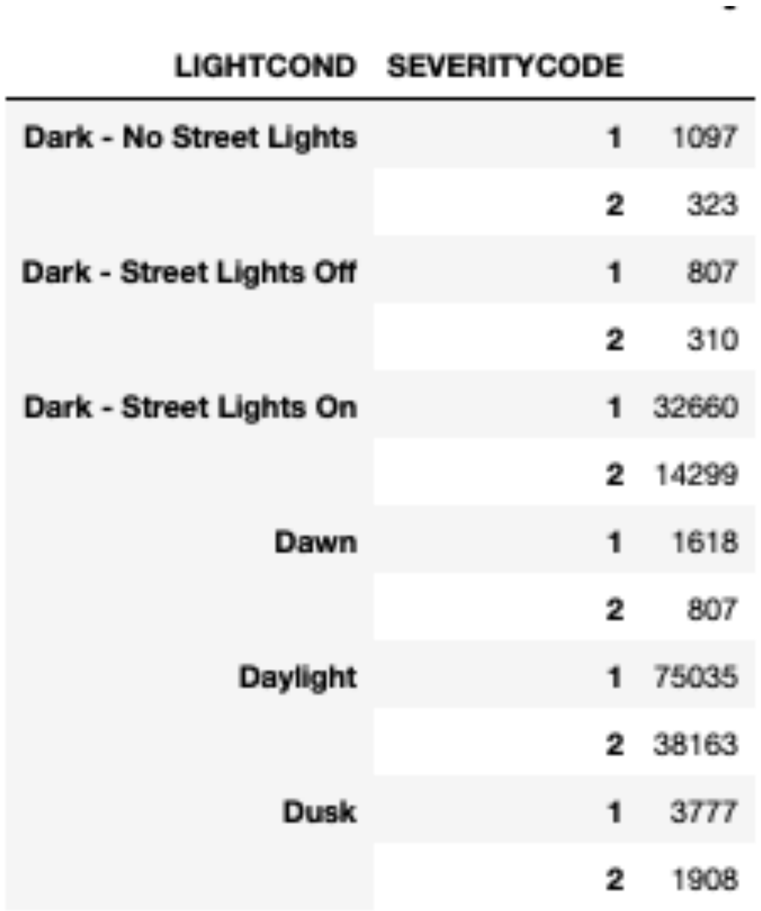
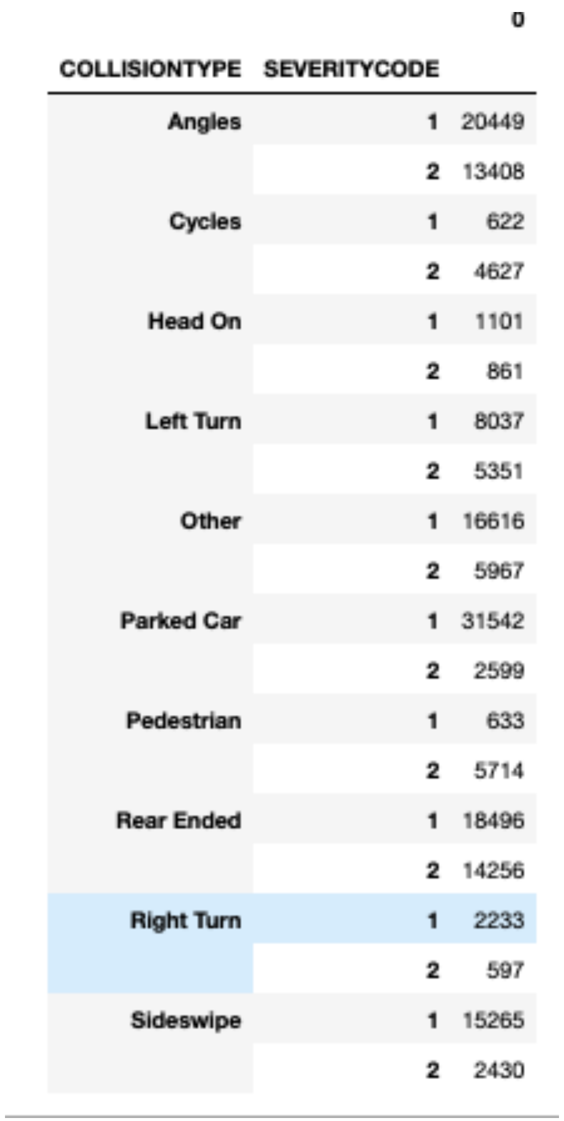
WEATHER	SEVERITYCODE	
Clear	1	73671
	2	35662
Fog/Smog/Smoke	1	376
	2	184
Overcast	1	18589
	2	8678
Raining	1	21596
	2	11085
Severe Crosswind	1	18
	2	7
Sleet/Hail/Freezing Rain	1	82
	2	28
Snowing	1	662
	2	166

Light Conditions



LIGHTCOND	SEVERITYCODE	
Dark - No Street Lights	1	1097
	2	323
Dark - Street Lights Off	1	807
	2	310
Dark - Street Lights On	1	32660
	2	14299
Dawn	1	1618
	2	807
Daylight	1	75035
	2	38163
Dusk	1	3777
	2	1908



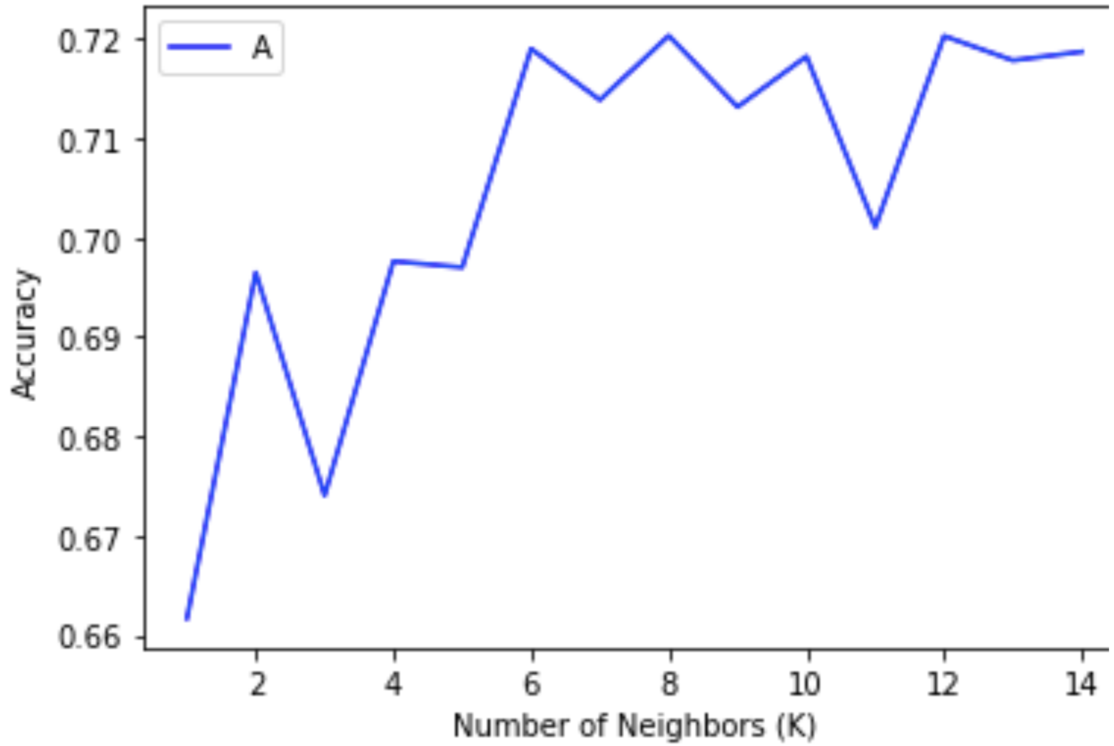
		0
COLLISIONTYPE	SEVERITYCODE	
Angles	1	20449
	2	13408
Cycles	1	622
	2	4627
Head On	1	1101
	2	861
Left Turn	1	8037
	2	5351
Other	1	16616
	2	5967
Parked Car	1	31542
	2	2599
Pedestrian	1	633
	2	5714
Rear Ended	1	18496
	2	14256
Right Turn	1	2233
	2	597
Sideswipe	1	15265
	2	2430

Collision Type

Classification Models

- Due to the nature of the data, Severity was either property damage or injury.
- Classification models were used.
- KNN, Decision Tree, SVM and logistic Regression were built to determine which would be the most accurate.

KNN



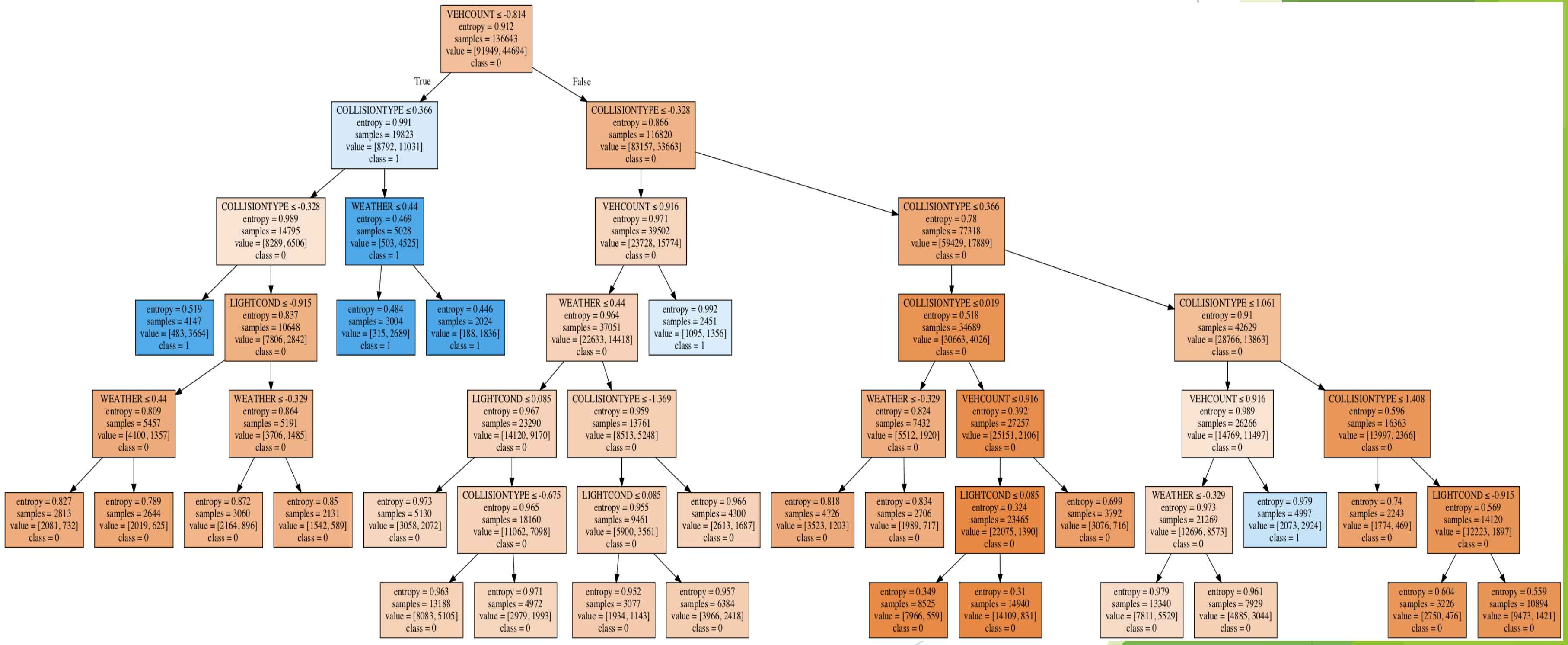
- Most Accurate K value was 8.
- This produced an accuracy of 0.72.

Decision Tree

- Decision Tree was most accurate when max depth was 6. The accuracy scores were one of the highest tested.

- Although decision tree can become large when using large dataset.

- For those not familiar with decision trees this could be difficult to interpret.



SVM and Logistic Regression

- SVM had issues fitting the whole training set. Time to process this was too long. Smaller sample had to be used as a result.

- Logistic Regression – Accuracy scores were lower than other models.
- Probability for datapoints class was predicted.
- Mode probability – 0.58 & 0.42

Model Evaluation Comparison

Model	Jaccard Score	F1-Score	Log-Loss
KNN	0.67	0.69	N/A
Decision Tree	0.71	0.78	N/A
SVM	0.71*	0.78*	N/A
Logistic Regression	0.68	0.55	0.62

* Small dataset was used to train model

Conclusions + Recommendations

- Several Models have been built that can predict the severity of an accident.
- Decision Tree is recommended as this was most accurate.

- Future Recommendations:
- Using target that has more classes for severity. This could be fatalities, serious injury, minor injury ect.
- Accuracy of models could be improved.
- Using data from other cities. Comparing different cities could provide a different angle of insight.