SAFE ROAD PROJECT 2024

Submitted by:

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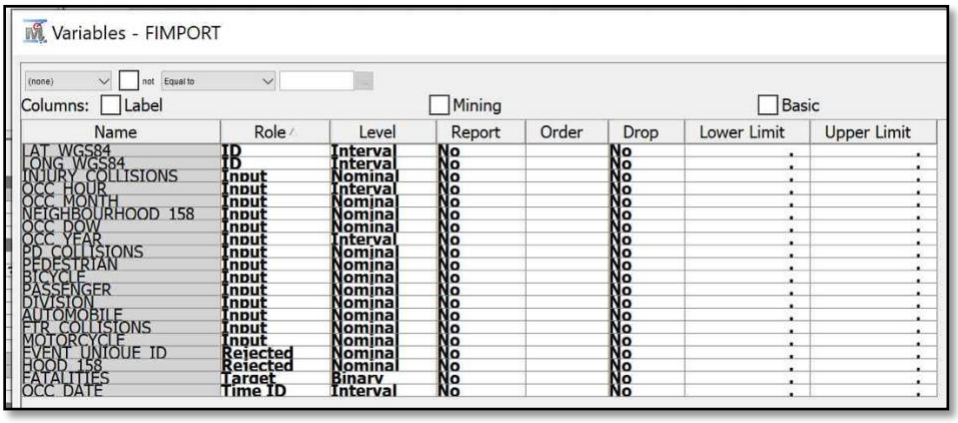
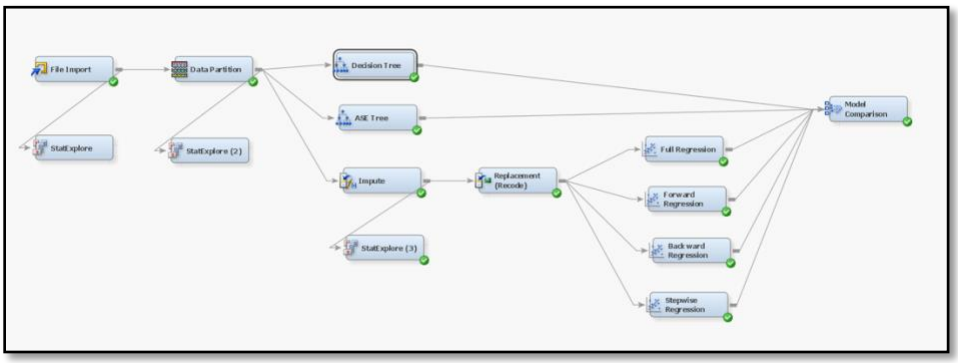
SAS Miner Modeling

File Import



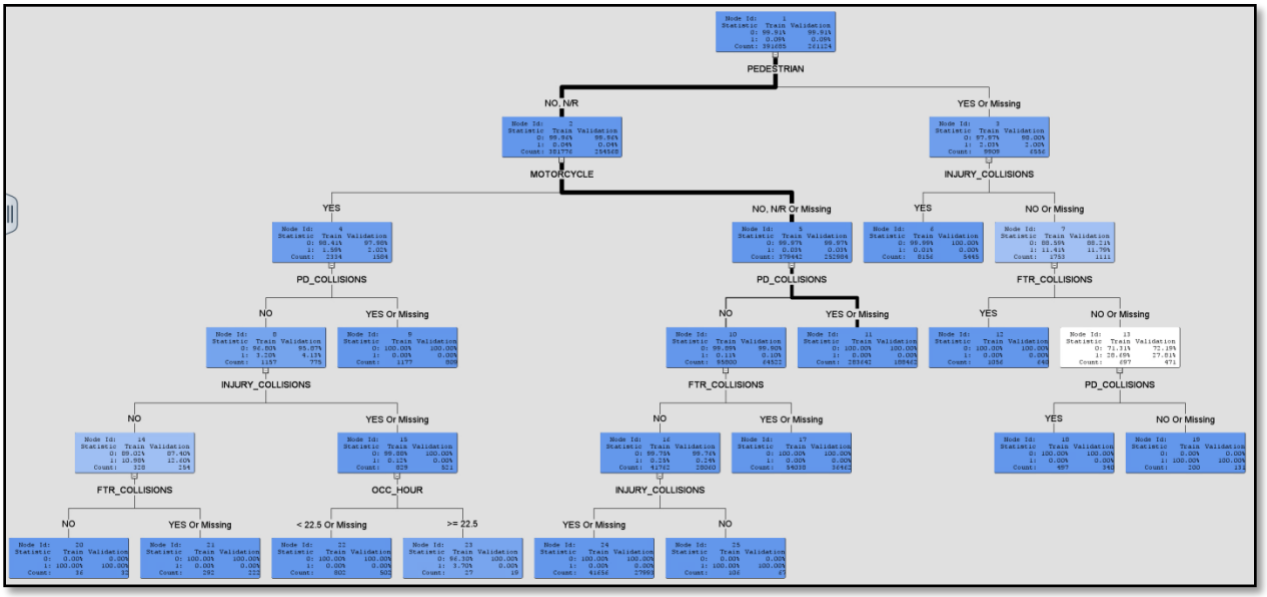
Name	Role	Level	Report	Order	Drop	Lower Limit	Upper Limit
LAT_WGS84	ID	Interval	No		No		
LONG_WGS84	ID	Interval	No		No		
INJURY_COLLISIONS	Input	Nominal	No		No		
OCC_HOUR	Input	Interval	No		No		
OCC_MONTH	Input	Nominal	No		No		
NEIGHBOURHOOD_158	Input	Nominal	No		No		
OCC_DOW	Input	Nominal	No		No		
OCC_YEAR	Input	Interval	No		No		
PD_COLLISIONS	Input	Nominal	No		No		
PEDESTRIAN	Input	Nominal	No		No		
BICYCLE	Input	Nominal	No		No		
PASSENGER	Input	Nominal	No		No		
DIVISION	Input	Nominal	No		No		
AUTOMOBILE	Input	Nominal	No		No		
FTR_COLLISIONS	Input	Nominal	No		No		
MOTORCYCLE	Input	Nominal	No		No		
EVENT_UNIQUE_ID	Rejected	Nominal	No		No		
HOOD_158	Rejected	Nominal	No		No		
FATALITIES	Target	Binary	No		No		
OCC_DATE	Time ID	Interval	No		No		

Modelling

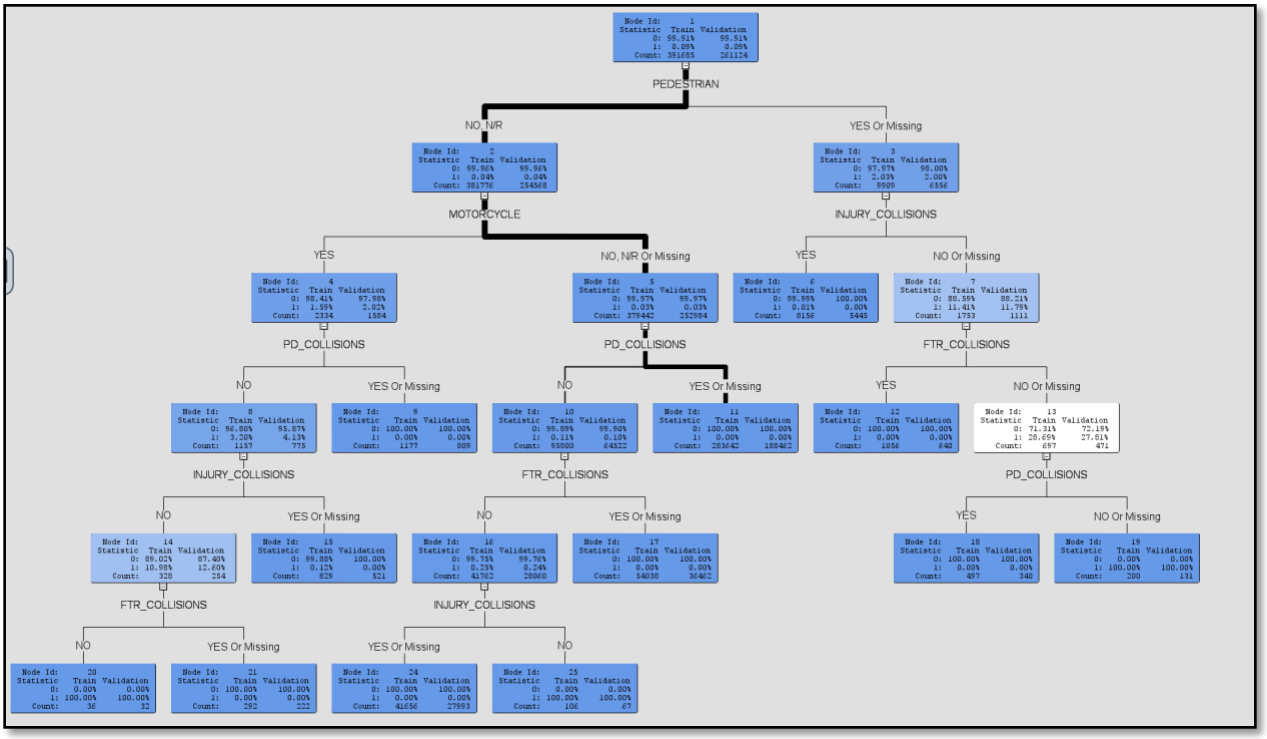


Trees

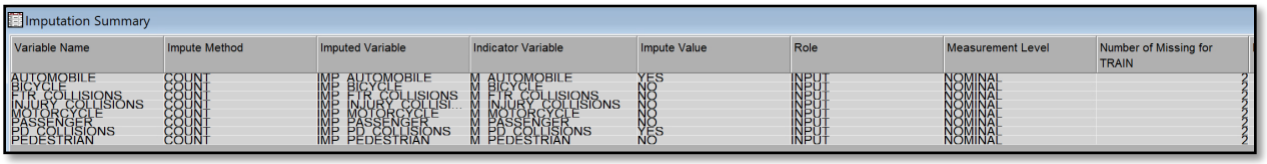
- Decision Tree



- ASE Tree

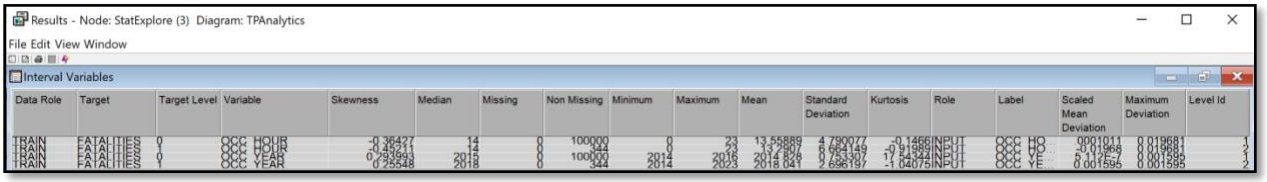


Imputation



Imputation Summary

Variable Name	Impute Method	Imputed Variable	Indicator Variable	Impute Value	Role	Measurement Level	Number of Missing for TRAIN
AUTOMOBILE	COUNT	IMP_AUTOMOBILE	M_AUTOMOBILE	YES	INPUT	NOMINAL	2
BICYCLE	COUNT	IMP_BICYCLE	M_BICYCLE	NO	INPUT	NOMINAL	2
FTR_COLLISIONS	COUNT	IMP_FTR_COLLISIONS	M_FTR_COLLISIONS	NO	INPUT	NOMINAL	2
INJURY_COLLISIONS	COUNT	IMP_INJURY_COLLISI	M_INJURY_COLLISIONS	NO	INPUT	NOMINAL	2
MOTORCYCLE	COUNT	IMP_MOTORCYCLE	M_MOTORCYCLE	NO	INPUT	NOMINAL	2
PASSENGER	COUNT	IMP_PASSENGER	M_PASSENGER	NO	INPUT	NOMINAL	2
PD_COLLISIONS	COUNT	IMP_PD_COLLISIONS	M_PD_COLLISIONS	YES	INPUT	NOMINAL	2
PEDESTRIAN	COUNT	IMP_PEDESTRIAN	M_PEDESTRIAN	NO	INPUT	NOMINAL	2



Results - Node: StatExplore (3) Diagram: TPAnalytics

File Edit View Window

Interval Variables

Data Role	Target	Target Level	Variable	Skewness	Median	Missing	Non Missing	Minimum	Maximum	Mean	Standard Deviation	Kurtosis	Role	Label	Scaled Mean Deviation	Maximum Deviation	Level Id
TRAIN	FATALITIES	0	OCC_HOUR	-0.36427	14	0	100000	0	23	13.55889	4.790077	-0.1466	INPUT	OCC_HO	.0001011	0.019681	1
TRAIN	FATALITIES	0	OCC_HOUR	-0.45211	14	0	344	0	23	13.2907	6.664149	-0.91989	INPUT	OCC_HO	-0.01968	0.019681	1
TRAIN	FATALITIES	0	OCC_YEAR	0.793993	2015	0	100000	2014	2016	2014.828	0.753307	17.54344	INPUT	OCC_YE	5.112E-7	0.001595	1
TRAIN	FATALITIES	1	OCC_YEAR	0.25548	2018	0	344	2014	2023	2018.041	2.696197	-1.04075	INPUT	OCC_YE	0.001595	0.001595	2

Replacement

Replacement Editor-WORK.OUTCLASS

Variable	Formatted Value	Replacement Value	Frequency Count	Type	Character Unformatted Value	Numeric Value
DIVISION	East Field		194963	C	East Field	.
DIVISION	West Field		141003	C	West Field	.
DIVISION	NSA		55719	C	NSA	.
DIVISION	_UNKNOWN_	**_DEFAULT_**	.	C		.
FATALITIES	0		391341	N		
FATALITIES	1		344	N		
FATALITIES	_UNKNOWN_	**_DEFAULT_**	.	N		.
IMP_AUTOMOBILE	YES		386328	C	YES	.
IMP_AUTOMOBILE	N/R		3617	C	N/R	.
IMP_AUTOMOBILE	NO		1740	C	NO	.
IMP_AUTOMOBILE	_UNKNOWN_	**_DEFAULT_**	.	C		.
IMP_BICYCLE	NO		382009	C	NO	.
IMP_BICYCLE	YES		6059	C	YES	.
IMP_BICYCLE	N/R		3617	C	N/R	.
IMP_BICYCLE	_UNKNOWN_	**_DEFAULT_**	.	C		.
IMP_FTR_COLLISIONS	NO		327768	C	NO	.
IMP_FTR_COLLISIONS	YES		63917	C	YES	.
IMP_FTR_COLLISIONS	_UNKNOWN_	**_DEFAULT_**	.	C		.
IMP_INJURY_COLLISIONS	NO		339769	C	NO	.
IMP_INJURY_COLLISIONS	YES		51916	C	YES	.
IMP_INJURY_COLLISIONS	_UNKNOWN_	**_DEFAULT_**	.	C		.
IMP_MOTORCYCLE	NO		385711	C	NO	.
IMP_MOTORCYCLE	N/R		3617	C	N/R	.
IMP_MOTORCYCLE	YES		2357	C	YES	.
IMP_MOTORCYCLE	_UNKNOWN_	**_DEFAULT_**	.	C		.
IMP_PASSENGER	NO		357960	C	NO	.
IMP_PASSENGER	YES		30108	C	YES	.
IMP_PASSENGER	N/R		3617	C	N/R	.
IMP_PASSENGER	_UNKNOWN_	**_DEFAULT_**	.	C		.
IMP_PD_COLLISIONS	YES		285383	C	YES	.
IMP_PD_COLLISIONS	NO		106302	C	NO	.
IMP_PD_COLLISIONS	_UNKNOWN_	**_DEFAULT_**	.	C		.
IMP_PEDESTRIAN	NO		378161	C	NO	.
IMP_PEDESTRIAN	YES		9907	C	YES	.
IMP_PEDESTRIAN	N/R		3617	C	N/R	.
IMP_PEDESTRIAN	_UNKNOWN_	**_DEFAULT_**	.	C		.
M_AUTOMOBILE	0		391683	N		
M_AUTOMOBILE	1		2	N		
M_AUTOMOBILE	_UNKNOWN_	**_DEFAULT_**	.	N		.
M_BICYCLE	0		391683	N		
M_BICYCLE	1		2	N		
M_BICYCLE	_UNKNOWN_	**_DEFAULT_**	.	N		.
M_FTR_COLLISIONS	0		391683	N		
M_FTR_COLLISIONS	1		2	N		
M_FTR_COLLISIONS	_UNKNOWN_	**_DEFAULT_**	.	N		.
M_INJURY_COLLISIONS	0		391683	N		
M_INJURY_COLLISIONS	1		2	N		
M_INJURY_COLLISIONS	_UNKNOWN_	**_DEFAULT_**	.	N		.
M_MOTORCYCLE	0		391683	N		
M_MOTORCYCLE	1		2	N		
M_MOTORCYCLE	_UNKNOWN_	**_DEFAULT_**	.	N		.
M_PASSENGER	0		391683	N		
M_PASSENGER	1		2	N		
M_PASSENGER	_UNKNOWN_	**_DEFAULT_**	.	N		.
M_PD_COLLISIONS	0		391683	N		
M_PD_COLLISIONS	1		2	N		
M_PD_COLLISIONS	_UNKNOWN_	**_DEFAULT_**	.	N		.
M_PEDESTRIAN	0		391683	N		
M_PEDESTRIAN	1		2	N		
M_PEDESTRIAN	_UNKNOWN_	**_DEFAULT_**	.	N		.
NEIGHBOURHOOD_158	Old city of Toronto		105502	C	Old city of Toronto	.
NEIGHBOURHOOD_158	North York		83756	C	North York	.
NEIGHBOURHOOD_158	Scarborough		80233	C	Scarborough	.
NEIGHBOURHOOD_158	NSA		60979	C	NSA	.
NEIGHBOURHOOD_158	Etobicoke		39517	C	Etobicoke	.
NEIGHBOURHOOD_158	York		11590	C	York	.
NEIGHBOURHOOD_158	East York		10108	C	East York	.
NEIGHBOURHOOD_158	_UNKNOWN_	**_DEFAULT_**	.	C		.
OCC_DOW	Friday		65240	C	Friday	.
OCC_DOW	Thursday		62226	C	Thursday	.
OCC_DOW	Wednesday		60537	C	Wednesday	.
OCC_DOW	Tuesday		60119	C	Tuesday	.
OCC_DOW	Monday		52990	C	Monday	.
OCC_DOW	Saturday		50779	C	Saturday	.
OCC_DOW	Sunday		39794	C	Sunday	.
OCC_DOW	_UNKNOWN_	**_DEFAULT_**	.	C		.
OCC_MONTH	Novembe		35726	C	Novembe	.
OCC_MONTH	October		35216	C	October	.
OCC_MONTH	Decembe		34711	C	Decembe	.
OCC_MONTH	Septemb		33864	C	Septemb	.
OCC_MONTH	June		33297	C	June	.
OCC_MONTH	January		33289	C	January	.
OCC_MONTH	July		32328	C	July	.
OCC_MONTH	Februar		32313	C	Februar	.
OCC_MONTH	August		32225	C	August	.
OCC_MONTH	May		31574	C	May	.
OCC_MONTH	March		29988	C	March	.
OCC_MONTH	April		27154	C	April	.
OCC_MONTH	_UNKNOWN_	**_DEFAULT_**	.	C		.

Regression

- Full

Analysis of Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Standardized Estimate	Exp(Est)
Intercept		1	-247.1	1242.8	0.04	0.8424		0.000
DIVISION	East Field	1	-0.2964	0.9181	0.10	0.7468		0.743
DIVISION	NSA	1	0.7381	.	.	.	.	2.092
IMP_AUTOMOBILE	N/R	1	25.2492	.	.	.	.	999.000
IMP_AUTOMOBILE	NO	1	-26.2146	.	.	.	.	0.000
IMP_BICYCLE	N/R	1	2.0820	3579.4	0.00	0.9995		8.021
IMP_BICYCLE	NO	0	0	.	.	.	.	.
IMP_FTR_COLLISIONS	NO	1	54.8219	.	.	.	.	999.000
IMP_INJURY_COLLISIONS	NO	1	47.8777	374.7	0.02	0.8983		999.000
IMP_MOTORCYCLE	N/R	1	-17.4707	602.4	0.00	0.9769		0.000
IMP_MOTORCYCLE	NO	0	0	.	.	.	.	.
IMP_PASSENGER	N/R	1	13.6823	1064.3	0.00	0.9897		999.000
IMP_PASSENGER	NO	0	0	.	.	.	.	.
IMP_PD_COLLISIONS	NO	1	55.4160	.	.	.	.	999.000
IMP_PEDESTRIAN	N/R	1	-13.9243	602.4	0.00	0.9816		0.000
IMP_PEDESTRIAN	NO	0	0	.	.	.	.	.
M_AUTOMOBILE	0	1	-41.6844	.	.	.	.	0.000
M_BICYCLE	0	0	0	.	.	.	.	.
M_FTR_COLLISIONS	0	0	0	.	.	.	.	.
M_INJURY_COLLISIONS	0	0	0	.	.	.	.	.
M_MOTORCYCLE	0	0	0	.	.	.	.	.
M_PASSENGER	0	0	0	.	.	.	.	.
M_PD_COLLISIONS	0	0	0	.	.	.	.	.
M_PEDESTRIAN	0	0	0	.	.	.	.	.
NEIGHBOURHOOD_158	East York	1	-3.4465	3202.6	0.00	0.9991		0.032
NEIGHBOURHOOD_158	Etobicoke	1	-3.4722	1454.1	0.00	0.9981		0.031
NEIGHBOURHOOD_158	NSA	1	-4.5383	1912.0	0.00	0.9981		0.011
NEIGHBOURHOOD_158	North York	1	10.2446	801.5	0.00	0.9898		999.000
NEIGHBOURHOOD_158	Old city of Toronto	1	9.7723	801.5	0.00	0.9903		999.000
NEIGHBOURHOOD_158	Scarborough	1	-3.6120	1235.8	0.00	0.9977		0.027
OCC_DOW	Friday	1	10.5358	417.7	0.00	0.9799		999.000
OCC_DOW	Monday	1	-4.9671	.	.	.	.	0.007
OCC_DOW	Saturday	1	-3.9491	835.4	0.00	0.9962		0.019
OCC_DOW	Sunday	1	-3.2610	.	.	.	.	0.038
OCC_DOW	Thursday	1	-4.5133	.	.	.	.	0.011
OCC_DOW	Tuesday	1	-4.2307	.	.	.	.	0.015
OCC_HOUR		1	0.0849	0.1683	0.25	0.6141	0.2321	1.089
OCC_MONTH	April	1	-2.2657	.	.	.	.	0.104
OCC_MONTH	August	1	-2.6840	.	.	.	.	0.068
OCC_MONTH	Decembe	1	-2.1948	.	.	.	.	0.111
OCC_MONTH	Februar	1	13.9481	479.7	0.00	0.9768		999.000
OCC_MONTH	January	1	-2.5409	.	.	.	.	0.079
OCC_MONTH	July	1	-2.9393	959.4	0.00	0.9976		0.053
OCC_MONTH	June	1	-3.1650	.	.	.	.	0.042
OCC_MONTH	March	1	-2.6459	.	.	.	.	0.071
OCC_MONTH	May	1	-2.8312	.	.	.	.	0.059
OCC_MONTH	Novembe	1	-2.5358	.	.	.	.	0.079
OCC_MONTH	October	1	-2.9395	.	.	.	.	0.053
OCC_YEAR		1	0.0850	0.2501	0.12	0.7340	0.1322	1.089

Odds Ratio Estimates

Effect		Point Estimate
DIVISION	East Field vs West Field	1.156
DIVISION	NSA vs West Field	3.254
IMP_AUTOMOBILE	N/R vs YES	999.000
IMP_AUTOMOBILE	NO vs YES	<0.001
IMP_BICYCLE	N/R vs YES	64.331
IMP_BICYCLE	NO vs YES	.
IMP_FTR_COLLISIONS	NO vs YES	999.000
IMP_INJURY_COLLISIONS	NO vs YES	999.000
IMP_MOTORCYCLE	N/R vs YES	<0.001
IMP_MOTORCYCLE	NO vs YES	.
IMP_PASSENGER	N/R vs YES	999.000
IMP_PASSENGER	NO vs YES	.
IMP_PD_COLLISIONS	NO vs YES	999.000
IMP_PEDESTRIAN	N/R vs YES	<0.001
IMP_PEDESTRIAN	NO vs YES	.
M_AUTOMOBILE	0 vs 1	<0.001
M_BICYCLE	0 vs 1	.
M_FTR_COLLISIONS	0 vs 1	.
M_INJURY_COLLISIONS	0 vs 1	.
M_MOTORCYCLE	0 vs 1	.
M_PASSENGER	0 vs 1	.
M_PD_COLLISIONS	0 vs 1	.
M_PEDESTRIAN	0 vs 1	.
NEIGHBOURHOOD_158	East York vs York	4.487
NEIGHBOURHOOD_158	Etobicoke vs York	4.374
NEIGHBOURHOOD_158	NSA vs York	1.506
NEIGHBOURHOOD_158	North York vs York	999.000
NEIGHBOURHOOD_158	Old city of Toronto vs York	999.000
NEIGHBOURHOOD_158	Scarborough vs York	3.803
OCC_DOW	Friday vs Wednesday	1.162
OCC_DOW	Monday vs Wednesday	<0.001
OCC_DOW	Saturday vs Wednesday	<0.001
OCC_DOW	Sunday vs Wednesday	<0.001
OCC_DOW	Thursday vs Wednesday	<0.001
OCC_DOW	Tuesday vs Wednesday	<0.001
OCC_HOUR		1.089
OCC_MONTH	April vs Septemb	<0.001
OCC_MONTH	August vs Septemb	<0.001
OCC_MONTH	Decembe vs Septemb	<0.001
OCC_MONTH	Februar vs Septemb	3.172
OCC_MONTH	January vs Septemb	<0.001
OCC_MONTH	July vs Septemb	<0.001
OCC_MONTH	June vs Septemb	<0.001
OCC_MONTH	March vs Septemb	<0.001
OCC_MONTH	May vs Septemb	<0.001
OCC_MONTH	Novembe vs Septemb	<0.001
OCC_MONTH	October vs Septemb	<0.001
OCC_YEAR		1.089

- Forward

Analysis of Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Standardized Estimate	Exp(Est)
Intercept		1	-19.0832	417.8	0.00	0.9636		0.000
IMP_FTR_COLLISIONS	NO	1	20.6785	360.9	0.00	0.9543		999.000
IMP_INJURY_COLLISIONS	NO	1	14.7466	284.2	0.00	0.9586		999.000
IMP_MOTORCYCLE	N/R	1	-5.5509	.	.	.	.	0.004
IMP_MOTORCYCLE	NO	1	0.2364	0.8253	0.08	0.7746		1.267
IMP_PD_COLLISIONS	NO	1	21.3169	353.6	0.00	0.9519		999.000
IMP_PEDESTRIAN	N/R	1	-2.8634	1.6506	3.01	0.0828		0.057
IMP_PEDESTRIAN	NO	0	0	.	.	.	.	.
M_AUTOMOBILE	0	1	-20.4442	.	.	.	.	0.000

Odds Ratio Estimates

Effect		Point Estimate
IMP_FTR_COLLISIONS	NO vs YES	999.000
IMP_INJURY_COLLISIONS	NO vs YES	999.000
IMP_MOTORCYCLE	N/R vs YES	<0.001
IMP_MOTORCYCLE	NO vs YES	0.006
IMP_PD_COLLISIONS	NO vs YES	999.000
IMP_PEDESTRIAN	N/R vs YES	0.003
IMP_PEDESTRIAN	NO vs YES	.
M_AUTOMOBILE	0 vs 1	<0.001

NOTE: No (additional) effects met the 0.05 significance level for entry into the model.

Summary of Forward Selection

Step	Effect Entered	DF	Number In	Score Chi-Square	Pr > ChiSq	Validation Error Rate
1	IMP_PEDESTRIAN	2	1	4274.4326	<.0001	3051.2
2	M_AUTOMOBILE	1	2	5214.0427	<.0001	3019.8
3	IMP_MOTORCYCLE	1	3	1067.3311	<.0001	2846.8
4	IMP_INJURY_COLLISIONS	1	4	744.0577	<.0001	2331.8
5	IMP_PD_COLLISIONS	1	5	565.2369	<.0001	1869.3
6	IMP_FTR_COLLISIONS	1	6	3534.7730	<.0001	2.6751

- Backward

Analysis of Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Standardized Estimate	Exp(Est)
Intercept		1	105.9	44.2813	5.72	0.0168		999.000
IMP_INJURY_COLLISIONS	NO	1	4.1805	0.3617	133.55	<.0001		65.396
IMP_MOTORCYCLE	N/R	1	-1.2702	35.0666	0.00	0.9711		0.281
IMP_MOTORCYCLE	NO	1	-1.4786	17.5337	0.01	0.9328		0.228
IMP_PASSENGER	N/R	1	-3.4702	0.1709	412.28	<.0001		0.031
IMP_PASSENGER	NO	0	0	.	.	.	.	.
IMP_PD_COLLISIONS	NO	1	3.1737	0.3566	79.21	<.0001		23.896
IMP_PEDESTRIAN	N/R	1	-4.8482	0.1414	1175.10	<.0001		0.008
IMP_PEDESTRIAN	NO	0	0	.	.	.	.	.
NEIGHBOURHOOD_158	East York	1	0.3944	0.3085	1.63	0.2011		1.484
NEIGHBOURHOOD_158	Etobicoke	1	0.5388	0.1596	11.40	0.0007		1.714
NEIGHBOURHOOD_158	NSA	1	-1.3234	0.2809	22.20	<.0001		0.266
NEIGHBOURHOOD_158	North York	1	0.1643	0.1415	1.35	0.2455		1.179
NEIGHBOURHOOD_158	Old city of Toronto	1	-0.2118	0.1357	2.44	0.1185		0.809
NEIGHBOURHOOD_158	Scarborough	1	0.3637	0.1332	7.46	0.0063		1.439
OCC_HOUR		1	-0.0232	0.0102	5.19	0.0227	-0.0635	0.977
OCC_YEAR		1	-0.0586	0.0202	8.44	0.0037	-0.0911	0.943

Odds Ratio Estimates

Effect		Point Estimate
IMP_INJURY_COLLISIONS	NO vs YES	999.000
IMP_MOTORCYCLE	N/R vs YES	0.018
IMP_MOTORCYCLE	NO vs YES	0.015
IMP_PASSENGER	N/R vs YES	<0.001
IMP_PASSENGER	NO vs YES	.
IMP_PD_COLLISIONS	NO vs YES	571.034
IMP_PEDESTRIAN	N/R vs YES	<0.001
IMP_PEDESTRIAN	NO vs YES	.
NEIGHBOURHOOD_158	East York vs York	1.378
NEIGHBOURHOOD_158	Etobicoke vs York	1.592
NEIGHBOURHOOD_158	NSA vs York	0.247
NEIGHBOURHOOD_158	North York vs York	1.095
NEIGHBOURHOOD_158	Old city of Toronto vs York	0.751
NEIGHBOURHOOD_158	Scarborough vs York	1.336
OCC_HOUR		0.977
OCC_YEAR		0.943

NOTE: No (additional) effects met the 0.05 significance level for removal from the model.

Summary of Backward Elimination

Step	Effect Removed	DF	Number In	Wald Chi-Square	Pr > ChiSq	Validation Error Rate
1	IMP_FTR_COLLISIONS	1	13	0.0000	1.0000	1574.7
2	M_AUTOMOBILE	1	12	0.0000	1.0000	1627.9
3	DIVISION	2	11	0.0633	0.9688	1645.8
4	OCC_DOW	6	10	6.1493	0.4067	1643.5
5	OCC_MONTH	11	9	12.0071	0.3631	1638.1
6	IMP_BICYCLE	1	8	0.9906	0.3196	1655.3

- Stepwise

Analysis of Maximum Likelihood Estimates

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Standardized Estimate	Exp(Est)
Intercept		1	-8.8499	9.0507	0.96	0.3282		0.000
IMP_PEDESTRIAN	N/R	1	-5.9464	18.1013	0.11	0.7425		0.003
IMP_PEDESTRIAN	NO	1	0.9839	9.0508	0.01	0.9134		2.675

Odds Ratio Estimates

Effect		Point Estimate
IMP_PEDESTRIAN	N/R vs YES	<0.001
IMP_PEDESTRIAN	NO vs YES	0.019

NOTE: Model building terminates because the last effect entered is removed by the Wald test criterion.

Summary of Stepwise Selection

Step	Effect Entered	Effect Removed	DF	Number In	Score Chi-Square	Wald Chi-Square	Pr > ChiSq	Validation Error Rate
1	IMP_PEDESTRIAN		2	1	4274.4326		<.0001	3051.2
2	M_AUTOMOBILE		1	2	5214.0427		<.0001	3019.8
3		M_AUTOMOBILE	1	1		0.0835	0.7726	3051.2

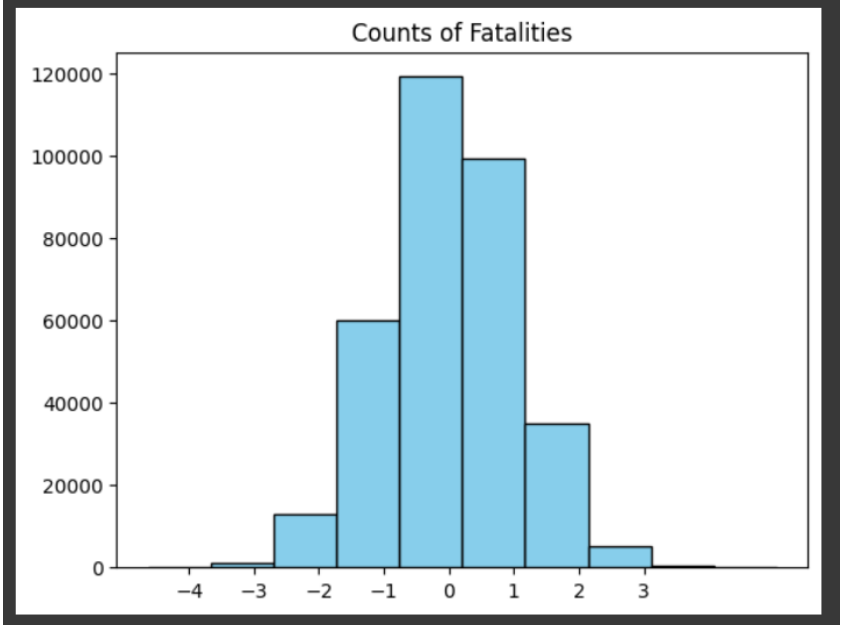
Model Comparison

Model Description	Target Variable	Valid: Average Squared Error ▲
ASE Tree	FATALITIES	3.217E-9
Forward Regression	FATALITIES	1.412E-8
Decision Tree	FATALITIES	1.001E-7
Full Regression	FATALITIES	9.565E-7
Backward Regression	FATALITIES	9.565E-7
Stepwise Regression	FATALITIES	.0008633

Data Exploration

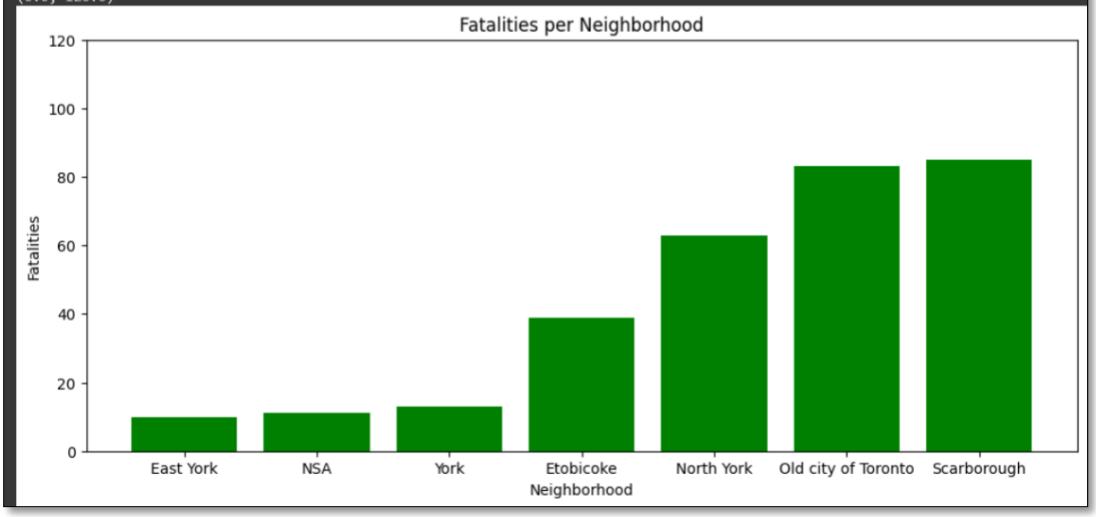
```
x = np.random.normal(safe['FATALITIES'])

plt.hist(x,bins=10, color='skyblue', edgecolor='black')
plt.title("Counts of Fatalities")
plt.xticks(range(-4, 4))
plt.show()
```



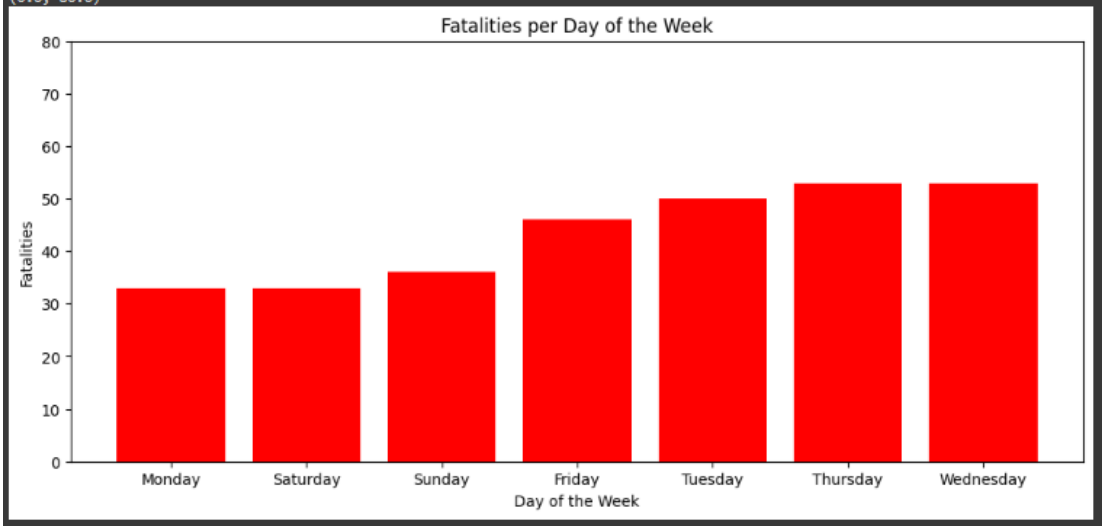
```
dataForPlot = safe.groupby('NEIGHBOURHOOD_158')['FATALITIES'].sum().sort_values(ascending=True)
fig, ax = plt.subplots(figsize=(12,5))
ax.bar(dataForPlot.index, dataForPlot,color='green')
ax.set_xlabel('Neighborhood') ; ax.set_ylabel('Fatalities')
ax.set_title('Fatalities per Neighborhood')
ax.set_ylim([0,120])
```

```
(0.0, 120.0)
```



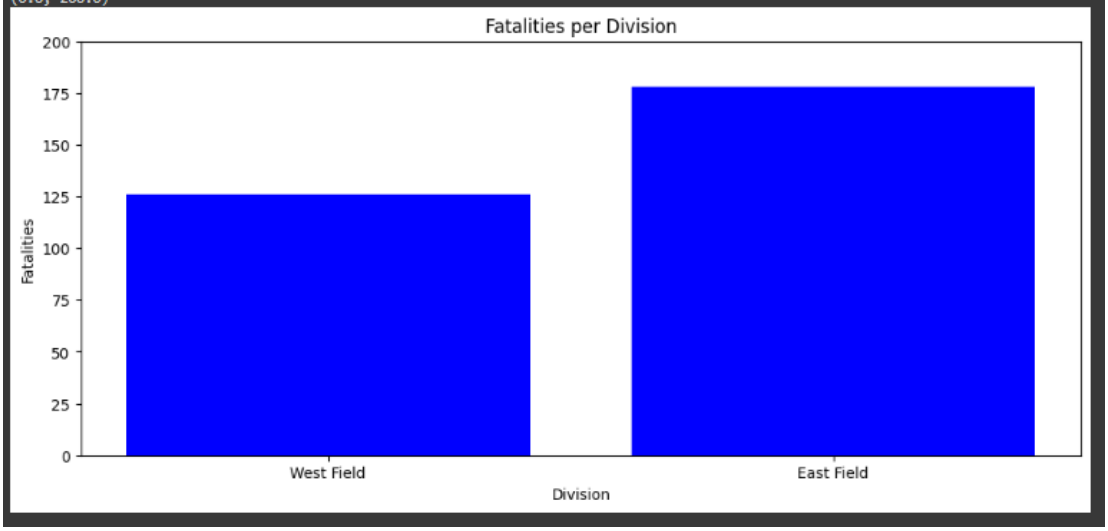

```
dataForPlt = df.groupby('OCC_DOW')['FATALITIES'].sum().sort_values(ascending=True)
fig, ax = plt.subplots(figsize=(12,5))
ax.bar(dataForPlt.index, dataForPlt, color=['red'])
ax.set_xlabel('Day of the Week') ; ax.set_ylabel('Fatalities')
ax.set_title('Fatalities per Day of the Week')
ax.set_ylim([0,80])
```

```
(0.0, 80.0)
```



```
dataForPt = df.groupby('DIVISION')['FATALITIES'].sum().sort_values(ascending=True)
fig, ax = plt.subplots(figsize=(12,5))
ax.bar(dataForPt.index, dataForPt, color=['blue'])
ax.set_xlabel('Division') ; ax.set_ylabel('Fatalities')
ax.set_title('Fatalities per Division')
ax.set_ylim([0,200])
```

```
(0.0, 200.0)
```



Descriptive Statistics

FATALITIES	Freq.	Percent	Cum.
0	652,235	99.91	99.91
1	568	0.09	100.00
2	4	0.00	100.00
3	2	0.00	100.00
Total	652,809	100.00	

INJURY_COLLISIONS	Freq.	Percent	Cum.
0	565,994	86.70	86.70
1	86,811	13.30	100.00
Total	652,805	100.00	

FTR_COLLISIONS	Freq.	Percent	Cum.
0	545,931	83.63	83.63
1	106,874	16.37	100.00
Total	652,805	100.00	

PD_COLLISIONS	Freq.	Percent	Cum.
0	177,772	27.23	27.23
1	475,033	72.77	100.00
Total	652,805	100.00	

AUTOMOBILE	Freq.	Percent	Cum.
N/R	6,073	0.93	0.93
NO	2,953	0.45	1.38
YES	643,779	98.62	100.00
Total	652,805	100.00	

MOTORCYCLE	Freq.	Percent	Cum.
N/R	6,073	0.93	0.93
NO	642,773	98.46	99.39
YES	3,959	0.61	100.00
Total	652,805	100.00	

PASSENGER	Freq.	Percent	Cum.
N/R	6,073	0.93	0.93
NO	596,619	91.39	92.32
YES	50,113	7.68	100.00
Total	652,805	100.00	

BICYCLE	Freq.	Percent	Cum.
N/R	6,073	0.93	0.93
NO	636,647	97.52	98.46
YES	10,085	1.54	100.00
Total	652,805	100.00	

PEDESTRIAN	Freq.	Percent	Cum.
N/R	6,073	0.93	0.93
NO	630,271	96.55	97.48
YES	16,461	2.52	100.00
Total	652,805	100.00	

	FATALITIES				
PEDESTRIAN	0	1	2	3	Total
N/R	6,073	0	0	0	6,073
NO	630,029	239	2	1	630,271
YES	16,133	325	2	1	16,461
Total	652,235	564	4	2	652,805

	FATALITIES				
OCC_YEAR	0	1	2	3	Total
2014	64,545	51	0	0	64,596
2015	67,200	65	0	0	67,265
2016	69,592	75	0	1	69,668
2017	74,132	61	1	0	74,194
2018	79,205	66	0	0	79,271
2019	82,768	62	1	0	82,831
2020	44,698	40	0	0	44,738
2021	43,684	56	2	0	43,742
2022	59,125	47	0	1	59,173
2023	67,286	45	0	0	67,331
Total	652,235	568	4	2	652,809

DIVISION	Freq.	Percent	Cum.
D11	23,577	3.61	3.61
D12	21,945	3.36	6.97
D13	20,754	3.18	10.15
D14	35,131	5.38	15.53
D22	34,931	5.35	20.88
D23	31,965	4.90	25.78
D31	34,123	5.23	31.01
D32	52,647	8.06	39.07
D33	43,258	6.63	45.70
D41	44,217	6.77	52.47
D42	52,189	7.99	60.47
D43	34,926	5.35	65.82
D51	24,208	3.71	69.53
D52	29,161	4.47	73.99
D53	36,584	5.60	79.60
D55	40,232	6.16	85.76
NSA	92,961	14.24	100.00
Total	652,809	100.00	