Predicting New Store Location

Part 1 – Cleaning the Data.

Business decisions.

Pawdacity is a leading pet store chain in Wyoming with 13 stores throughout the state. This year, Pawdacity would like to expand and open a 14th store. The aim of this project is to perform analysis to recommend the city for Pawdacity's newest store, based on predicted yearly sales.

What decisions need to be made?

There are three sets of data:

p2-2010-pawdacity-monthly-sales.csv,
p2-partially-parsed-wy-web-scrape.csv,
p2-wy-453910-naics-data.csv.

We need to work out what data from the above files will be necessary to predict where our next store should be.

What data is needed to inform those decisions?

We will need to extract the following columns of data from the above files:

City
2010 Census Population
Total Pawdacity Sales
Households with under 18
Land Area
Population Density
Total Families

The data from the above fields will later be used to create a prediction model for the new store location.

The Dataset.

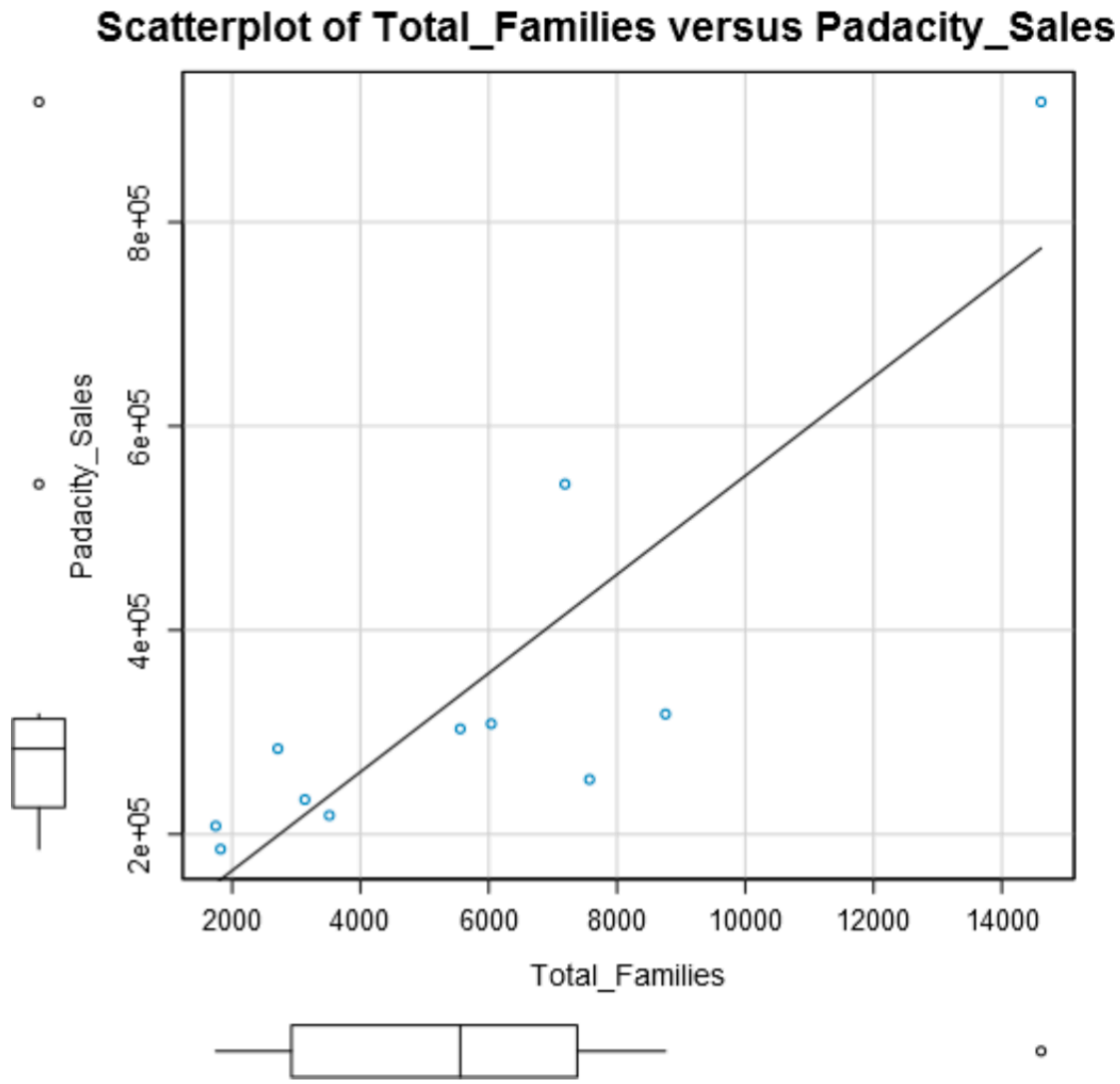
The below is a summary of the dataset.

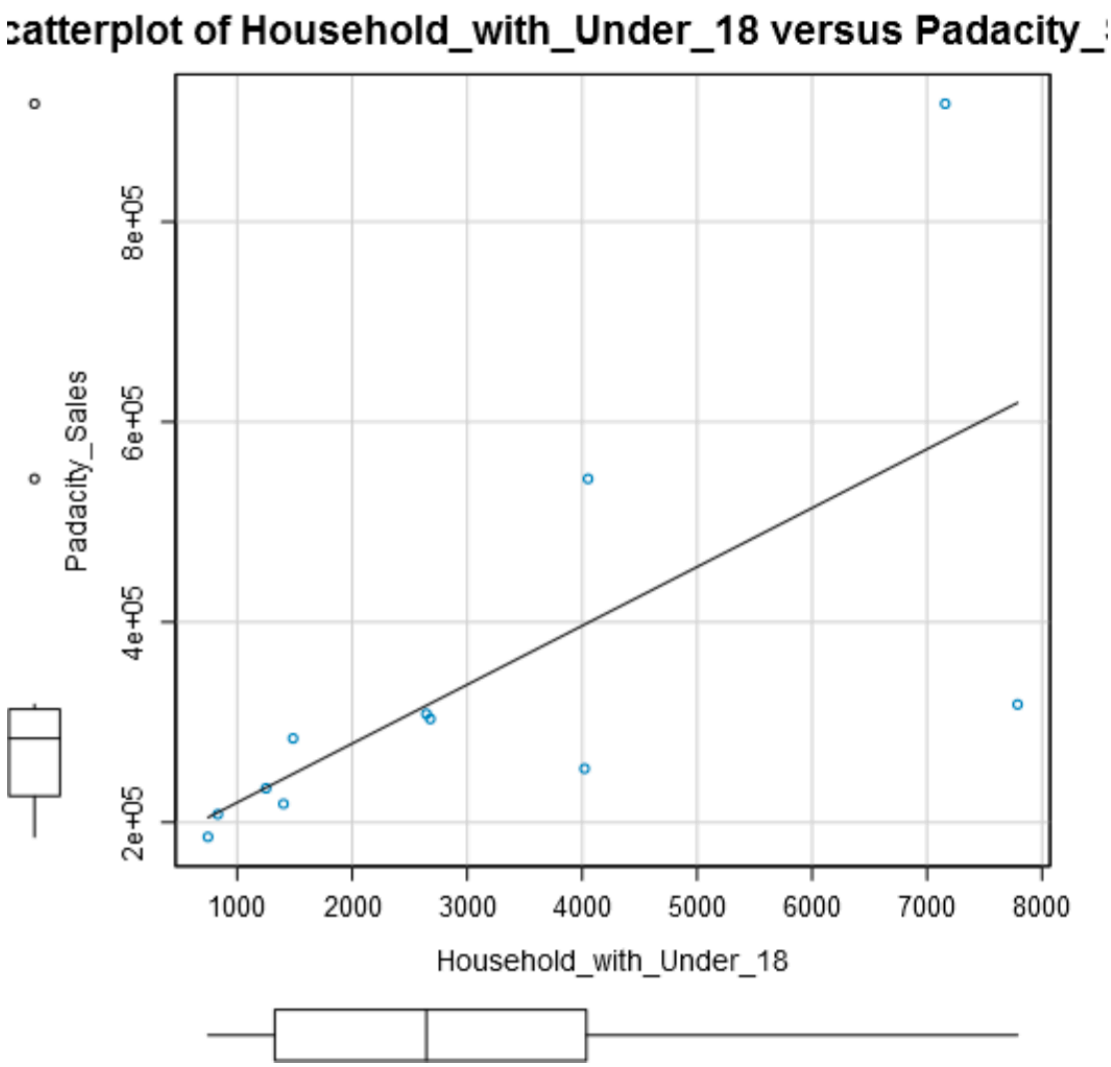
Column	Sum	Average
Census Population	213862	19442
Total Pawdacity Sales	3773304	343027.64
Households with Under 18	34064	3096.73
Land Area	33071	3006.49
Population Density	63	5.71

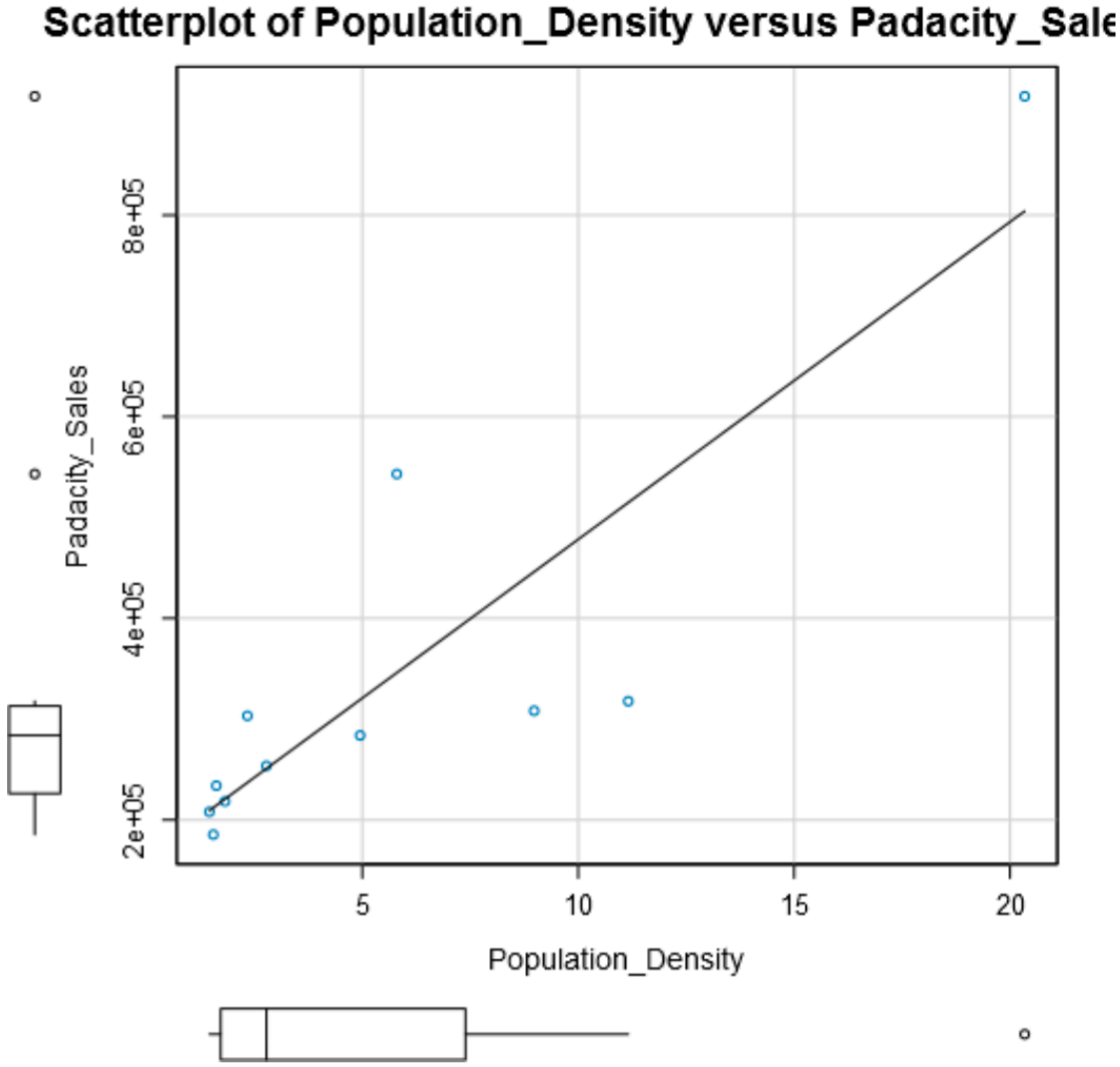
Total Families	62653	5695.71

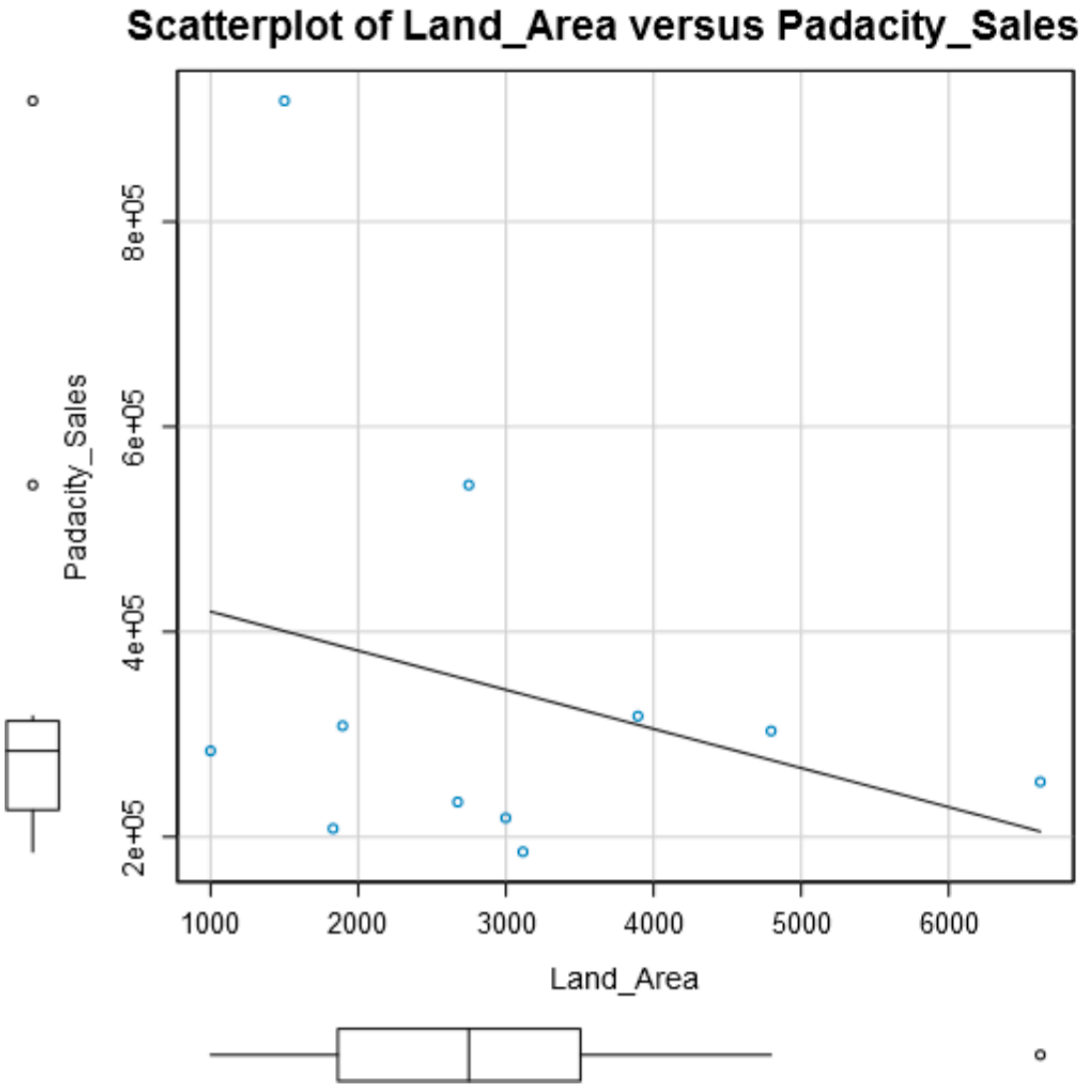
Outliers in the dataset.

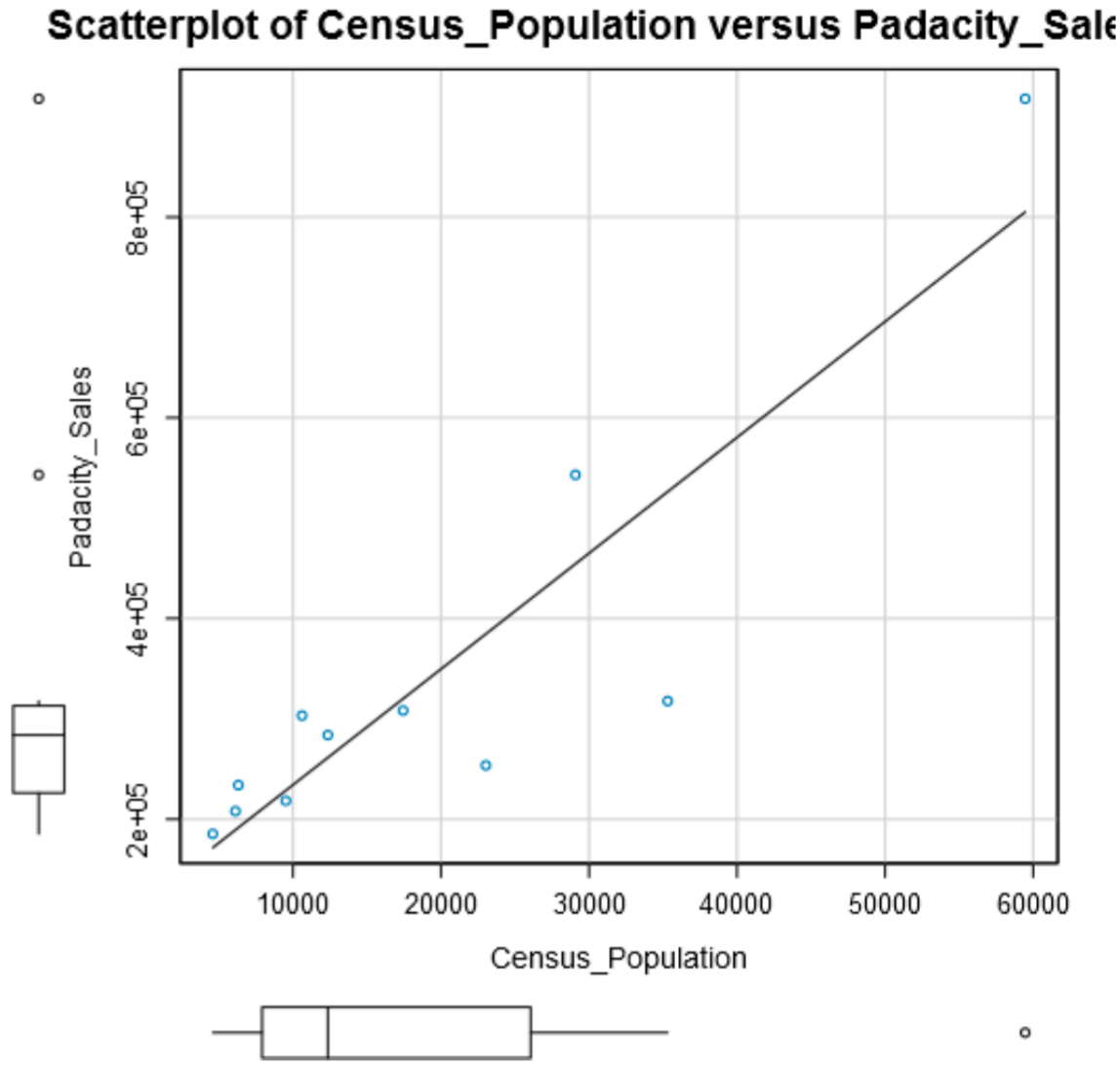
Below are scatter plots and boxplots of the dataset, with each potential predictor variable plotted against the Pawdacity Sales for that city.




catterplot of Household_with_Under_18 versus Padacity_
Padacity_Sales
2e+05
4e+05
6e+05
8e+05
1000
2000
3000
4000
5000
6000
7000
8000
Household_with_Under_18


Scatterplot of Population_Density versus Padacity_Sale
Padacity_Sales
2e+05
4e+05
6e+05
8e+05
5
10
15
20
Population_Density


Scatterplot of Land_Area versus Padacity_Sales
Padacity_Sales
2e+05
4e+05
6e+05
8e+05
1000
2000
3000
4000
5000
6000
Land_Area



Below is a summary of the dataset, with a further analysis of the interquartile ranges for the variables and their subsequent upper fence which for this project will be [1.5 * Interquartile Range] + 3rd Quartile.

I will look into values that are above the “Upper Fence” for each variable.

Name	Min	Max	Median	Mean	Std. Dev.
Census_Population	4585.00	59466.00	12359.00	19442.00	16616.02
Household_with_Under_18	746.00	7788.00	2646.00	3096.73	2453.00
Land_Area	999.50	6620.20	2748.85	3006.49	1617.46
Padacity_Sales	185328.00	917892.00	283824.00	343027.64	213538.71
Population_Density	1.46	20.34	2.78	5.71	5.85
Total_Families	1744.08	14612.64	5556.49	5695.71	3816.05

Census_Population_IQR	Padacity_Sales_IQR	Household_with_Under_18_IQR	Land_Area_IQR	Population_Density_IQR	Total_Families_IQR
18144.50	86832.00	2710.00	1643.19	5.67	4457.40
Census_Population_Upper_Fence	**Padacity_Sales_Upper_Fence**	**Household_with_Under_18_Upper_Fence**	**Land_Area_Upper_Fence**	**Population_Density_Upper_Fence**	**Total_Families_Upper_Fence**
53278.25	443232.00	8102.00	5969.69	15.90	14066.90

The list below indicates max points above that of their respective “Upper Fence”:

Census Population for Cheyenne
Land Area for Rock Springs
Population Density for Cheyenne
Total Families for Cheyenne
Pawdacity Sales for Gillette and Cheyenne

Below is a summary of the Pearson Correlation calculated from the predictor variables and the target variable which in this instance is Pawdacity Sales.

Pearson Correlation Analysis

Focused Analysis on Field Padacity_Sales

	Association Measure	p-value
Census_Population	0.89810	0.00017363***
Total_Families	0.86466	0.00059221***
Population_Density	0.86289	0.00062613***
Household_with_Under_18	0.67601	0.02239778*
Land_Area	-0.28890	0.38889983

Currently, the outliers I need to investigate are Cheyenne City for Census Population, Land Area, Population Density, Rock Springs for Land Area and Pawdacity sales for Gillette.

The scatterplot for Land Area vs Sales would indicate to me that Rock Springs follows the downward direction of the line of best fit for that plot with sales roughly inline with other sales values in that plot.

Cheyenne on the other hand has two stores and their data is aggregated in this analysis which could cause it to be an outlier, however since we are looking at where to place the new store, we should look at this data at a city level. This would mean that Cheyenne justifiably is s city that produces higher sales to warrant two stores.

Gillette also has two stores, however looking through the other categories Gillette’s data looks relatively with in our outlier range except for its sales. There doesn’t seem to be a good reason for this based on the small amount of information that I know.

My recommendation here would be to keep Cheyenne and Rock Springs as I believe their data looks to be appropriate. Gillette however is harder to explain and it would

be best to remove this city totally from our data set, however I am reluctantly removing Gillette due to the fact we already have a small amount of data.