Final Project

Data Visualization IDC 6700

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Real Estate Rental Property Evaluation

This report analyzes and evaluates a dataset of real estate rental property variables through a simulation. This simulation and the generated data visualizations could be pitched to a real estate investor, providing compelling evidence of past, present, and future debt, net worth, and other values that would be essential to the decision making process. The dataset in Table 1 shows actual variables of a realtor's rental property's that would be of interest to a real estate investor.

Table 1

Address	LON (X)	LAT (Y)	Debt Owed	Monthly Pay	Rent	EST WORTH
2704 36th av	27.468692	-82.588922	0	0	1146	130000
915 60th ae '	27.435101	-82.571476	40000	400	1100	110000
5011 9th St E	27.452402	-82.554618	2000	200	1200	125000
110 22nd St (	27.499932	-82.53658	50000	500	1100	125000
807 68th Ave	27.420464	-82.570758	40000	400	1100	180000
1011 14th St	27.525598	-82.576757	60000	600	1249	150000
1712 32nd A	27.471112	-82.543714	52700	527	1400	95000
1011 32nd A	27.471993	-82.55335	70000	700	1275	105000
2117 11 st w	27.48009	-82.572575	75000	750	1400	110000
704 51st ave	27.45109	-82.569356	45000	450	900	55000
2704 36 ave	27.468692	-82.588922	36000	360	1140	150000
709 49th Ave	27.454975	-82.569491	0	0	900	55000
1732 32nd A	27.471115	-82.542911	0	0	700	60000
2826 18th st	27.47438	-82.57925	0	0	775	100000
510 36th Ave	27.467665	-82.558347	0	0	950	100000
411 52 ave d	27.449325	-82.566819	0	0	875	40000
2208 37th Av	27.466399	-82.536836	0	0	1050	110000
1620 32nd A	27.471176	-82.544898	0	0	1100	105000

Certain factors, such as when the realtor will be debt free, how much debt he can maintain, and what level of risk the realtor can justify taking, are all made apparent through the following simulation. Through this process, a realtor can develop a portfolio of statistics on current rental property's, helping him understand his business, and providing a visual aid for potential investors and business partners. This system allows for optimal organization, which can be key for some real estate moguls who own hundreds of property's.

With this story in mind, I took a table of real-life data from an actual realtor and set out to create a storyboard for potential investors. To start, I determined each rental property's longitude and latitudes coordinates, and then plotted on Google Maps to provide a visual display of the property locations. On this same visual, I also mutated the initial data frame so that the additional vector in the dataframe would have a string either "Paid Off" or "Not Paid Off". These variables are represented by a shape aesthetic and will help potential investors discern the financial status of each property in its respective location. From here, I created two separate graphs (as seen below in Figures 1 and 2) to show 1) rent value by location, and 2) estimated worth by location to illustrate the cost of living in each area. The aesthetic for rent value and estimated worth is mapped to the color with the scale color gradient function.

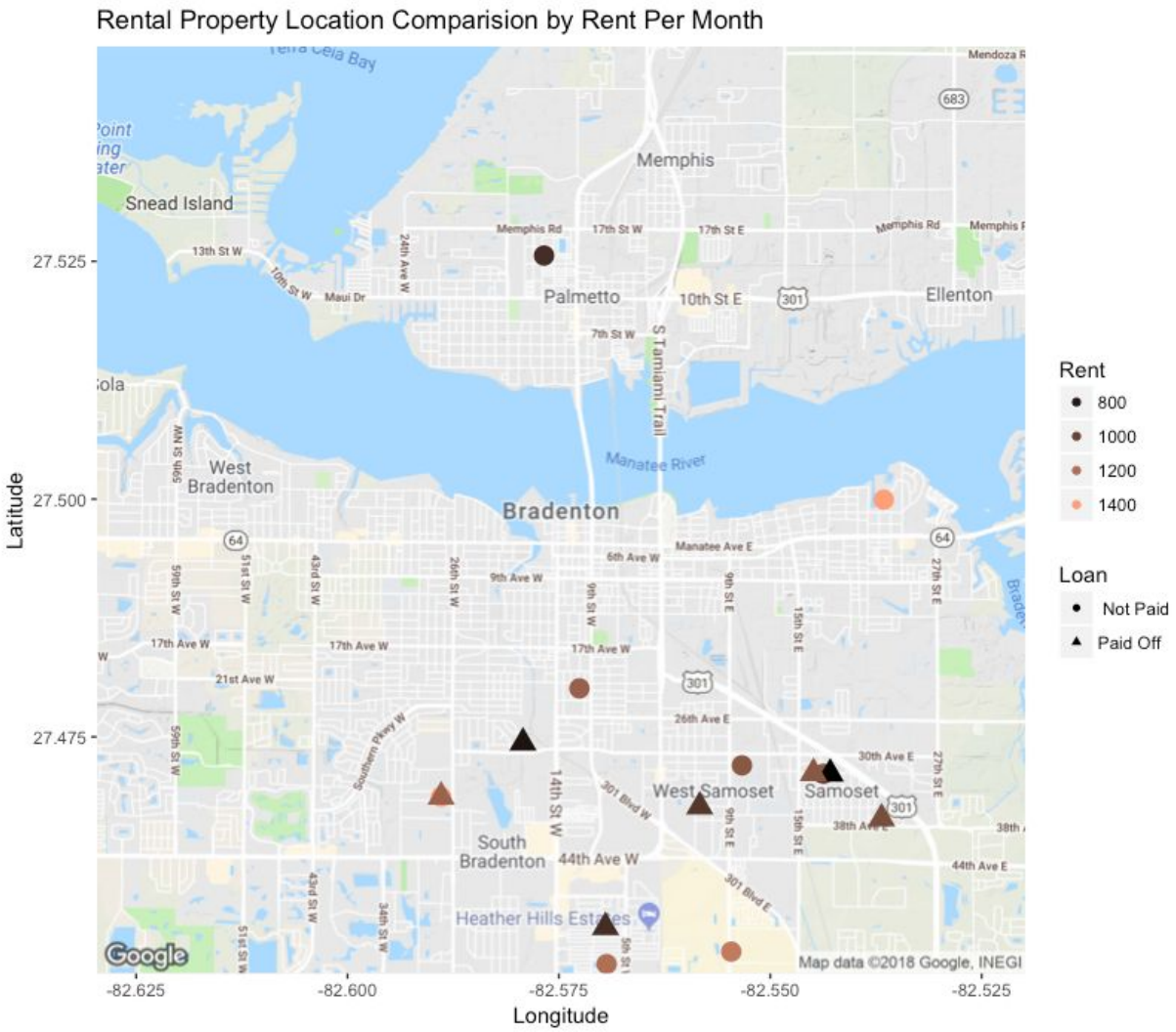
Rental Property Location Comparision by Rent Per Month
Latitude
27.525
27.500
27.475
-82.625
-82.600
-82.575
-82.550
-82.525
Longitude
Memphis
Snead Island
Palmetto
Ellenton
West Bradenton
Bradenton
South Bradenton
West Samoset
Samoset
Heather Hills Estates
Manatee River
S Tamiami Trail
10th St E
Manatee Ave E
44th Ave W
Map data ©2018 Google, INEGI
Rent
800
1000
1200
1400
Loan
Not Paid
Paid Off

Figure 1

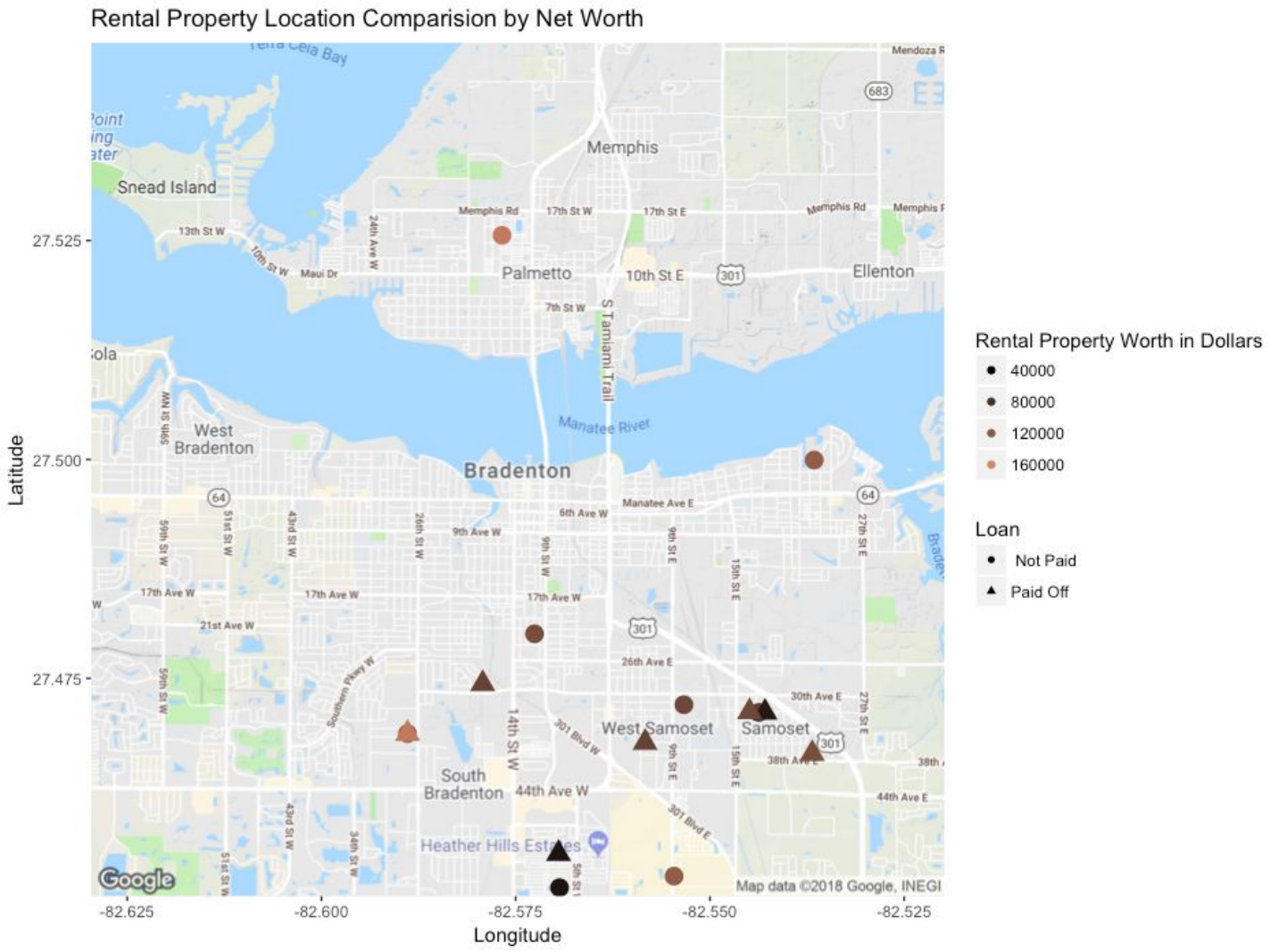

Figure 2

I experienced some issues with overplotting, but the graphs proved to be too abstract when converted to outlines because of the color coding. Nevertheless, Figures 1 and 2 effectively illustrate the realtor's portfolio and allow insight into potential prospects. To further explore this data in the future, I would like to overlay census data onto the Google Map for a more detailed look at the given dataset compared to the relative area.

For those investors who might not be familiar with the map on Figures 1 and 2, I created the plot in Figure 3, seen below. This more minimalist visual can be used to avoid distracting someone who is only interested in the property variables and less focused on the locations.

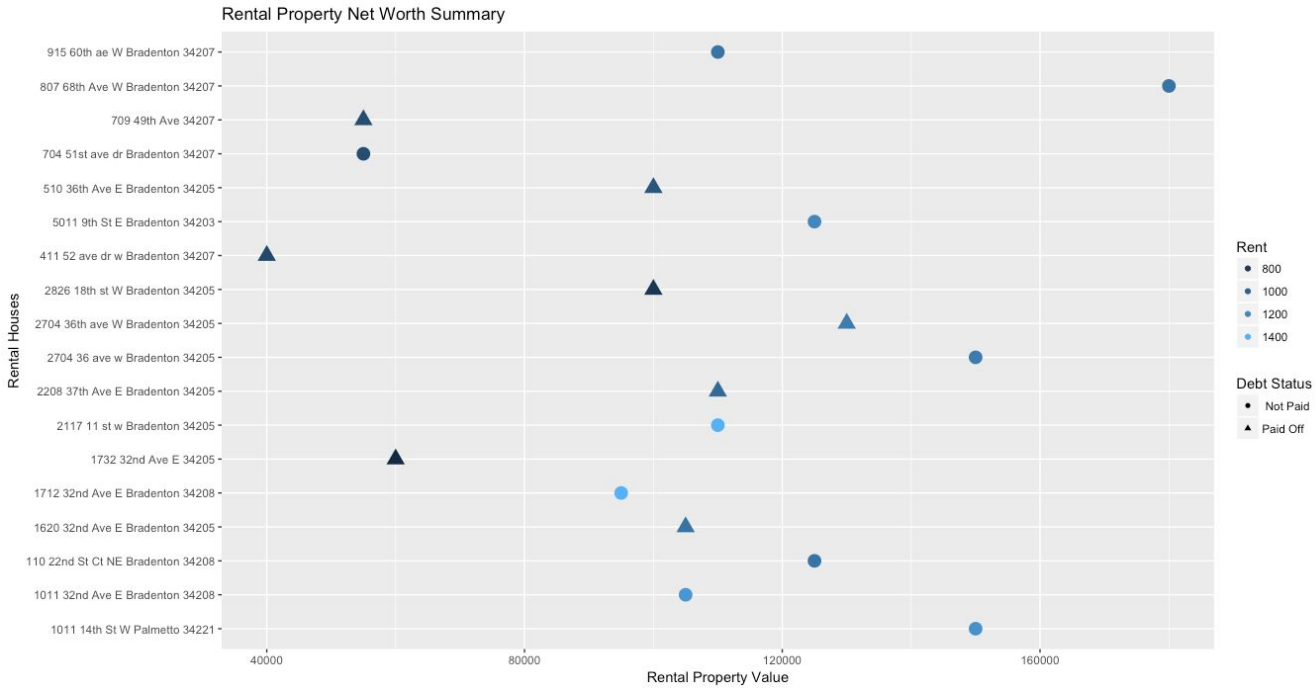

Figure 3

This depiction is able to display more variables than the Google Maps rendition. In particular, an investor could use Figure 3 to conclude that property's with lower values are more likely to be paid off (with this set of property's)and lower in rental value (noticing more triangles on the left side of the graph). Visually, it is easy to see that the darker colors are mostly contained to the left side of the chart while the bright colors are mostly on the right. Purchase price of each rental property and date of purchase could be an interesting addition to the data. This would depict how

the general value of the rental property has maintain, increased, or decreased in market value over time.

Figure 4 looks at the total monthly income set against the total debt for the entire portfolio. A potential investor will use this to understand how the debt to income ratio will affect the overall growth of the real estate enterprise. The two graphs below give a total monthly overview, describing the total rent income per month vs total loan interest payment.

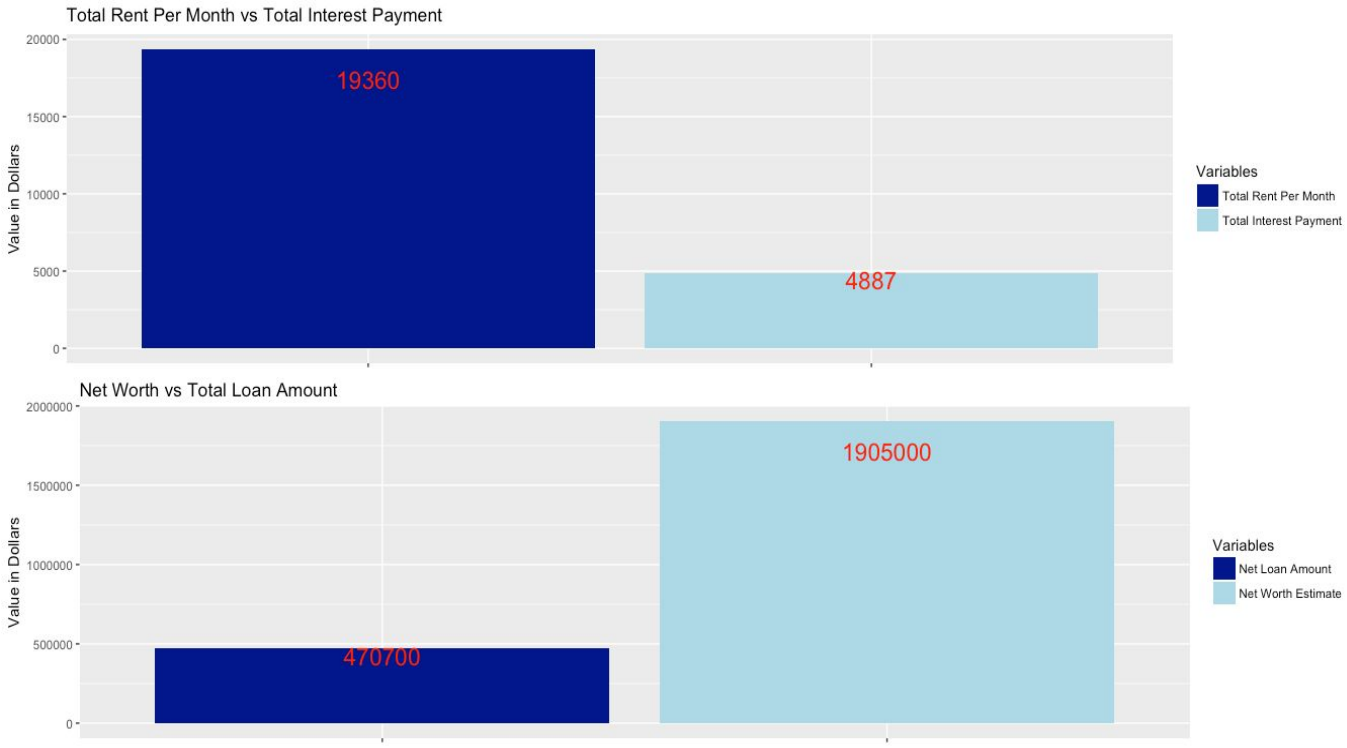

Figure 4

The calculation for this “rent to interest payment” dataset is about 25%. In other words 25% of all of the rental income each month goes towards loan interest payments. Therefore, an investor can see the potential for the remaining 75% of income to pay off the “Not Paid-Off” property's seen above in Figure 3. Since some of the 75% goes toward monthly interest, managing a healthy

debt to income ratio is important. After considering and calculating the length of time it will take to pay off all the property's, 25% seems like a comfortable ratio. Figure 5 shows this timely progression of payments from now until each house is debt-free, giving an investor a great prediction of future financial states and how much risk can be assumed.

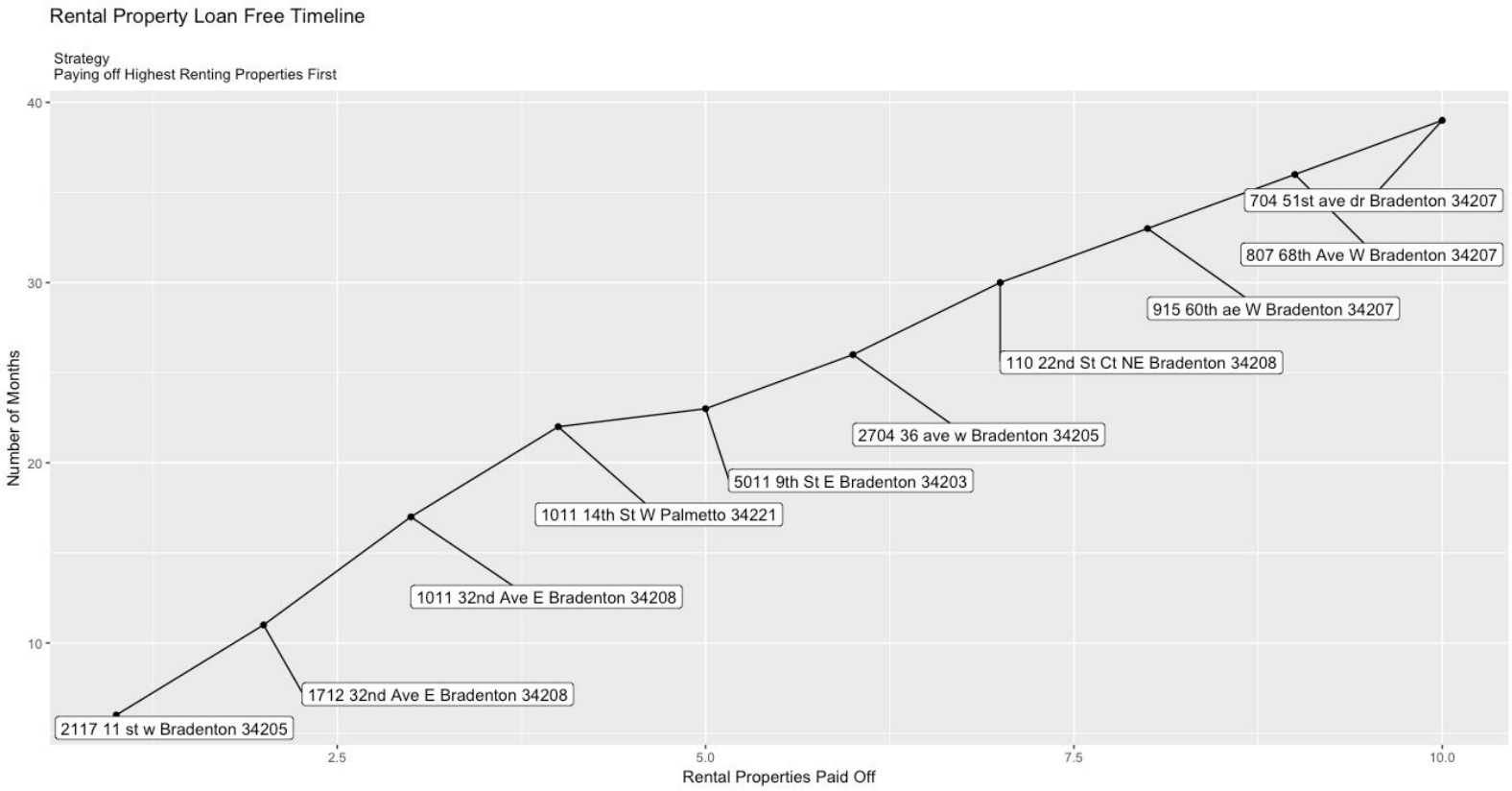

Figure 5

I included a caption to Figure 5 to provide insight into the payment strategy. For example, the strategy used in Figure 5 sorted the property's that had the higher rental rent amount per month to be paid off first. This is the most optimized approach to maximize rental income because it dedicates more resources toward the payments that take up most of the debt first. Figure 5 easily depicts that all ten rental homes will take about 40 months or a less than 3.5 years to fully pay off

using this strategy. Additionally, an investor can note that this debt sum is about $500,000 and a 3.5 year pay-off time is a great use of resources. It is necessary to account for unforeseen events over the course of these 3.5 years, such as vacancies or a decision to sell the property altogether. In the current code of my simulation, vacancies are accounted for by a probability of 1/6th and, if this occurs, the investors loses $2000 including repairs. To get a better long-term picture, I would run a monte-carlo simulation and add probabilities for vacancies lasting longer than 1 month. Running the simulation multiple times and averaging the values will give the best estimation on the average time it will take to pay off the rental property's. Figure 6 below gives a debt summary specifically of the rental property's that have active loans.

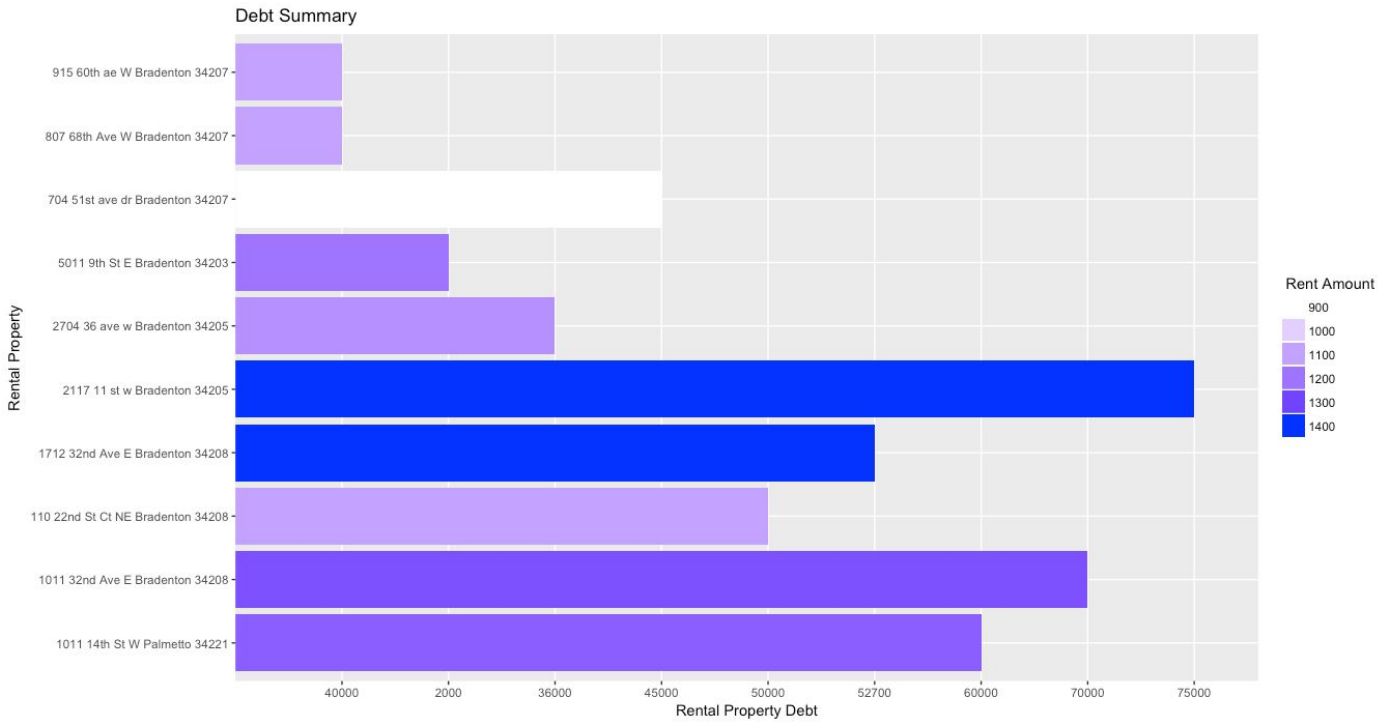

Figure 6

Figure 6 depicts each property's loan values, varying in color based on rent amount. The sorting strategy could be aided with Figure 6 since we are visualizing only the propertys that have loans.

This is important to note because some values are currently very low and the previous strategy does not take this into account. It would seem that paying off the rental property's that have less than 25% of the original loan first would provide a better strategy than paying the highest loans first. Even though the data visualizations seem to lean in that direction, further analysis is necessary to confirm this theory.

Lastly, I developed Figure 7: a pairwise plot of the all the rental property variables.

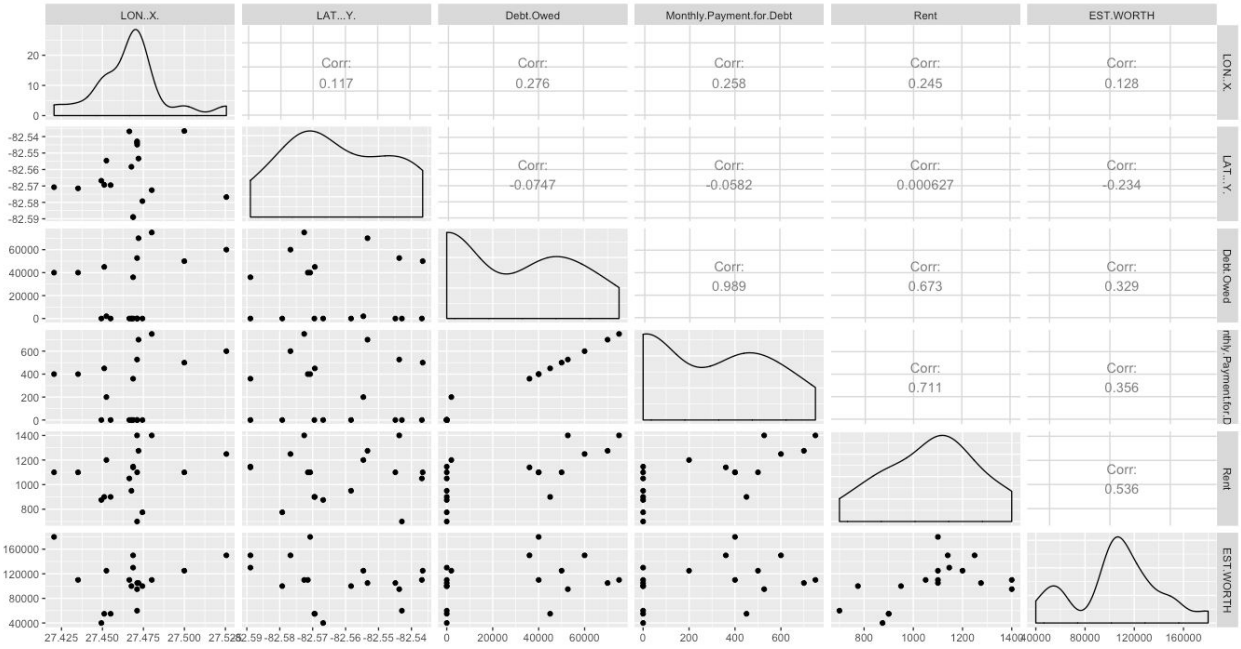

Figure 7

This plot suggests that the monthly payment for debt or interest payment strongly correlates to the debt owed or loan amount. This is confirmed by the fact that the interest payment is actually 10% of the original loan amount. The only other high correlations were of Rent and Debt (total loan amount, and interest). This is most likely because some of the houses in the dataset are paid off, but it also seems that there is a positive correlation with the paid-off property's.

Since the recent crash of the housing market, understanding debt to income ratios is essential to avoid potentially fatal business moves. In an event like this, the rent for all property's would decrease and the debt to income ratio would widen, meaning the property's would take even longer pay off. In general, having a high debt to income ratio ratio is risky for any business, especially in real estate.

In conclusion, the graphs create a storyboard for a potential investor, helping them visually understand a realtor’s portfolio of property's. Additionally, these visuals can guide a realtor’s decision making process when buying or selling property's. The figures give a big picture view relative to location and provide important geographical insight. In future work, adding census data to the Google Map could prove advantageous for realtors scouting new property's and understanding trends with current houses. Being able to run a simulation or calculation to determine the length of time to pay off houses and having this data over an extended period of time will prove to be extremely valuable for realtors and investors. Consistently updating these datasets will provide accurate overviews for past, present, and future business.