



Heat Maps for Hot Housing Markets SAS an ultimate tool for analyzing real estate data

By Harshita Budumuru

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ABSTRACT

The pandemic has introduced a new dynamic of societal uncertainty for stakeholders and home buyers fueled by rapid inflation and soaring house prices. The federal reserve has stepped in this past month by increasing interest rates to limit credit flows. Some analysts are predicting another housing bubble while others say logistic growth due to stagnant supply chains. Will this volatile housing market crash or are we in a perpetual state of exponential growth? The question of where and when to invest has become a challenging discussion, but is there a solution? Scientific literature on the use of heat maps for statistical analysis increased in almost every industry and field. Of late, heat maps have become increasingly popular in real estate, especially as a useful analytical tool for making informed decisions in the housing market. This paper aims to illustrate how SAS can be used to generate these heat maps which present complex data as simple visual aids. SAS can aid in the analysis of these hot housing markets to be readily available to entrepreneurs, mortgage institutions, and policy makers. In this article, real estate data will be used to identify key parameters such as employment growth, population growth, first time home buyers, listing prices, listing quantities, rental prices, occupancy rates, and much more. The future of the housing market landscape can be demonstrated and the differences between the spiraling recession and the booming pandemic can be addressed.



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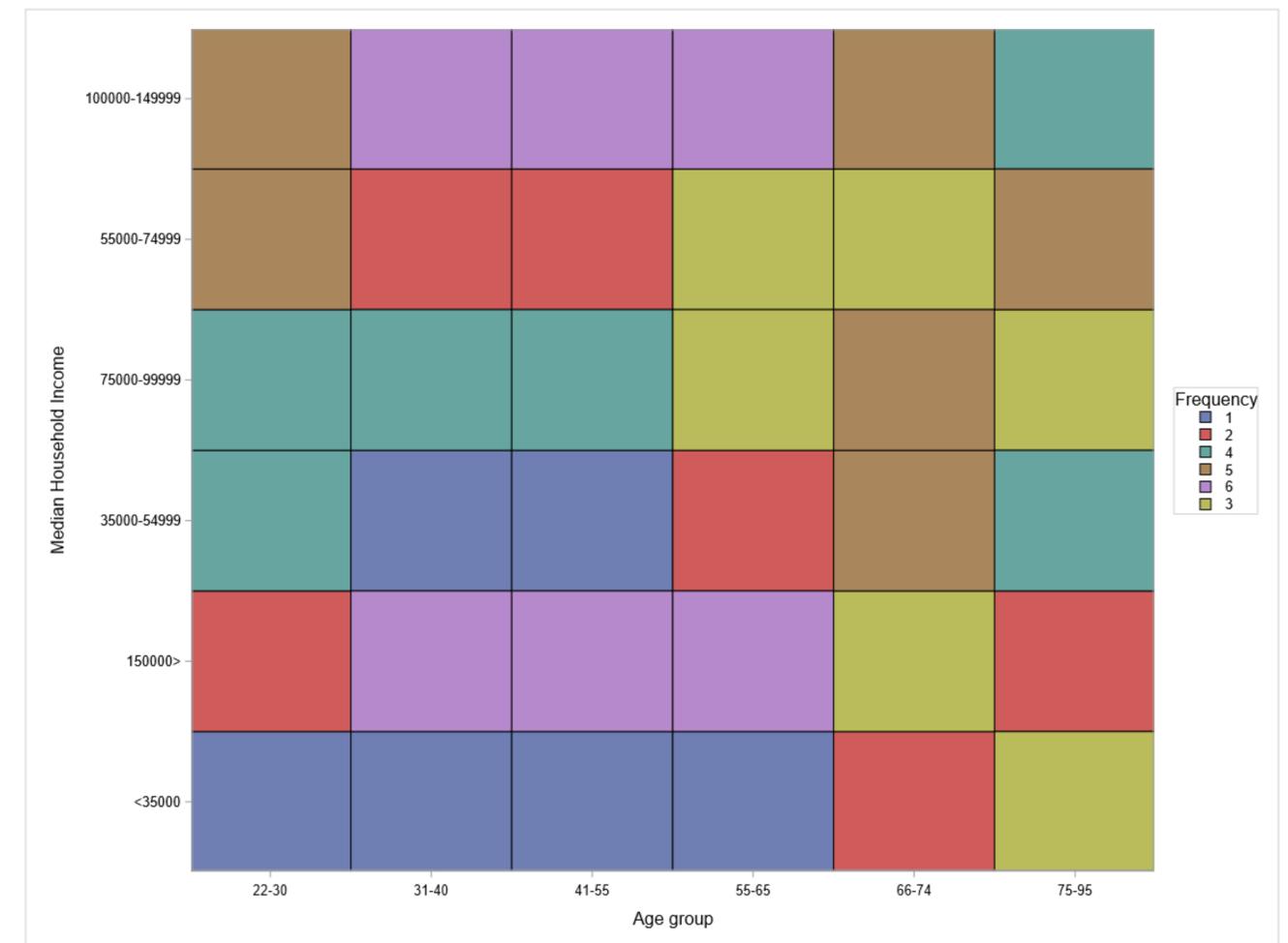
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INTRODUCTION

As visual learners, we humans are more receptive to these heat maps than other standard analytical tools. Heat maps allow us to organize more comprehensive data. So, how are they relevant? This poster aims to increase awareness and accessibility to creating heat maps using SAS within the field of real estate. Scientific literature on the use of heat maps for statistical analysis increased in almost every industry and field. Of late, heat maps have become increasingly popular in real estate, especially as a useful analytical tool for making informed decisions in the housing market.



The heat map above indicates sample parameters: age distribution of home buyers in 2021 in comparison to median household income.





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Our new method that will help investors have a better idea of market trends are heat maps! Heat maps are color coded systems that represent various data metrics. Now, how are heat maps created using SAS?

Heat Maps can be made using a PROC SGPLOT. You can import and save any data as a SAS dataset. Then, by labeling your x-axis and y-axis parameters along with your category to indicate the intensity of the colors, you have your very own heat map!

```
libname real "\\quintiles.net\enterprise\Sites\USRTP\Users\q765631\Yogs\conf\others";
```

```
proc import
datafile="\\quintiles.net\enterprise\Sites\USRTP\Users\q765631\Yogs\conf\others\real2.csv"
out=real2 dbms=csv replace;
getnames=yes;
datarow=2;
run;
```

```
libname real ":C\Yogs\conf\others";
```

```
proc import datafile=" :C\Yogs\conf\others \real2.csv"
out=real2 dbms=csv replace;
getnames=yes;
datarow=2;
run;
```

```
proc sgplot data=real2 /*dattrmap=Order*/;
*by state;
heatmapparm x=age y=income colorgroup=percent / outline attrid=SortOrder;
*heatmapparm x=state y=median colorgroup=cat / colormodel=(cxFAFBFE cx667FA2 cxD05B
cxAFB5A6 cx6497EB) outline attrid=SortOrder;
xaxis label="Age group" display=all ;
yaxis label="Median Household Income" /*valueattrs=(size=2.5) */ display=all discreteorder=data;
keylegend / location=outside position=right title="Frequency";
run;
```

	Age	Income	percent
1	22-30	<35000	1
2	22-30	150000>	2
3	22-30	35000-54999	4
4	22-30	75000-99999	4
5	22-30	55000-74999	5
6	22-30	100000-149999	5
7	31-40	<35000	1
8	31-40	35000-54999	1
9	31-40	55000-74999	2
10	31-40	75000-99999	4

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How are the criteria we used important?

- A price to rent ratio is a ratio of home prices to the annual rent in a given area. It is used as a benchmark to estimate whether it is cheaper to own or rent. If the price to rent ratio is higher, then home prices are more expensive than rent prices so it makes more sense to rent than own.
- The unemployment rate of an area is extremely important, especially given the circumstances brought on by the pandemic, because higher unemployment begins a cycle of less affordability and thus less demand. Less demand leads to more supply, causing prices to go down.
- The median home value is a great indicator of where the current market. A rising median home price is indicative of a seller's market while the opposite is true for a buyer's market. Here, we have presented the median home value in 2017 and 2022 along with the price placed by Zillow to show changing conditions and factors such as demand and inflation. We have also listed the average income in 2017 and 2019 to present the changes that have occurred over the pandemic. Investors can see how an increased income can lead to increased consumption and a resulting increase in owning or renting of properties.

- Property taxes are important because property taxes tend to increase when a county or state is increasing (or facing rapid population growth) in order for the government to be able to afford certain expenses such as schooling and other funds. For example, New Jersey has around three times the property taxes than in North Carolina. This is because certain urban centers in New Jersey have been established for far longer than in North Carolina. However, the Research Triangle Park area and Wake County have higher property taxes because of the booming markets.
- Lastly, the 3 year population growth rate illustrates how people tend to build more houses in proximity of larger population growth. This also causes price spike, especially now that the pandemic is making people lean toward urban sprawl into less dense areas





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CONCLUSION

Many users should employ heat maps to easily compare the foreclosure rate in various states and analyze whether foreclosures will increase, decrease, or stay the same by contrasting them to heat maps from previous months. Heat maps are valuable in that they can provide a quick, reliable, and thorough overview of a field. Now, SAS can be the latest tool for investors to come to the right conclusions!

REFERENCES

Kuhfeld, Warren. "Heat Maps: Graphically Displaying Big Data and Small Tables." *Heat Maps: Graphically Displaying Big Data and Small Tables*, SAS, 12 Mar. 2017, support.sas.com/resources/papers/proceedings17/SAS0312-2017.pdf.

