

MGMT 590V Visual Analytics

9:50 Section Professor Wei

Group 1

De Franco, Kanca, Reddy, Simopoulos, Wani, Zimmerman

Final Report

Student Housing Availability in the US

I. Introduction and Background.....	3
II. Objectives and Goals.....	4
III. Datasets.....	4
IV. Data Story.....	5
VII. Conclusion.....	11
VIII. References.....	12
Contributions.....	12

I. Introduction and Background

The impact of the housing market reverberates across diverse demographics and backgrounds throughout the United States. In recent times, the glaring issue of a nationwide housing shortage has become increasingly evident. As reported by CNN, the disparity between available housing units and families seeking homes has swelled to 2.3 million between 2012 and 2022, encompassing not only single-family dwellings but also apartments and rental properties (Bahney, 2023). This growing chasm can be attributed to mounting inflation and the subsequent uptick in mortgage rates, rendering homeownership less attainable. Additionally, the COVID-19 pandemic played a role by causing shortages in construction materials such as lumber, steel, and concrete, leading to project delays and increased construction costs (Santarelli, 2023). The pandemic-induced demand for larger living spaces, driven by the need for quarantine, further exacerbated the affordability crisis, particularly for lower-income families.

Furthermore, the housing market's ramifications extended beyond individual households. As described in the same article, the housing market's turmoil had a direct impact on the broader economy (Santarelli, 2023). Businesses faced difficulties in retaining employees in high-cost-of-living areas, contributing to stymied economic growth, reduced opportunities, and diminished disposable income.

The scope of this project is to narrow down the housing shortage to college towns and its influence on rental prices in proximity to campuses. According to CNBC, one in five students experiences housing insecurity, lacking a stable residence while pursuing their degrees (McNair, 2022). This predicament compounds the financial burdens already faced by students due to rising living costs and tuition fees. Forbes, in an analysis of Zillow rental data, revealed that the average monthly rent for students nationally stands at \$2,062 (Perry, 2023). This represents an additional obstacle for students coming from lower-income backgrounds who heavily rely on financial aid.

Colleges and universities have witnessed a surge in enrollment, as the pandemic prompted students to defer or delay their education. Purdue University, for instance, grappled with the housing shortage, impacting our group members' personal experiences in securing affordable housing. While Purdue has unveiled measures to address the housing crisis, some state officials believe there is more work to be done (Caucus, I. H. D., 2023). Therefore, our research focuses on assessing whether the average rental prices in college areas and towns surpass the local cost of living, shedding light on the challenges faced by students and the need for further action.

II. Objectives and Goals

The objective of this project is to assess whether rental companies are exploiting college students by imposing excessive fees. Through the utilization of Zillow Rental data and additional information from Zillow concerning new and available listings, our aim is to pinpoint the disparities in reasonably priced housing options for college students in various college towns across the United States. The primary stakeholders in this endeavor encompass the students themselves, construction firms, and the local governing bodies in cities hosting colleges or universities.

By performing this analysis, our intent is to assist college students in identifying affordable living options and to provide insights to construction companies and local authorities regarding housing shortages in these college towns. Ideally, this effort would encourage collaboration between local legislation and construction companies to bridge the housing gap and alleviate the financial strain on students.

III. Datasets

We have acquired two datasets from zillow.com. The first dataset, titled "Rental_Data_Zillow," was developed by Zillow to monitor housing price indices and new property listings across various metropolitan statistical areas (MSAs) in the United States. This dataset covers monthly housing price index values from January 2015 to August 2023, encompassing a span of nine years. Each MSA has its own time series of housing price index values, facilitating the analysis of pricing trends both at the national level and within individual metropolitan areas during this period. The dataset "Rental Data" consists of 598 rows and 109 columns, with key variables including Region ID, SizeRank, RegionName, RegionType, and StateName.

Our second dataset records new property listings per month from March 2018 to August 2023, encompassing 925 cities across the United States. Important variables within this dataset comprise Region ID, SizeRank, RegionName, RegionType, and StateName. This data equips us to create informative charts at the city, state, and national levels for the United States.

The primary objective of these datasets is to monitor housing price trends over time in diverse metropolitan areas. Such information is invaluable for analyzing trends in the housing market. Zillow conducts this research and provides access to this data to assist potential home buyers and renters in making well-informed decisions regarding their rental and purchase choices. One limitation we identified in the data was that there wasn't a measure for the population in a specific area and therefore we lose a context element in the visualizations.

IV. Data Story

I. Local Data Dashboard

The generated dashboard presents a comprehensive view of local data insights, incorporating information from the first three charts outlined below. Positioned at the top of the dashboard is a map showcasing all the college towns in Indiana. Directly below this map, you will find a line chart illustrating the evolution of rental increases over time, along with a scatterplot providing details on the number of new listings and the average median rental prices for the year 2023. These elements are seamlessly integrated, allowing users to concentrate on a specific college town and make visual comparisons with others. Furthermore, the dashboard offers two interactive features that enhance the user experience. Firstly, users can click on any data point on the map to instantly apply a filter to the graphs below, refining the data to their specific area of interest. Secondly, clicking on data points within the scatterplot enables users to explore potential trends in rental prices over time, thus gaining deeper insights from the displayed data.

II. Map

We are specifically focusing on Indiana cities that have college towns within them for our map visualization chart. This choice is driven by our desire to compare the average median rental rates of West Lafayette, Indiana, with those of other college towns like Bloomington, Muncie, and South Bend. Currently, we have created one map chart for the year 2019 and another for the year 2023. Our intention is to display these charts side by side in a dashboard to facilitate easy comparison and contrast for our stakeholders. To construct this chart, we will utilize the variables Date, Median Rent, City, and the geolocation data for each city, sourced from the Zillow Rental dataset.

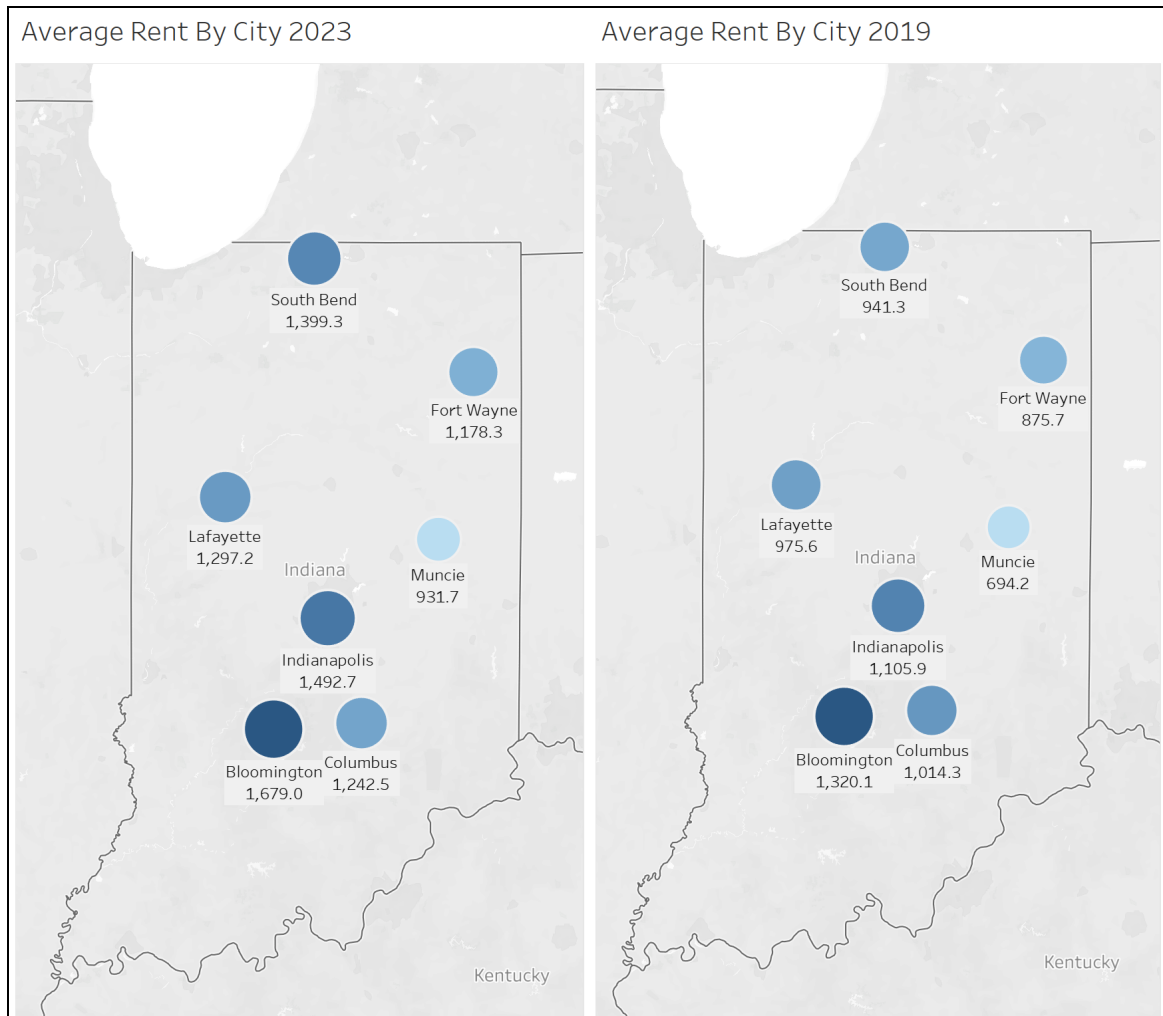


Figure 1: This map shows the increase in average rent for our selected Indiana college towns in the year 2023 compared to the year 2019.

III. Line Chart

The project's line chart offers a finer-grained view of the evolving rental price trends. It comprises individual panels dedicated to each of the specified college towns in Indiana, with a line chart within each panel illustrating the average median prices from 2019 to 2023. Furthermore, the chart incorporates a best-fit line to project anticipated costs for 2024. It draws its data from the Zillow Rentals dataset, utilizing median rental prices and corresponding measurement dates. This visualization prominently underscores the surge in rent prices following the 2020 COVID-19 pandemic.

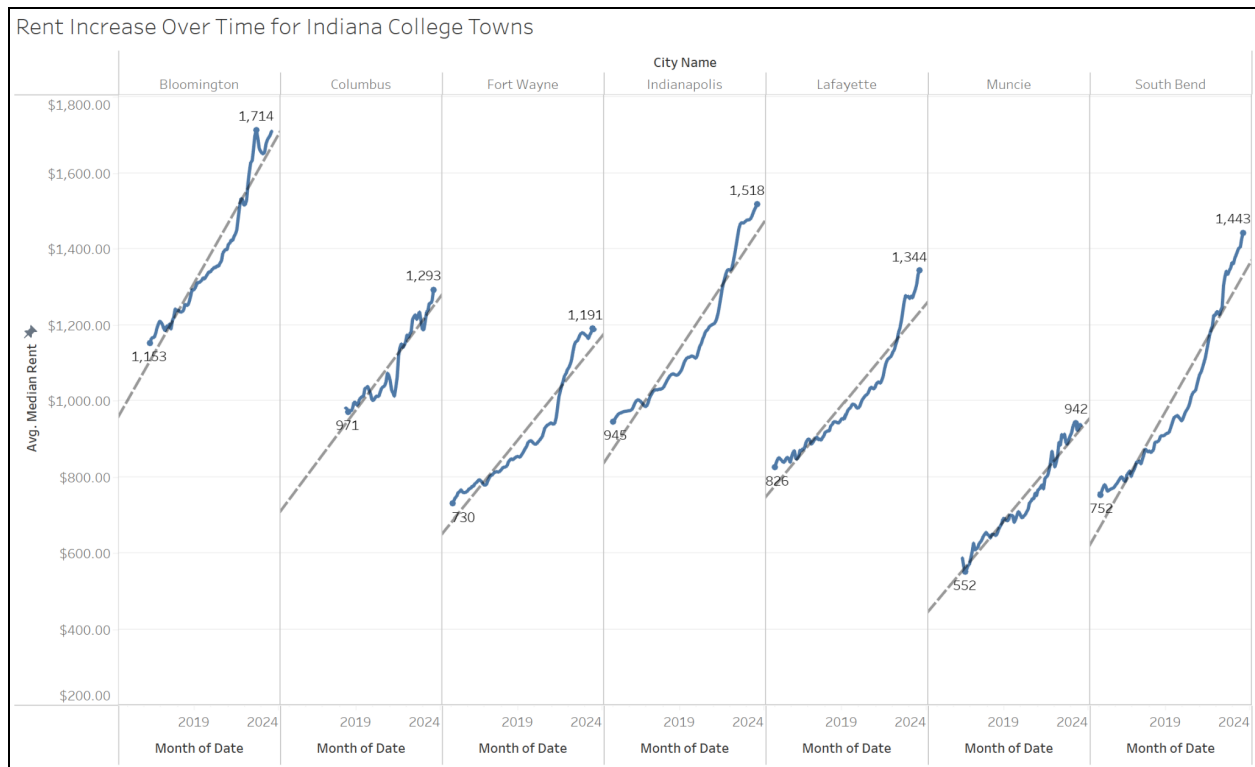


Figure 2: This figure shows a line chart showing the average median rent across time from 2019 to 2014 by Indiana college town.

IV. Scatter Plot

We've crafted a scatter plot to illustrate the connection between the number of new property listings or size rank and rental prices within Indiana's college towns. This scatter plot serves as a means to juxtapose these distinct variables and discern whether any correlation exists between them. The data for the "new listings" variable is drawn from Zillow's new listing data, while the "median rental price" variable is extracted from the Zillow rental data previously identified in our analysis. The data for the "size rank" metric is present and equivalent in both datasets. The "new listings" metric signifies the quantity of fresh property listings introduced to the market within a specific month, while the "rental price" metric represents the median rental prices for that same month. The "size rank" refers to the rank of cities by population where a higher ranking suggests a greater population. Building this graph necessitates data blending between these two data sources, with linkage established using the unique Region ID. The scatter plot is a valuable tool for our audience, aiding in the identification of correlations and potential outliers within the dataset.

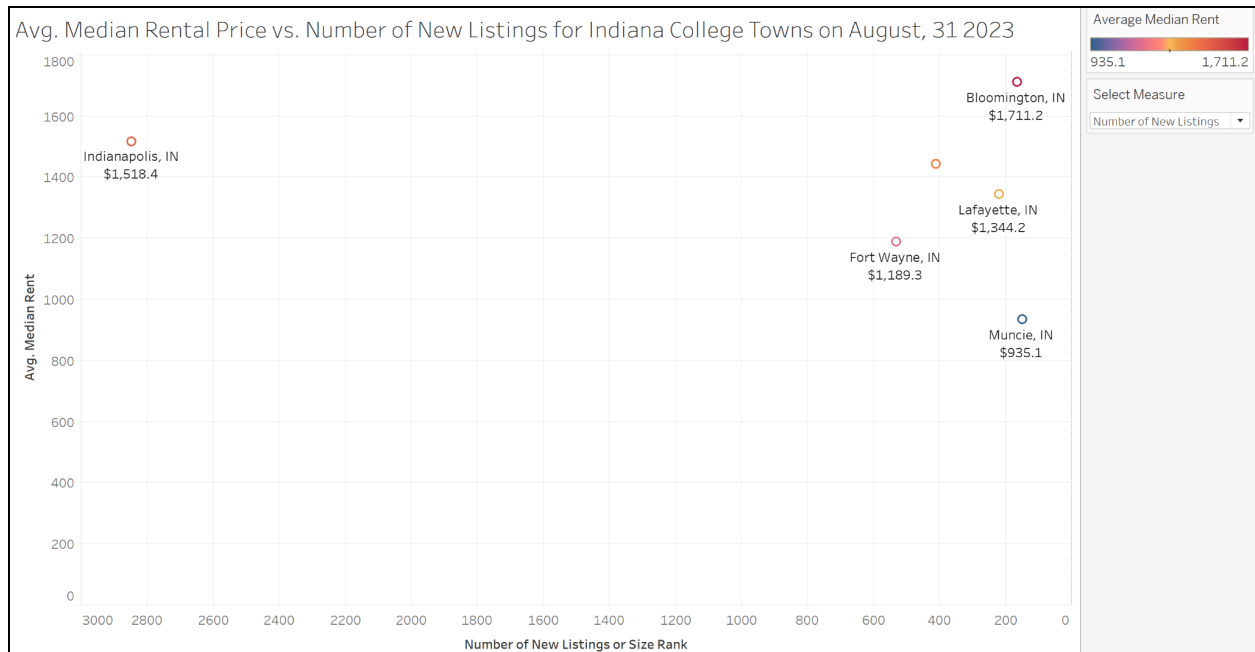


Figure 3: This figure shows a scatterplot of the average median rent vs. the average number of new listings or size rank for Indiana college towns on August 31, 2023.

V. Horizontal Bar (Median Rental Prices)

When creating the horizontal bar chart, our aim was to broaden the scope of our comparisons beyond just Indiana college towns. This visual representation presents the average monthly median rental prices across the past six years in the United States, allowing users to select their parameter of choice, which is the state. The color scheme employed in this chart is designed to direct the user's attention to the notable price spike observed from 2020 to 2021. The data for median prices, year, and region is derived from the Zillow rental dataset. Additionally, we have incorporated a reference line to enable users to compare the prices of different regions with the overall average.

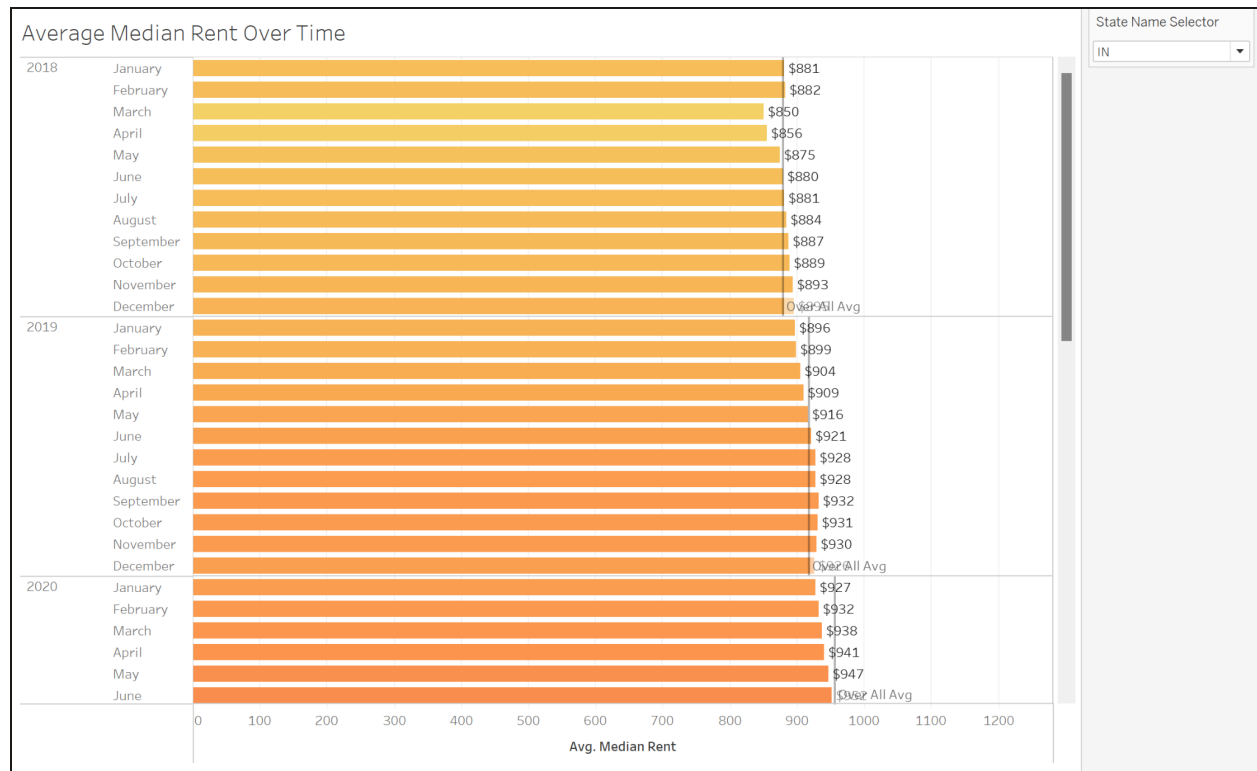


Figure 4. This figure displays a horizontal bar chart showing the average median rent per each year and month for a selected state. The line allows the user to compare the rent for a specific month to other months in the year.

VI. Crosstab

In order to construct a crosstab that displays average median rental prices for each state across different years, we extracted relevant information from the rental dataset. Specifically, we utilized variables such as state name, median rental price, and date, with a focus on isolating the year component of the date variable. Our objective in showcasing the average median prices for all U.S. states is to provide a comprehensive overview of rental price trends across the entire nation. To enhance the visual appeal and clarity of this presentation, we applied color palettes to the rental prices, resulting in a visual display reminiscent of a heat map.

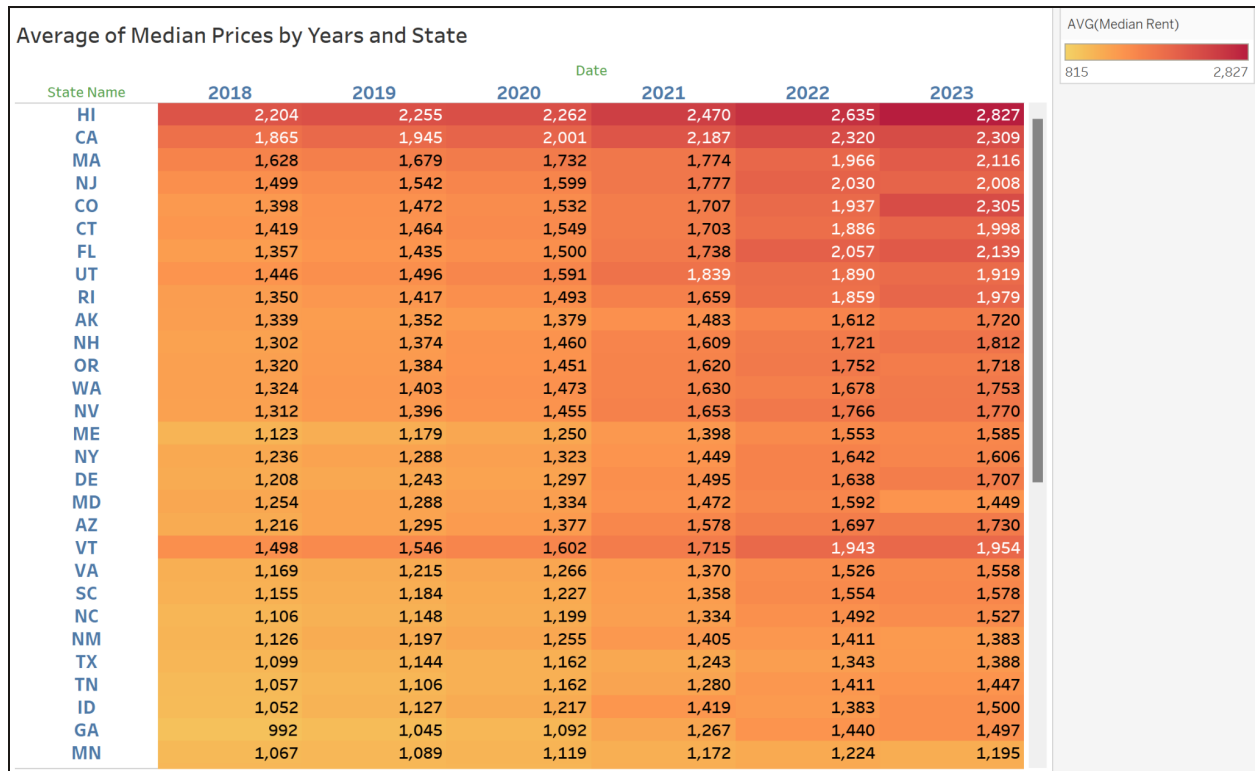


Figure 5: This is a heat map of the average median prices with the year as a column. The darker areas indicate a higher average median rent while the lighter areas indicate a lower average median rent allowing a user to easily distinguish the two.

VII. Horizontal Bar (Number of Listings): To analyze the impact of the COVID-19 pandemic on listing numbers, we utilized the Zillow dataset for new listings. This dataset was structured with years as columns and states as rows. Specifically, we focused on the years 2020 and 2023 to facilitate a straightforward comparison of new listing counts. As anticipated, there was a consistent decline in new listings across all states. To aid in clarity, we incorporated a color palette to differentiate values, and we included the total new listings as a label. Furthermore, we enriched the tooltip with information on average median rental prices for a convenient comparison with the listing numbers.

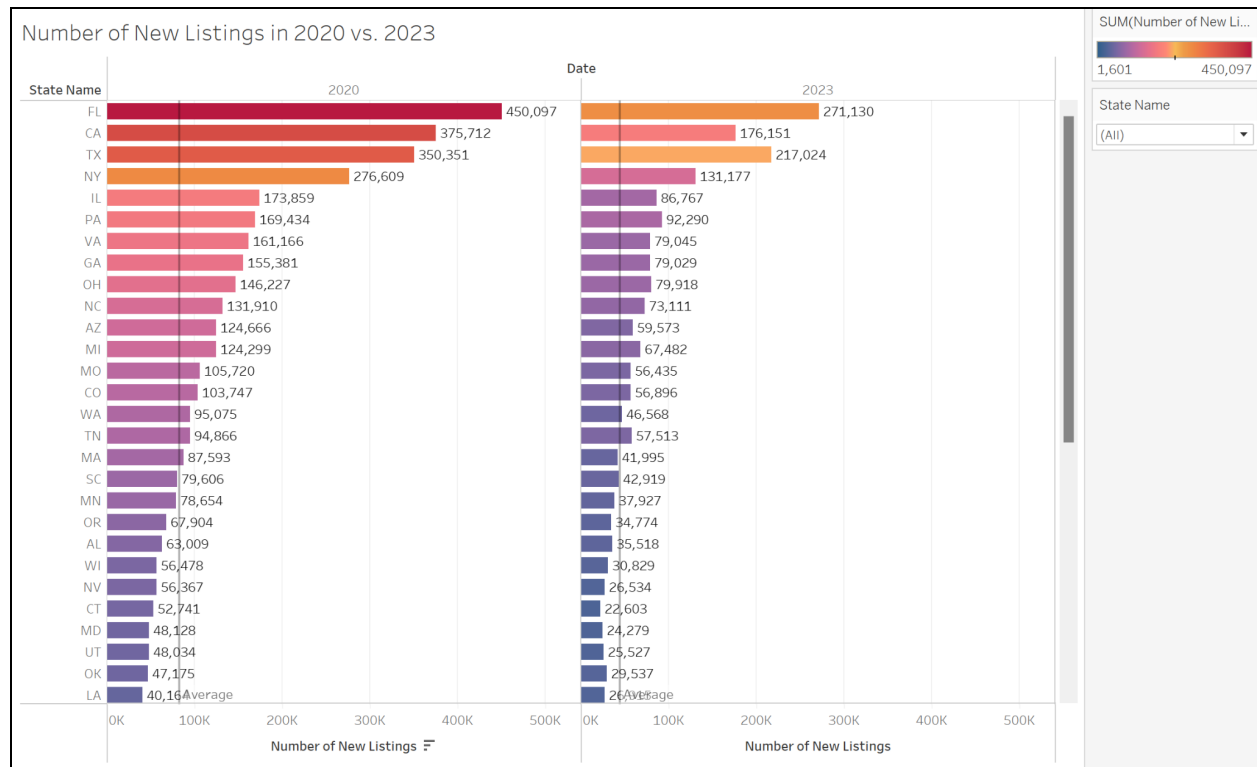


Figure 6: This figure shows the horizontal bar chart for the number of new listings by state for 2020 and 2023.

VI. Summary

This report analyzes the impact of the housing shortage on rental prices in college towns across the United States. After providing background on the national housing crisis, the report focuses specifically on how this shortage affects college students. With rising tuition costs and inflation, the lack of affordable housing presents yet another financial burden for students. The report uses rental data from Zillow to compare prices over time in Indiana college towns as well as nationally. Initial data analysis shows steep rental price increases since 2020 in college towns like Bloomington, Fort Wayne, Lafayette, and South Bend. This indicates that the housing supply has not kept up with demand, driving up costs for students.

VII. Conclusion

In conclusion, this analysis of rental data reveals that college students are being negatively impacted by inflated rental prices in college towns across the country. The COVID-19 pandemic exacerbated existing housing shortages, leading to a supply-demand imbalance and unaffordable rent hikes. More construction of affordable student housing units is needed to close this gap. Additionally, colleges, local governments, and housing providers should work together to find solutions that ease the financial burden on students. Ensuring adequate and affordable student housing must become a priority nationwide.

VIII. References

- Bahney, A. (2023, March 8). The US housing market is short 6.5 million homes | CNN Business. CNN.
<https://www.cnn.com/2023/03/08/homes/housing-shortage/index.html>.
- Caucus, I. H. D. (2023, August 23). Campbell commends Purdue for response to housing crisis but believes there is more to be done. Indiana House Democratic Caucus.
<https://indianahousedemocrats.org/news-media/campbell-commends-purdue-for-response-to-housing-crisis-but-believes-there-is-more-to-be-done>
- Zillow Group Inc. (n.d.). Housing Data - Zillow Research. Housing Data.
<https://www.zillow.com/research/data/>
- McNair, K. (2022, November 30). 20% of college students struggle to find stable housing-why it could have long-term consequences. CNBC.
<https://www.cnn.com/2022/11/30/20percent-of-college-students-struggle-to-find-stable-housing.html>.
- Perry, A. (2023, August 28). No room at the dorm: As college begins, some students are scrambling for housing. Forbes.
<https://www.forbes.com/sites/alexpermy/2023/08/20/no-room-at-the-dorm-as-collegebegins-some-students-are-scrambling-for-housing/?sh=375d89f731f5>.
- Santarelli, M. (2023, September 13). Housing shortage in the US: Challenges and solutions. Norada Real Estate Investments.
<https://www.noradarealestate.com/blog/housing-shortage-in-america/#:~:text=According%20to%20the%20National%20Low,homelessness%2C%20particularly%20in%20urban%20areas>.

IX. Contributions

Megha Wani : Wrote Datasets for Milestone 1 and one of the two datasets for milestone 2. Helped in trimming the content and formatting, wrote datasets as well as summary and conclusion for the final project. Created “horizontal bar chart showing the average median rent per each year and month for a selected state” as one of the six graphs for the team final presentation. Physically participated in the team final presentation to explain about the datasets. Actively participated in all team meetings and contributed to general discussions on the direction of the project. Helped in final project documentation.

Anton De Franco: Created the first line chart draft for milestone 2. Created the milestone 1 map chart. Helped find articles for reference and cited the datasources. Actively participated in all team meetings and contributed to general discussions on the direction of the project. Participated in meetings to draft and create the final presentation and report.

Liana Simopoulos: Wrote the introduction and background information for milestones 1 and 2, and the final project as well as the objectives and goals of the project. Assisted in writing the data story by adding a description of the dashboard and the second horizontal bar chart for the number of listings. Created the dashboard from the charts created by others and created one horizontal bar chart for the number of new listings for 2020 and 2023.

Ridvan Kanca: Wrote part of the visualization plan for the second milestone, and made editing for the first milestone. For the second milestone also helped find articles for reference, add his contributions to the introduction part and cited the datasources. For the final part of the project worked on crosstab which is showing average median prices by states and by year and prepared it for the presentation. Actively participated in all team meetings, helped editing final versions of the documents and contributed to general discussions on the direction of the project.

Sahana Reddy: Wrote about one of the two datasets for the second milestone and wrote about the datasets for the first milestone. Helped with editing milestones and researching project topics. Created scatterplot for final dashboard and contributions in writing and editing the final report and project. Actively participated in all team meetings and contributed to general discussions on the direction of the project.

Nicholas Zimmerman: Found the initial data set used for sourcing rental costs through Zillow's data, which was integral in the discovery process of the project. Built out the map charts and built out analysis on localized rent cost changes. Assisted in editing Average Rental and Number of Listings charts. Led presentation framing, and physically led the project presentation. Major contributions in revisal of the project.