Group 7 Project 3

Austin, Texas House Listings

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Introduction

Group 7 started project 3 by utilizing the Austin, Texas House Listings dataset. While we wanted to look at real estate sales across the US our initial dataset was 69 MB and we had to pivot to a more condensed version of our previous plan. We focused our scope by utilizing the house listings across the greater Austin, Texas area to explore historical data that would give us insight into the housing market. Our group was interested in identifying trends we may see over time or patterns we may observe. From there our goal was to design a functional data application that could hopefully be useful to those interested in the Austin market. To execute that we built a FLASK backend queried against a SQLITE database, and a HTML/JS front-end to facilitate user requests and aid in the dynamic building of our visualizations and interactive map.

Data Cleaning/Database Creation

Luckily our pivot to the new dataset resulted in us not needing to do any data cleaning. Our next step was to create the database that would connect to our FLASK. Because our dataset was stored as a CSV, we read the file in as a dataframe to do some initial exploration of our data, then created the SQLite database:

```
# Create a SQLite database and table using SQLAlchemy engine
engine = create_engine('sqlite:///austinHousingData.sqlite')
```

```
# Write the DataFrame to the SQLite database
housing_df.to_sql('austin_housing', con=engine, index=False)
```

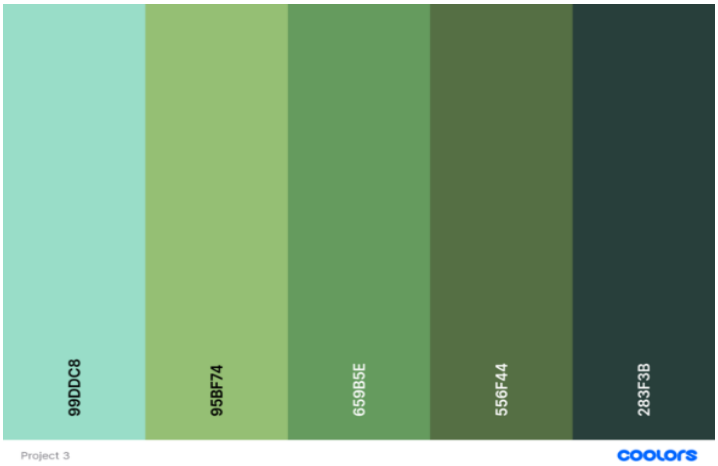
Finally, we used the INSPECT function to confirm the database's existence, then closed the engine:

```python
# INSPECT to confirm existence
# Create the inspector and connect it to the engine
inspector_gadget = inspect(engine)

# Collect the names of tables within the database
tables = inspector_gadget.get_table_names()

# Print metadata for each table
for table in tables:
    print(table)
    print("-----------")

    # Retrieve columns
    columns = inspector_gadget.get_columns(table)
    for column in columns:
        print(column["name"], column["type"])

    print()
```

```python
# Close the engine
engine.dispose()
```

Color Design

While our attention was heavily focused on the functional success of our project we still tried to maintain a sense of cohesion regarding the color design. There is much room for improvement with the visual aspect of our application, but we tried to use the color scheme referenced below. We selected it because while the colors worked well together, there was also enough variability among colors to be impactful when showing trends.



Website Architecture

This website was designed to showcase housing listings in the Austin, TX area, along with visualizations that highlighted trends within the data. It featured 5 pages within the website including:

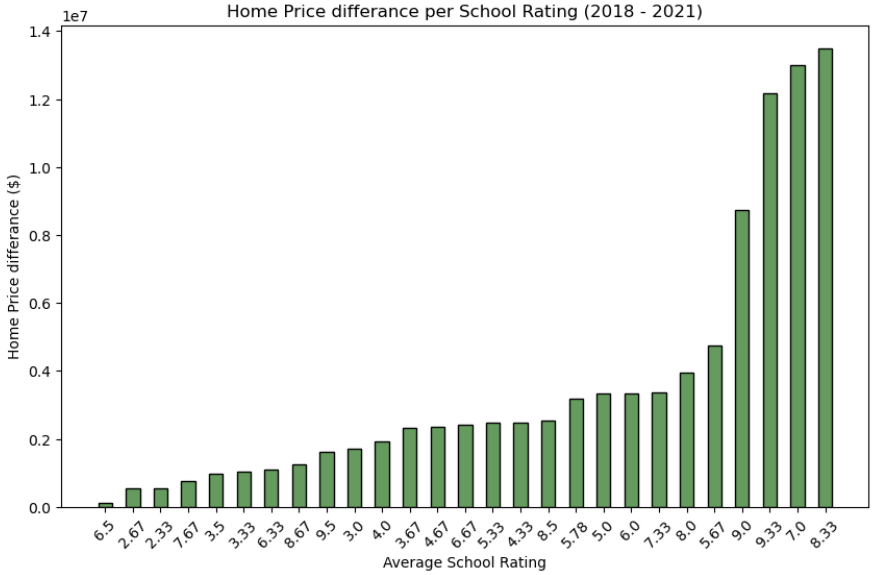
- A home page to introduce our website and give background on our project and dataset
- A dashboard that provides visualizations and insights into the housing trends that are able to be filtered by a minimum year built filter
- A map that is also interactive and filterable by the same minimum year built filter that was on the dashboard.
- An about us page that introduces every member of the team with links to each team member's linkedin page
- A works cited page with links to our dataset, GitHub repository, our inspiration for the project.

Research Question 1

What is the biggest difference in home price, per School Rating, from 2018 - 2021? The data analysis indicates that the most significant difference in home prices is associated with an average school rating of 8.33. At this rating, the maximum home price is $13,500,000, while the minimum is $5,500, which results in a substantial difference of $13,494,500. This notable variation suggests that homes in areas with better-rated schools not only command higher prices but also exhibit a wider range of prices compared to areas with lower-rated schools. In summary, the analysis emphasizes that the largest difference in home prices is strongly correlated with higher school ratings. As the school rating increases, the spread between the most expensive and least expensive homes widens dramatically, with the most significant variation observed around the highest average school ratings. This pattern underscores the potential impact of school

quality on the housing market, particularly in driving both higher home prices and greater price variability.

	avgSchoolRating	maxPrice	minPrice	price_differance
21	8.33	13500000.0	5500.0	13494500.0

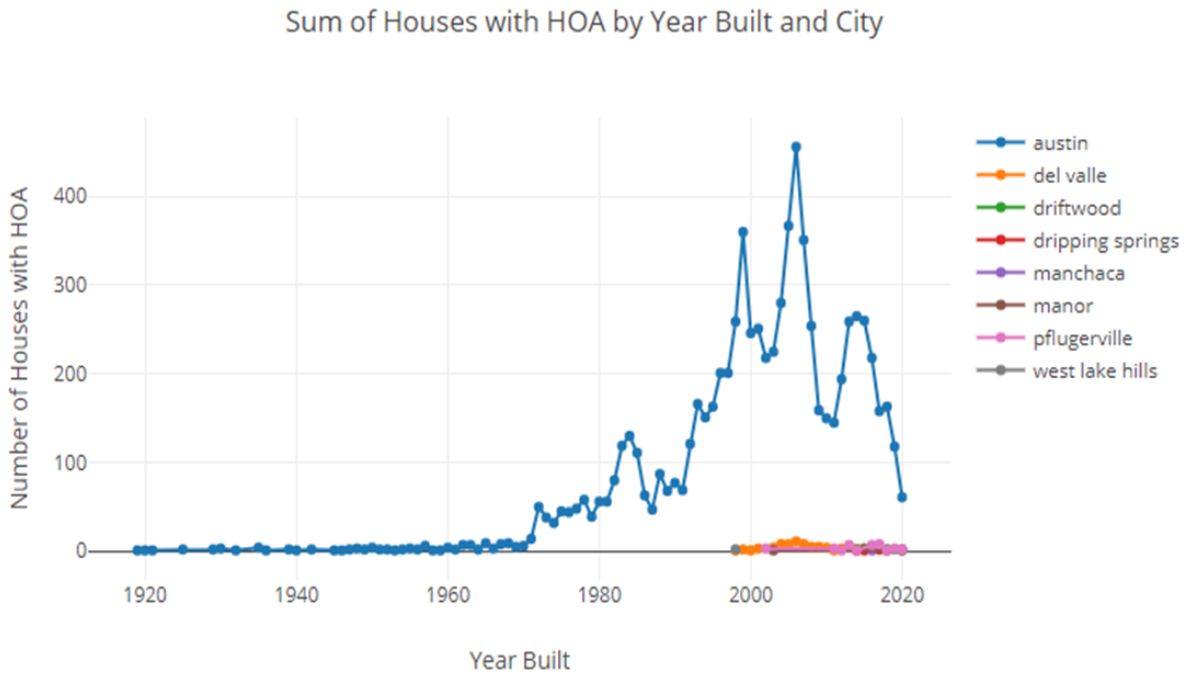


Research Question 2

How many homes have Homeowner Associations per year built?

We chose to explore this question since HOAs can be a big part of the monthly housing costs and usually imply stricter rules within a community. Based on the line graph that we created from our dataset, we observed that the surrounding cities around Austin (such as Driftwood, Dripping Springs, Manor) generally had a small population of homes with HOAs. The number of homes with HOAs in these cities was almost zero. Additionally, HOAs were nonexistent for the surrounding cities up until about the year 2000, whereas Austin saw a rise in HOAs starting in the 1970s. Between 1988 – 1998, homes with HOAs rose from 47 to 360, and when exploring the context potentially behind this increase, we learned that during the 90s Texas was growing faster than any other state in the nation. Texas had secured large shares of the booming

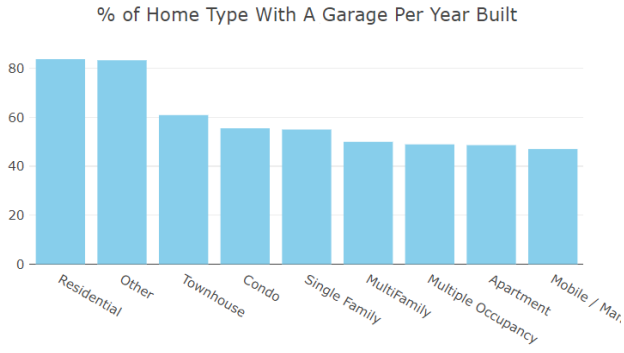
industries. For instance, Austin's higher education and high-tech research contributed to its thriving business climate in electronics manufacturing and semiconductor industries. Moreover, Texas employment grew at an average of 3.3% per year, compared to the national average of 2.1%, and Austin had the fastest growing workforce. During this period, construction employment grew at an average rate of 11% per year, reflecting the dramatic increase in population as well. Moving on from this time frame, homes with HOAs reached an all-time high of 456 in 2006 which also marks the period of the housing bubble when home buying was at an all-time high due to low interest rates and loose lending standards. After 2006, homes with HOAs continued to decline until 2020 when the number of homes with HOAs was 61. In 2020, the world was hit by the global pandemic and most activity was halted. Overall, Austin's housing market between 2010 and 2020 saw a decline in demand, a decrease in affordable housing, and subsequently a rise in prices.

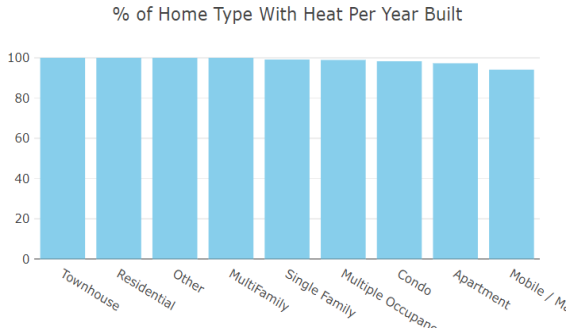


Research Question 3

Are certain amenities more common in houses that were built more recently?

We chose this question because we wanted to see when certain amenities became more popular. The 2 amenities we chose to look at is if a house had a garage and if a house had heating. We found that the percentage of houses that had heating was very high regardless of when they were built, but if you filtered the data for houses built since 2010 the percentage of houses with heating would jump close to 100%. However, when looking at the data for houses with a garage we see that over time each home type has become more likely to have a garage. This is shown with 83% of residential houses having a garage when there is no filter applied. However, that number jumps to 91% when looking at the residential houses built since 1980 and up to 100% when looking at residential houses built since 2010. We found that the more recent a house was built the better the chances of those houses having more amenities.





Bias/Limitations

Our dataset included a Latest Price category that reflected both sale price and rental price from 2018 - 2021. It would have been more ideal to have had a separate category that reflected only the sale price over a longer time span. Our dataset did not provide any information regarding the demographics and income of buyers. Having this information could have allowed us to

analyze which groups of people are buying, understand any migration patterns, and compare our findings with those from other research datasets. With an expanded dataset, we also could have attempted to build a predictive model that would show how some of these trends may change over time.

Conclusion

Our study of the Austin housing market from 2018 to 2021 highlights a strong link between school ratings and home prices, where homes near top-rated schools saw price differences as high as $13.5 million, indicating a significant demand for properties in these areas. We also observed that the rise of Homeowner Associations (HOAs) in Austin peaked in 2006, with 456 homes, but has since declined, reflecting a shift in buyer preferences toward more modern, standard amenities. Meanwhile, surrounding areas have fewer homes with HOAs, suggesting different market dynamics. Looking ahead, expanding the analysis with more recent data, demographic and income information, migration patterns, and predictive models could provide deeper insights into how these trends may shape the future of the Austin housing market.