

Time Series Analysis of the San Antonio Metropolitan Area

Top Zip Codes for Investment Opportunities

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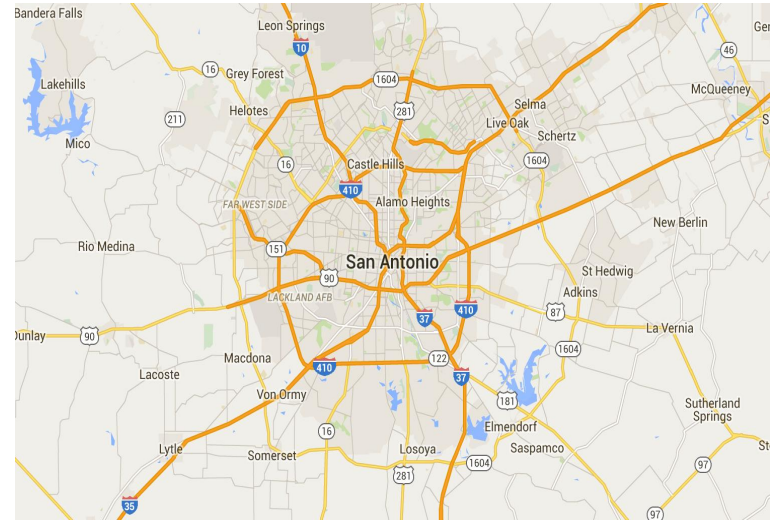
Background



- San Antonio is the 7th most populous city in the US and the fastest growing city among the top 10 largest
- One of the best places to visit and fastest growing economies in the US
 - Military
 - Health Care
 - Insurance
 - Tourism
- Build a time series model to forecast future home prices in the metro area

Business Case

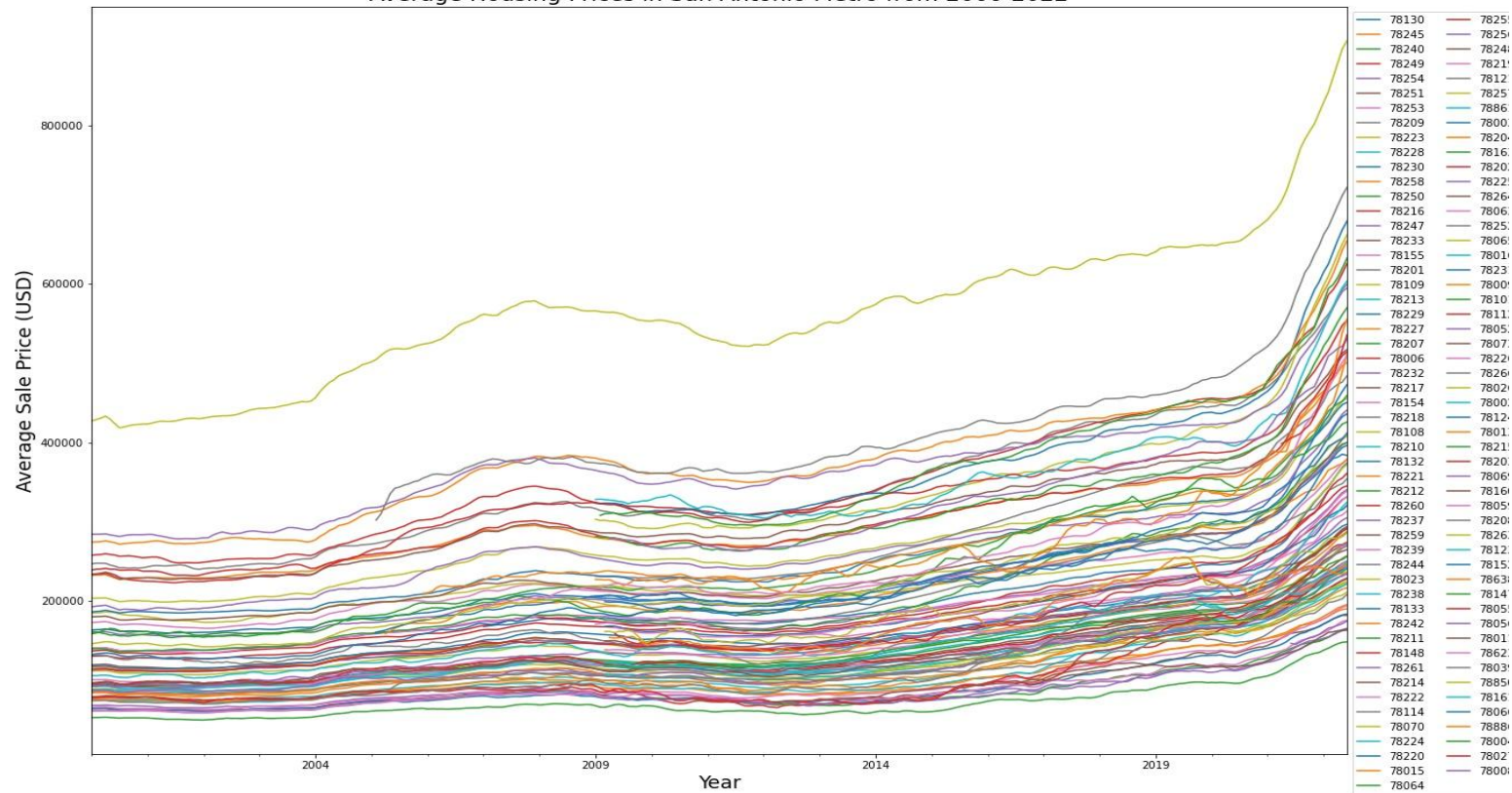
- EXPI Investments, a new real estate investment group wants to know the top 5 zip codes to invest in if they sell in 3 - 5 years
- They want the highest return on investment with the least amount of risk



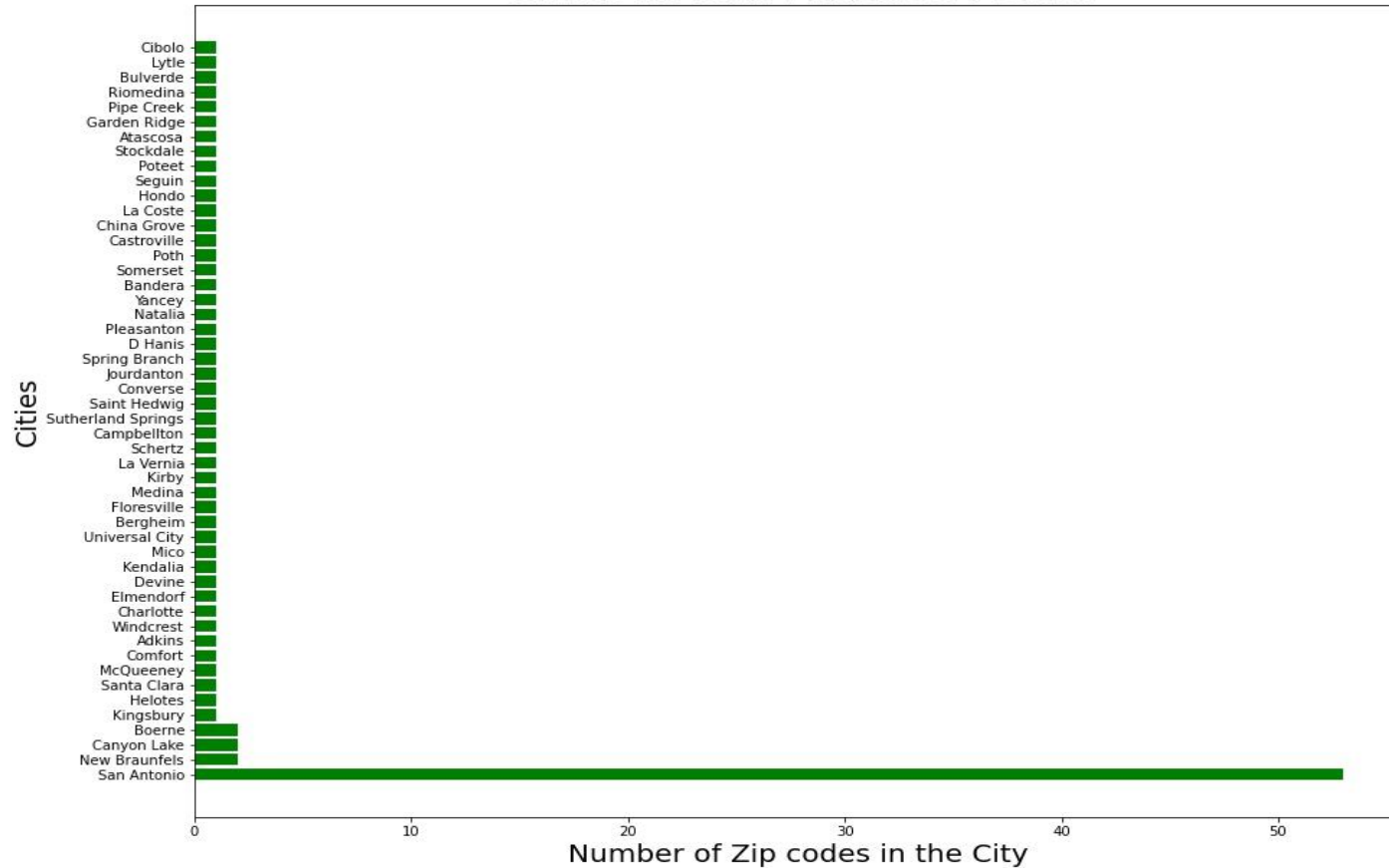
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- Dataset downloaded on Zillow @ <https://www.zillow.com/research/data>
- Contains monthly median home sale prices for each zip code
- 33rd to 67th percentile for each zip code
- Data ranged from January 2000 - June 2022
- Filtered down to 105 zip codes in San Antonio metro area

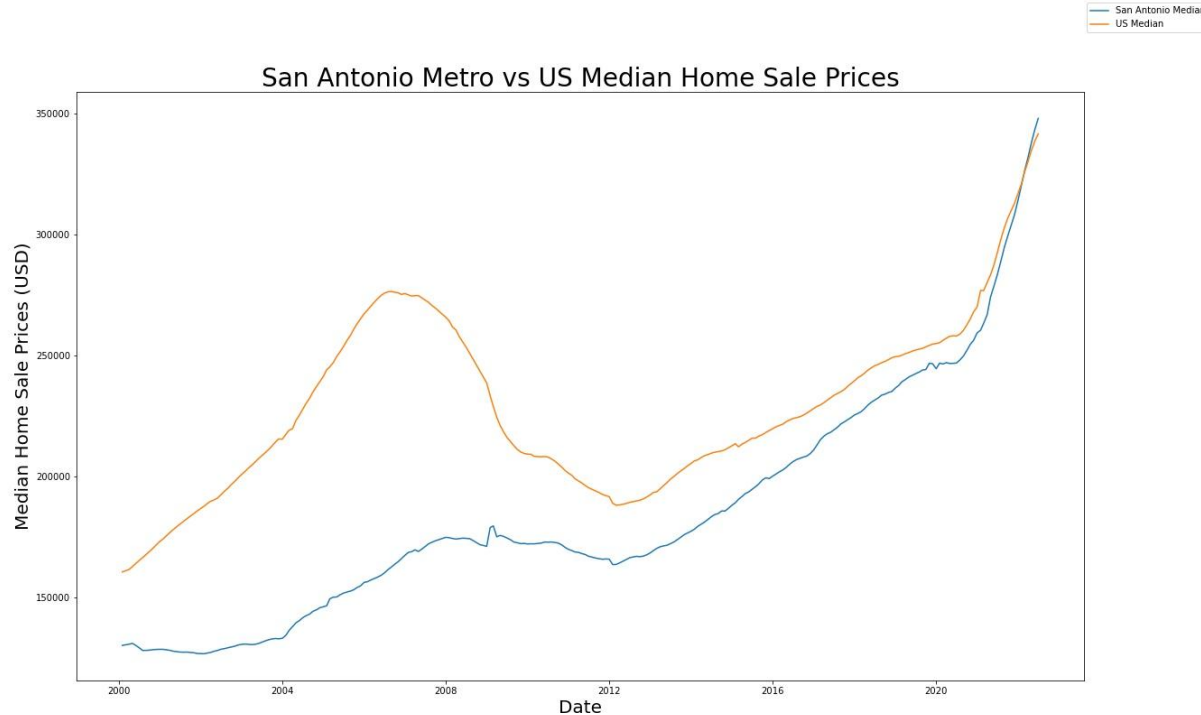
Average Housing Prices in San Antonio Metro from 2000-2022



Cities in San Antonio Metro

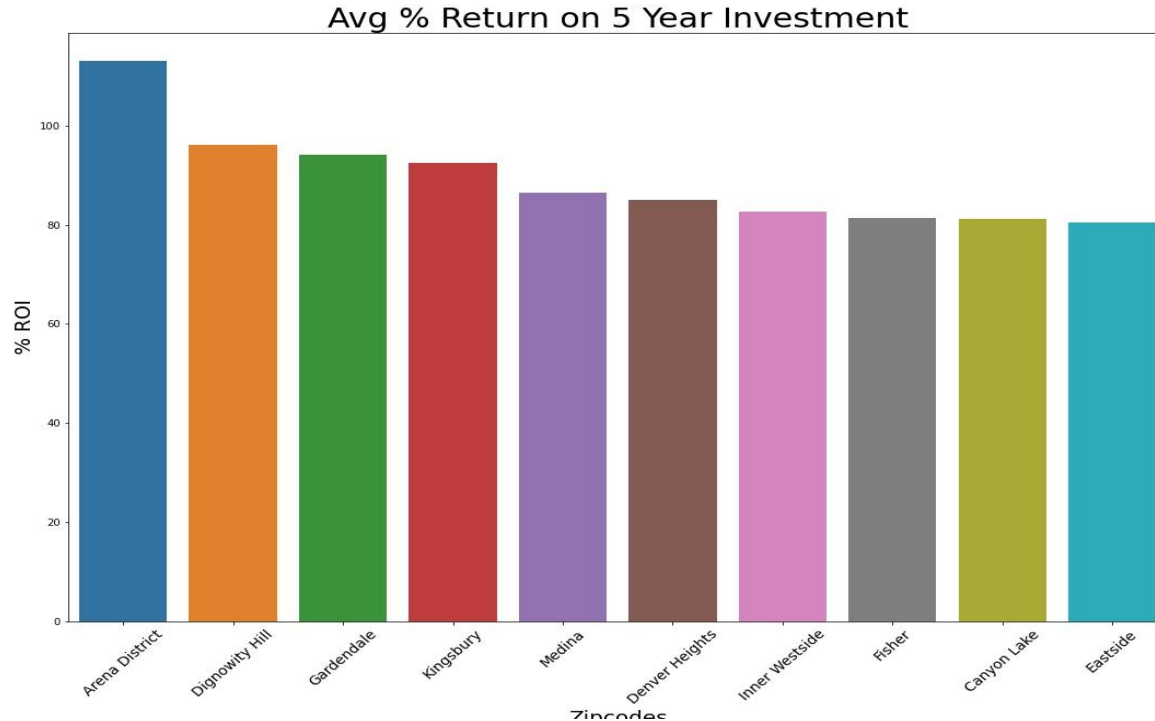


San Antonio Metro vs US



- Average median home value in the SA metro has surpassed the national average this year
- SA metro not as affected by 2008 crash

Avg % Return from 2017-2022



- These 10 zip codes have the highest ROI from 2017 - 2022
- They had 80% - 107% ROI over 5 years!

Modeling Methods

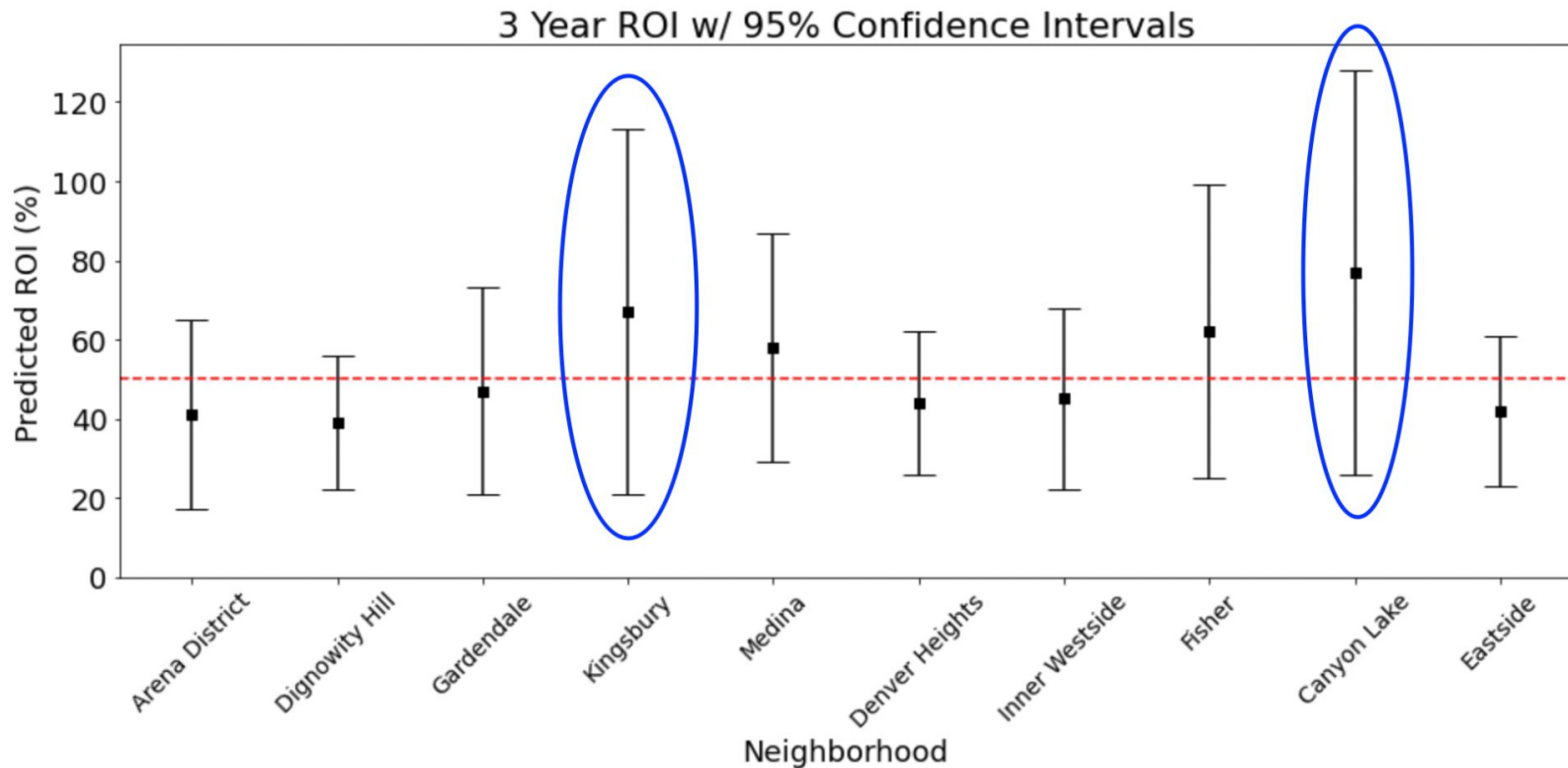
- SARIMAX Time Series Model on zip codes with highest ROI over last 5 years
- Dynamic Forecasting to predict house prices 3 and 5 years into the future
- Highest ROI with the lowest risk associated with purchase



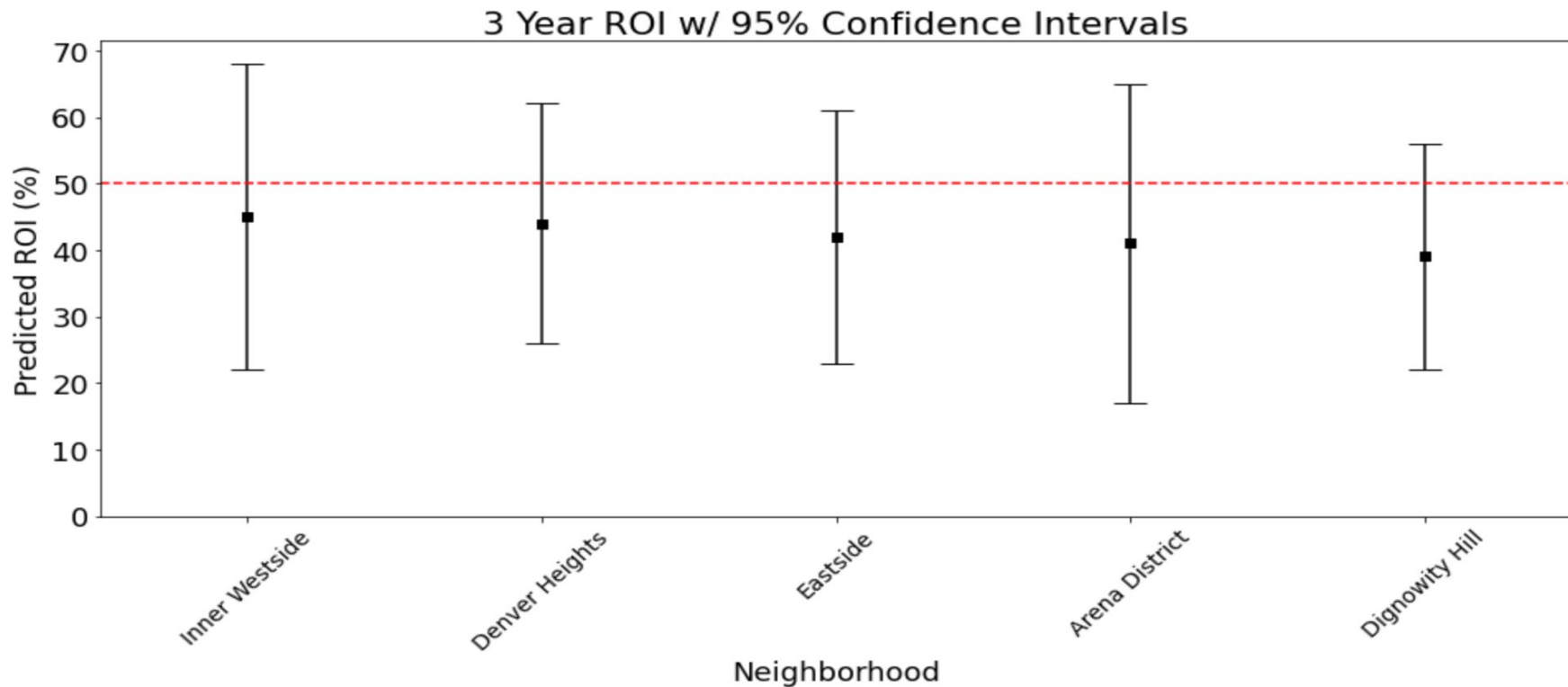
Top 10 Zip Codes 3 Year Projected ROI

Neighborhood	Zip Code	Investment Value (\$)	Predicted Sale Price (\$)	Min Pred Sale Price (\$)	Max Pred Sale Price (\$)	Predicted ROI (%)	Min Pred ROI (%)	Max Pred ROI (%)
Dignowity Hill	78202	228219.0	316210.20	277737.86	354682.55	39.0	22.0	55.0
Arena District	78203	241568.0	339839.66	283808.21	395871.11	41.0	17.0	64.0
Eastside	78220	183720.0	260936.10	226854.29	295017.91	42.0	23.0	61.0
Denver Heights	78210	234712.0	337287.14	295798.77	378775.51	44.0	26.0	61.0
Inner Westside	78237	163415.0	237227.36	199425.67	275029.05	45.0	22.0	68.0
Gardendale	78207	148461.0	217501.24	180366.22	254636.25	47.0	21.0	72.0
Medina	78055	361314.0	569344.07	465645.71	673042.44	58.0	29.0	86.0
Fisher	78623	509544.0	827218.41	638932.68	1015504.15	62.0	25.0	99.0
Kingsbury	78638	555727.0	930184.77	673410.44	1186959.09	67.0	21.0	114.0
Canyon Lake	78133	473175.0	837285.82	594395.25	1080176.39	77.0	26.0	128.0

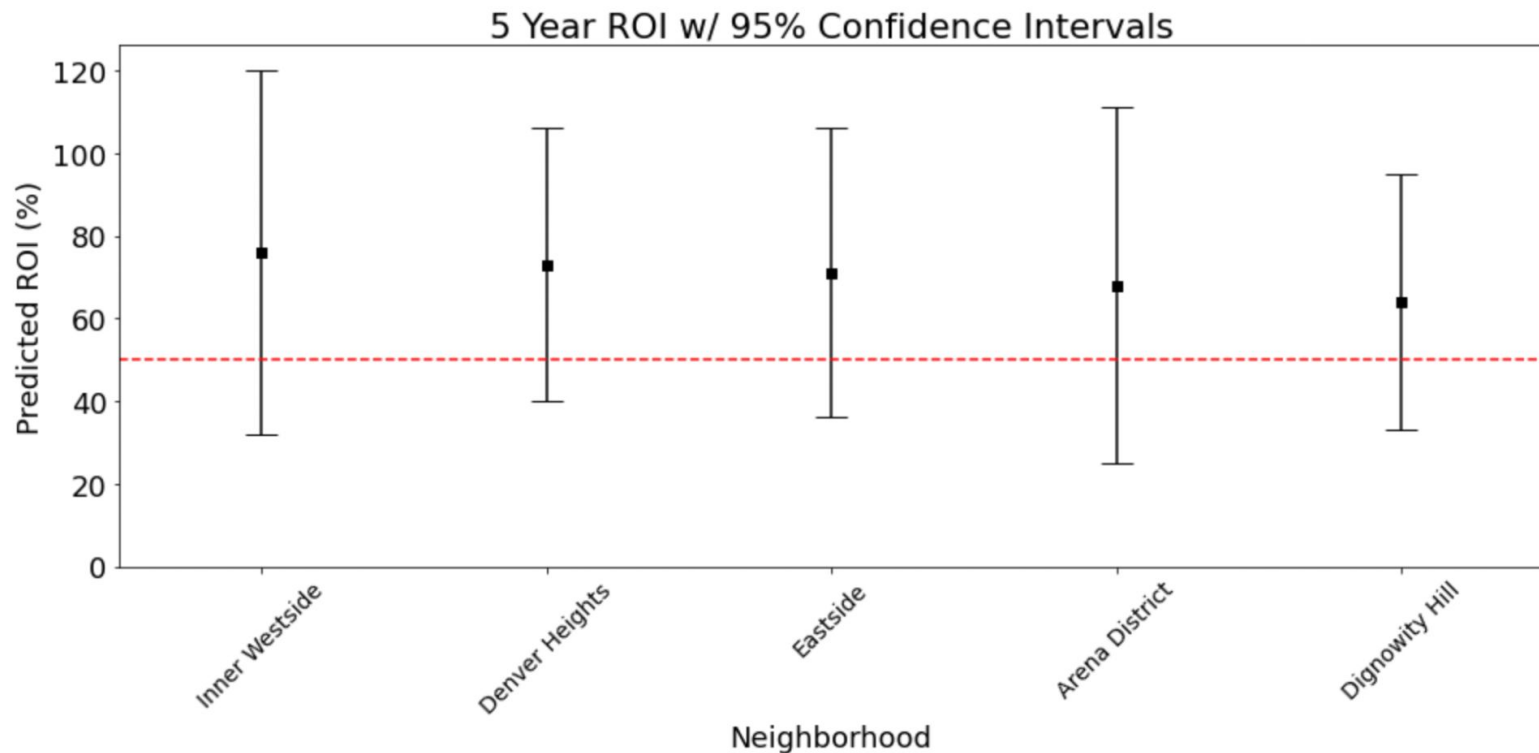
Top 10 Zip Codes 3 Year Projected ROI



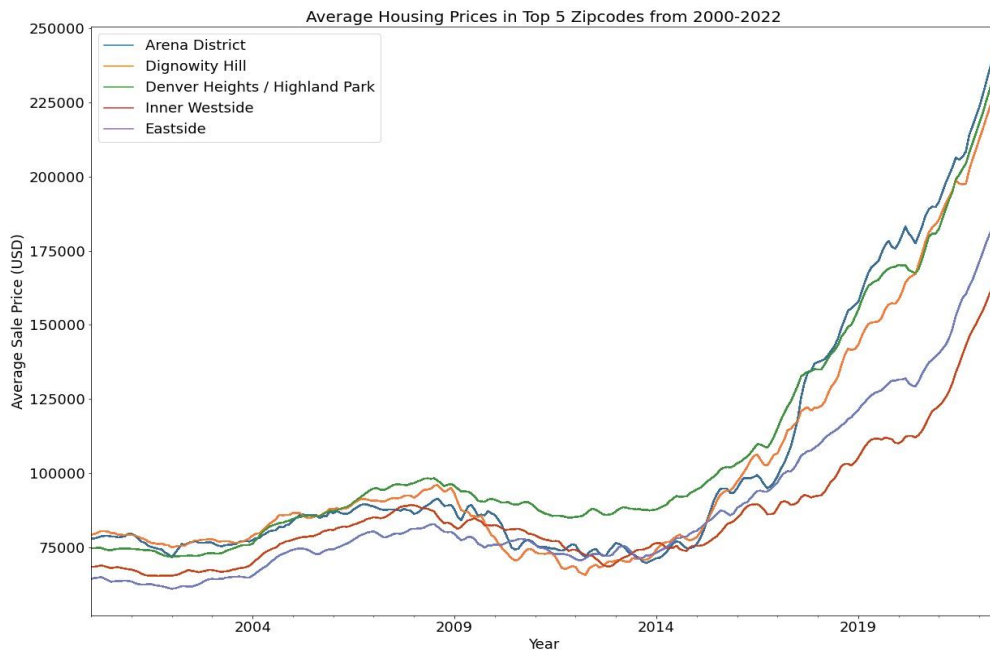
Top 5 Zip Codes 3 Year ROI Projection



Top 5 Zip Codes 5 Year ROI Projection

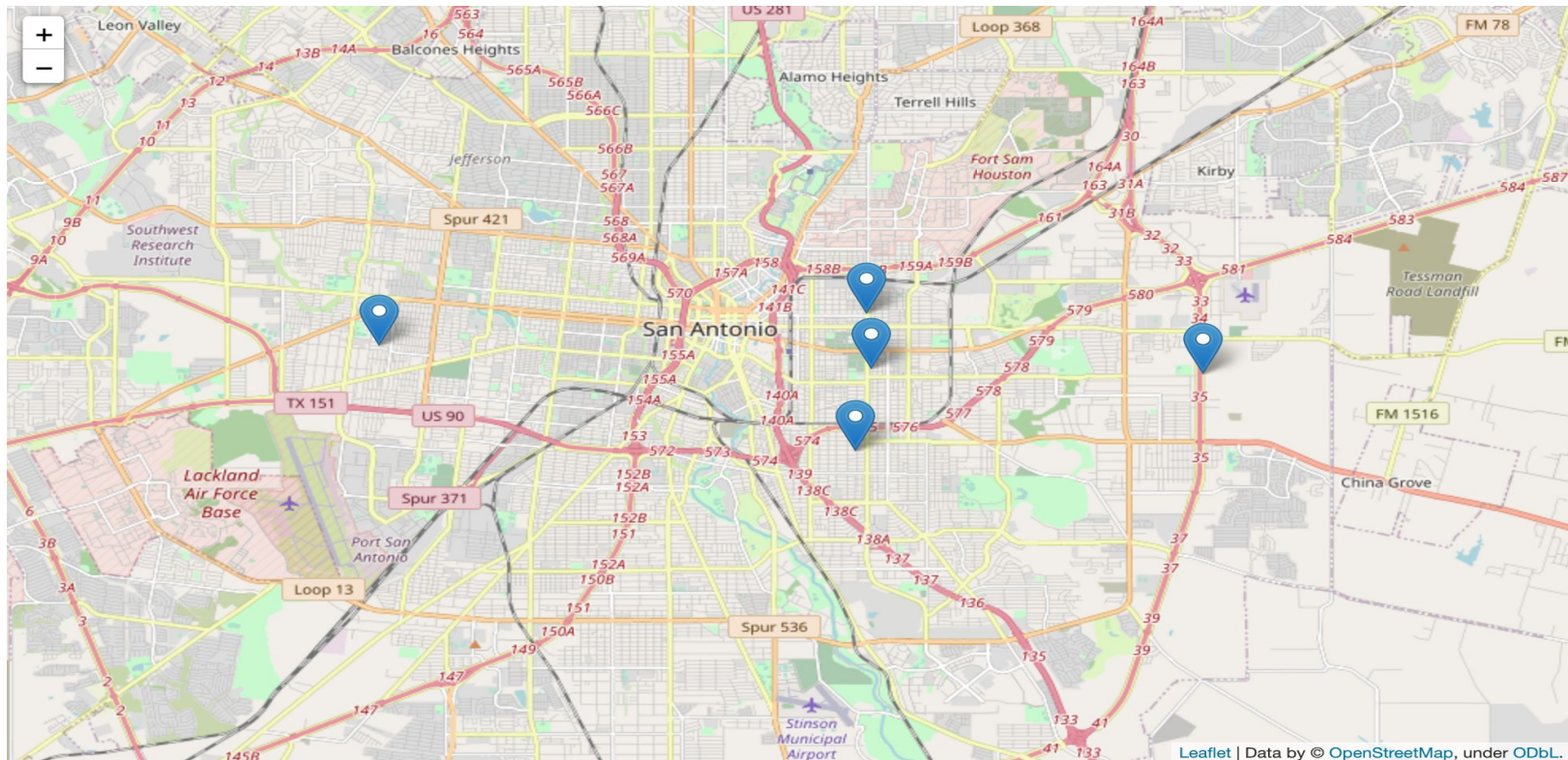


Top 5 Zip Codes Median Home Prices over Time



- Similar trend among top zip codes
- More pronounced in the Arena District, Dignowity Hill, and Denver Heights due to gentrification that has been taking place over past 4 years

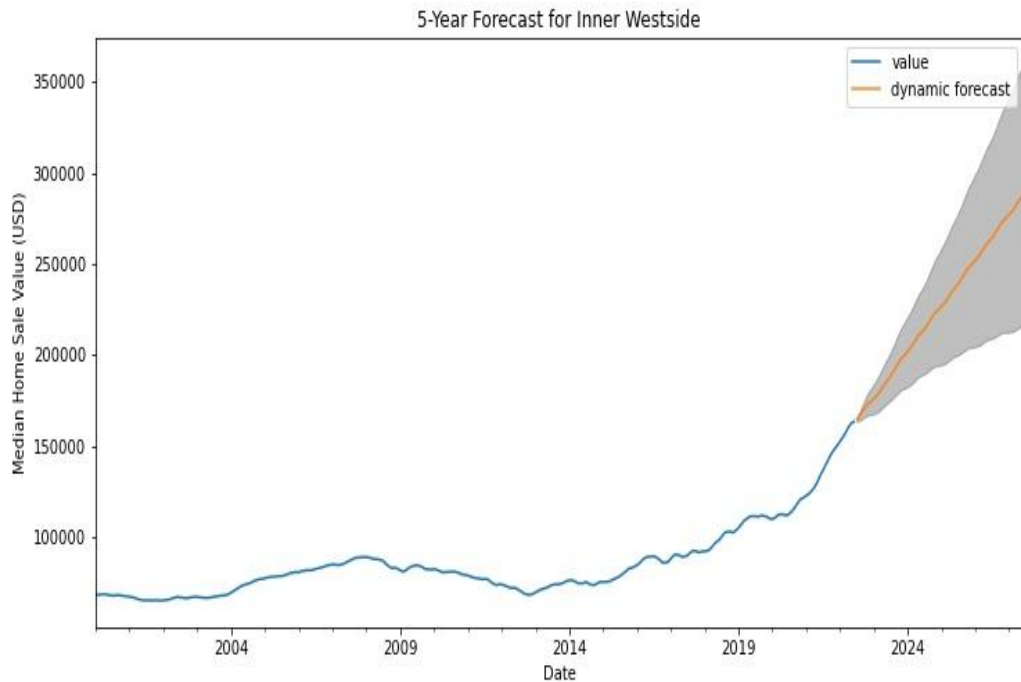
Location of Top 5 Zip Codes



Recommendations

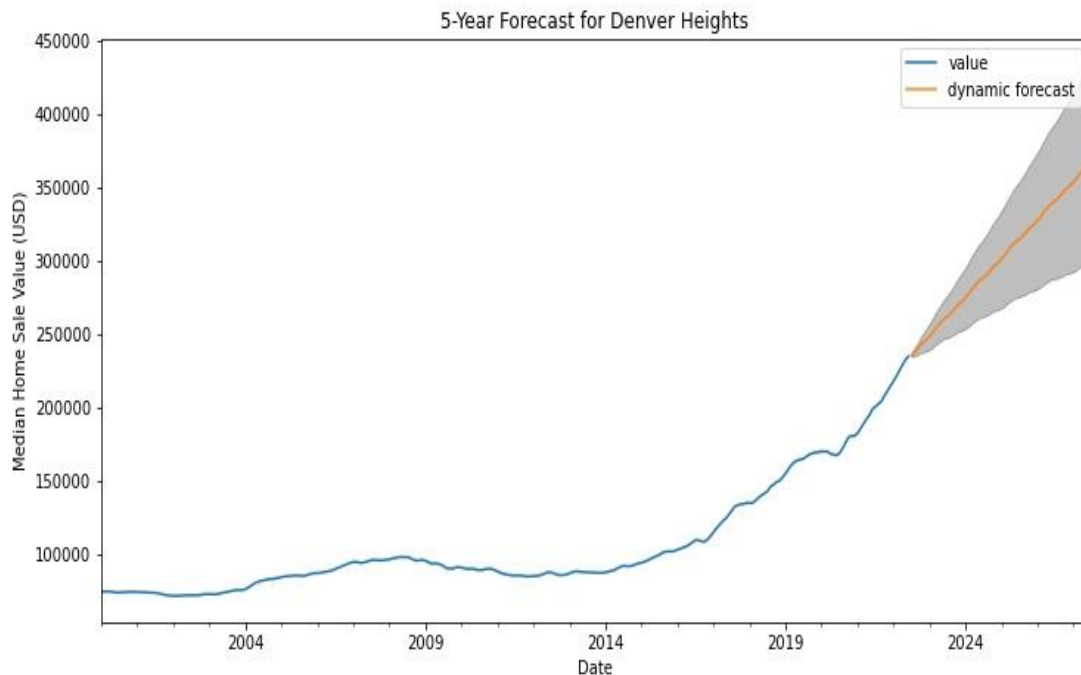
- The top 5 zip codes ranked by highest return on investment (ROI) with the least amount of unpredictability and variation are:
 - 78237: Inner Westside
 - 78210: Denver Heights / Highland Park
 - 78220: Eastside
 - 78203: Arena District
 - 78202: Dignowity Hill
- I recommend purchasing homes in these zip codes to maximize profits
 - Median prices in these zip codes are significantly lower than the median of metro area
 - Rate of crime is high and school rating is below average
 - If concerned, look at other zip codes in our top 10 - suburban areas with low crime and good schools

5 Year Forecast for Inner Westside



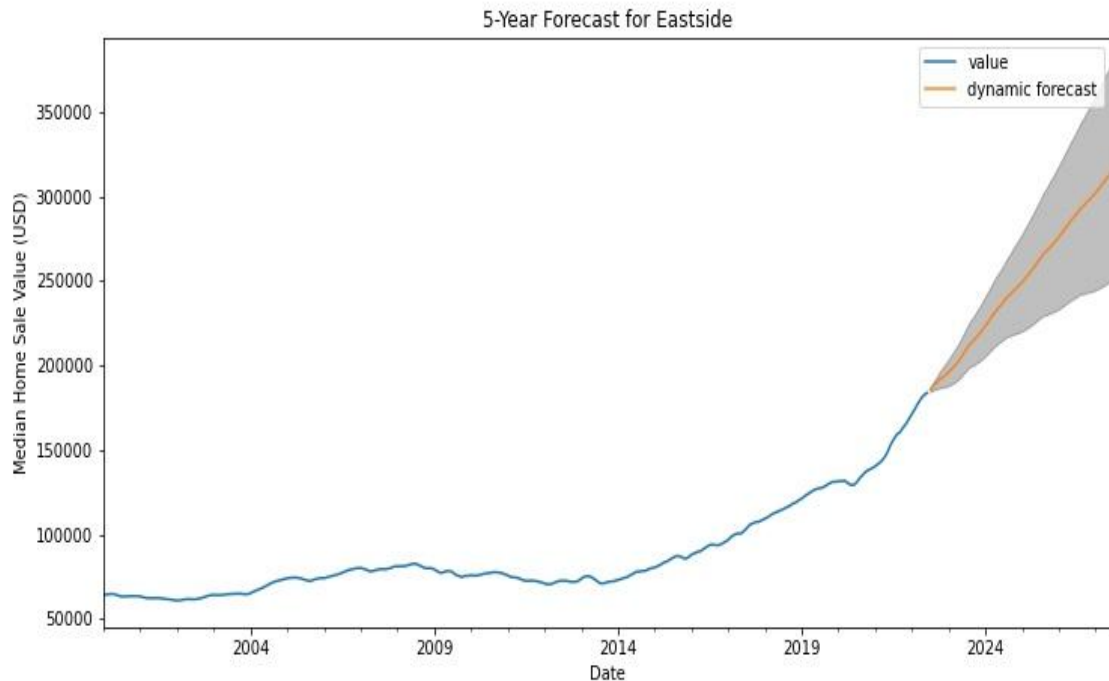
- Initial investment - 163k
- 3 year projected ROI - 45%
- 5 year projected ROI - 76%
- Lowest initial investment and highest projected 3 and 5 year ROI
- Homes should be bought in the winter and sold in the summer for additional 2% ROI

5 Year Forecast for Denver Heights



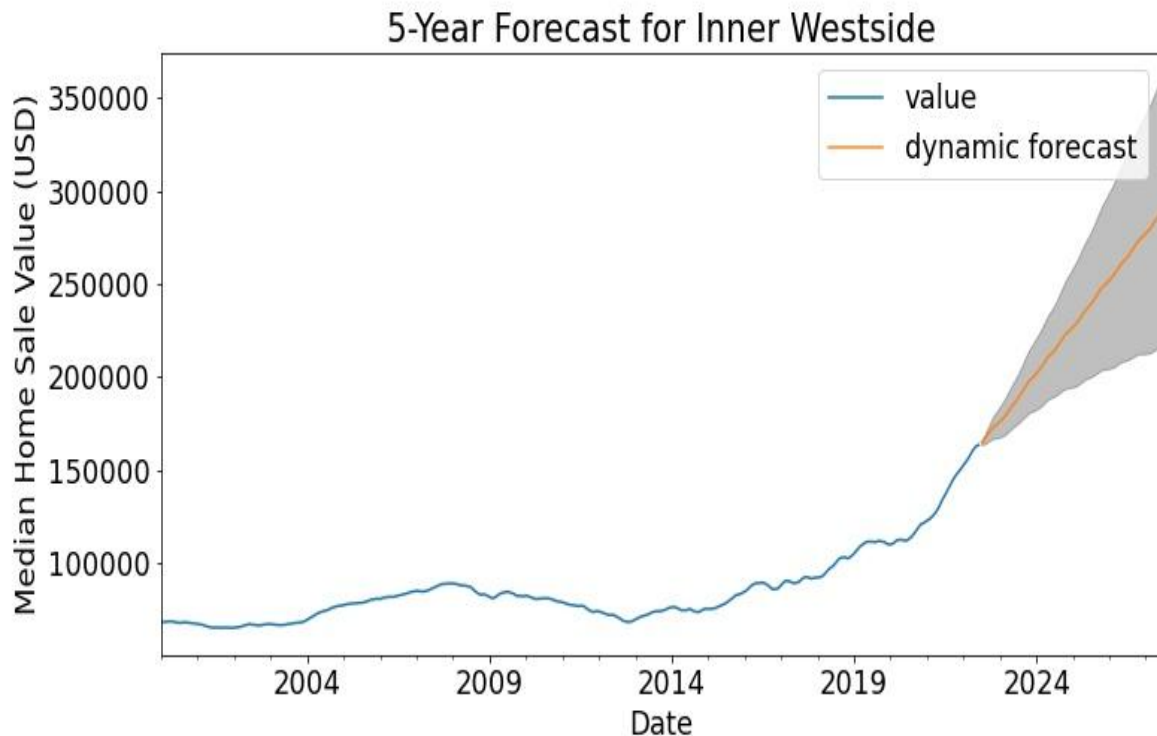
- Initial investment - 235k
- 3 year projected ROI - 44%
- 5 year projected ROI - 73%
- Millennial hot spot - median age of 27
- Low variation in data making it one of our safest investments

5 Year Forecast for Eastside



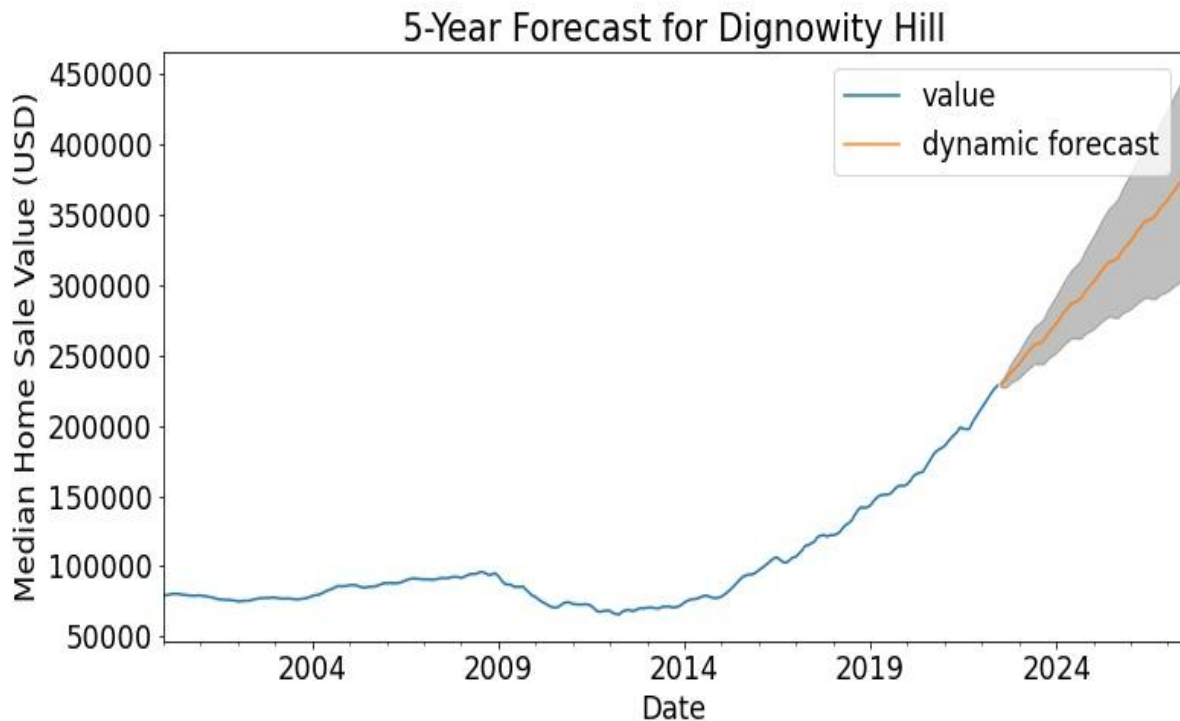
- Initial investment - 184k
- 3 year projected ROI - 42%
- 5 year projected ROI - 71%
- 2nd lowest initial investment with low associated risk
- Area was used for agricultural purposes until recently - larger plots of land available

5 Year Forecast for Arena District



- Initial investment - 242k
- 3 year projected ROI - 41%
- 5 year projected ROI - 68%
- Area surrounding AT&T Center - loaded with bars, restaurants, and coffee shops
- Highest initial investment and most risk
- Homes should be purchased in the summer and sold in the winter for additional 2% ROI

5 Year Forecast for Dignowity Hill



- Initial investment - 228k
- 3 year projected ROI - 39%
- 5 year projected ROI - 64%
- First residential suburb of San Antonio - historic zone
- Least variation in data and safest investment
- Homes should be purchased in the winter and sold in the summer for additional 1% ROI

Future Work

- Add exogenous factors to model:
 - Interest rates
 - Crime data
 - Median income over time
- Different modeling technique such as Facebook Prophet



THANK YOU!

Email : meljoy1099@gmail.com

Github Repo: <https://github.com/meljoy1099/housing-price-forecast-time-series-modeling>