The Effect of the COVID-19 Pandemic on Real Estate and Population Shift

Michael Ho , Ramakrishna Bijanapall, Michael Mow, Shashank Tripati, Giang Duaong, Enrico Eduardo

Georgia Tech College of Computing

SUMMARY

How has COVID-19 and the shift in remote work affected real estate prices and migration patterns in the US? How does the future look for those investing or wanting to move? Team Chain Coders was assmebled to develop an interactive visualization tool to allow users to view real estate metrics at the state and county level since 1975 and predictions up to 2026 to make informed real estate decisions. We found that COVID-19 had a significant effect on increasing the trajectory of real estate prices in almost every county, particularly in lower cost of living areas.

DATA

SETUP

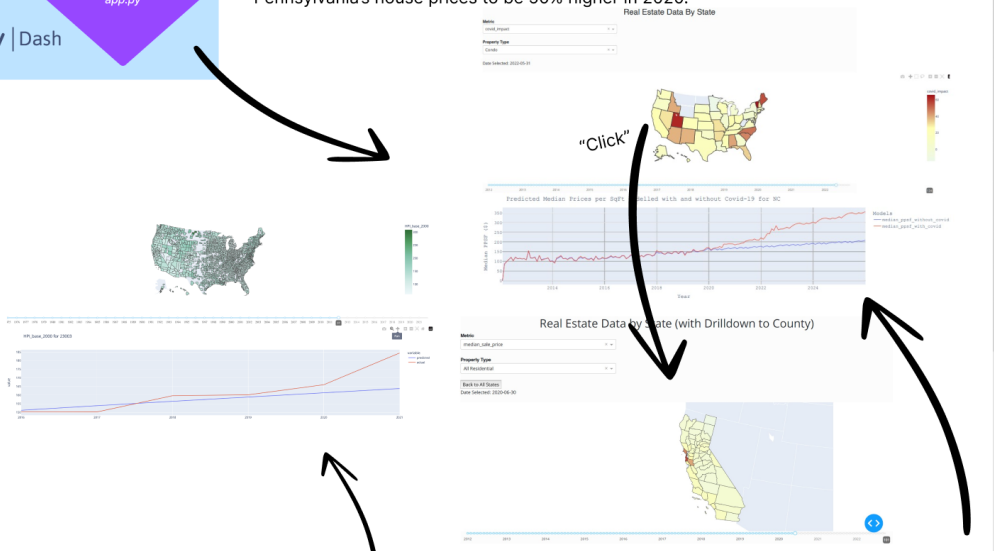
The data was pulled using the Redfin API and Federal Housing Financing Agency (FHFA) API and stored in our Google Cloud Platform (GCP) BigQuery database. The time-series models are trained and executed offline with their predictions stored in the cloud database. The visualizations are executed in separate python scripts with queries to our cloud database, which were held together by a main landing page having connections to each of our python scripts.

VISUALIZATIONS

When a user navigates to the landing page, they will see instructions and links to the different pages. One page is for US states, with drop down menus for various metrics, e.g. price per square feet, and property types, e.g. townhouse. Clicking a state will drill down to a county view of that state. The choropleths at both the state and county level are enhanced with line charts that output data from our trained SARIMA models, using pre-COVID and COVID data, between 2012 to 2022. The data displayed is accomplished by filtering a queried dataset on the cloud by the state or county view, and the selected dropdown menu and slider values, e.g., date, metric, and property type.

DON'T FORGET HPI!

Alongside the Redfin dataset, our visualizations also included data from the Federal Housing Finance Agency (FHFA) using the housing price index (HPI) to measure average prices changes in the sales or refinancings of real estate properties. The HPI doesn't reflect the price directly, but instead measures how the price has changed compared to previous years. So if Pennsylvania's HPI is 100 on 1980 and 150 on 2020, we can expect Pennsylvania's house prices to be 50% higher in 2020.



EVALUATION

The trained SARIMA models, using data between 2012 to 2016, were accurate at predicting actual housing prices between 2016 to 2020, resulting in lower RMSE compared to other models such as ARIMA and compared to the pandemic time periods. When the SARIMA model were trained using data before COVID (up to 2020) and during COVID (up to 2022), they revealed a significant descrepancy between the trajectory of real estate prices, where the model with COVID data far outpaced the prices in the non-COVID model, particularly in low cost of living areas. We propose that remote work and the cost of living have incentivized people to relocate to such areas, including states such as Vermont, Idaho, and SunBelt (Arizona). Our model was able to confirm the increase in housing prices due to this population migration in these areas post Covid.

A REAL WORLD USE CASE

"As an individual planning to move out of the mid-west in the next year, the choropleth at the county level provides the granularity of detail I need to see for states that I am not familiar with, and the metrics of HPI, median ppsf, median home sale price, and difference in SARIMA models using median ppsf, along with predictions up to 2026, not only give me the ability to view the data for a given period in time, but helps to make a more informed real estate investment for the future."
-Michael Ho