

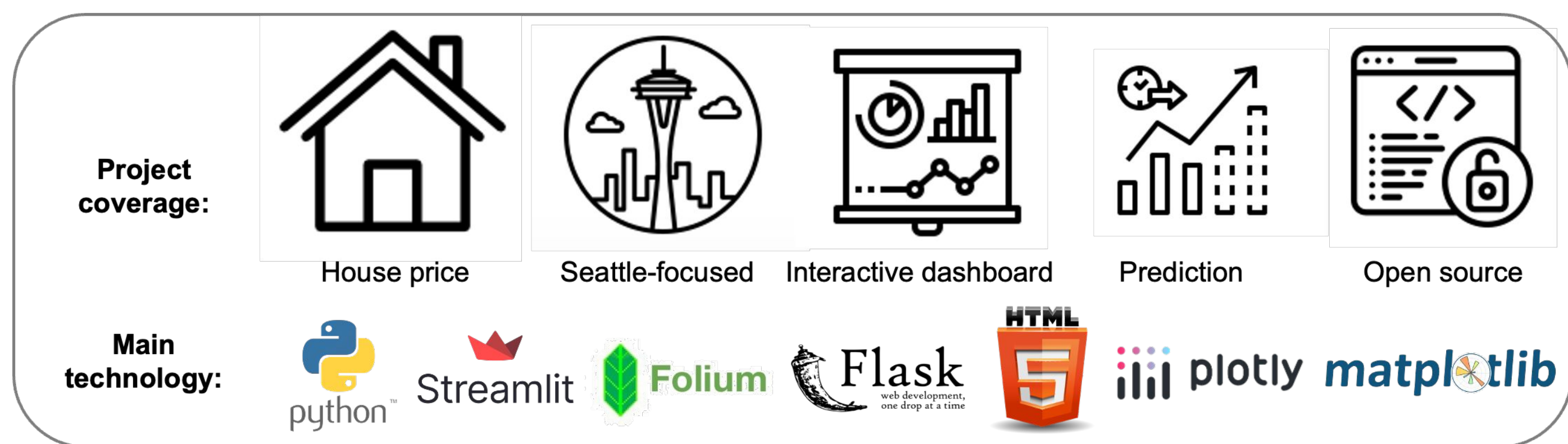
Seattle housing market analysis and prediction

CSE 583 project

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1. Problem statement & project overview

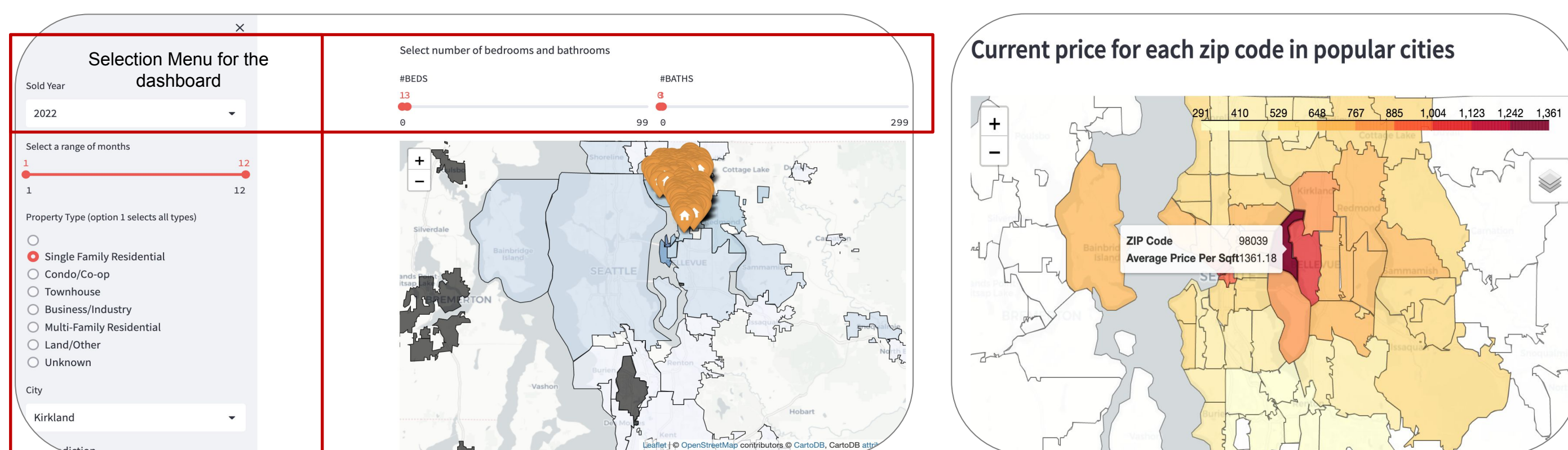
- First-time house buyers might not have a good understanding about the housing market and need a visualization tool to easily identify market trend and choose a right neighborhood for them.
- Leading real estate platforms such as Redfin and Zillow are providing users with home price prediction. However, users don't have access to the assumptions and predictor variables used in the prediction model to evaluate its accuracy and reliability.
- Our project provides **an interactive dashboard & open-source tool** for house buyers to visualize and predict house prices in the next 3 months or based on the selected features. Even though our analysis focuses on house prices in Greater Seattle Area, users can access to our code and make changes accordingly to enhance the dashboard and the prediction model.



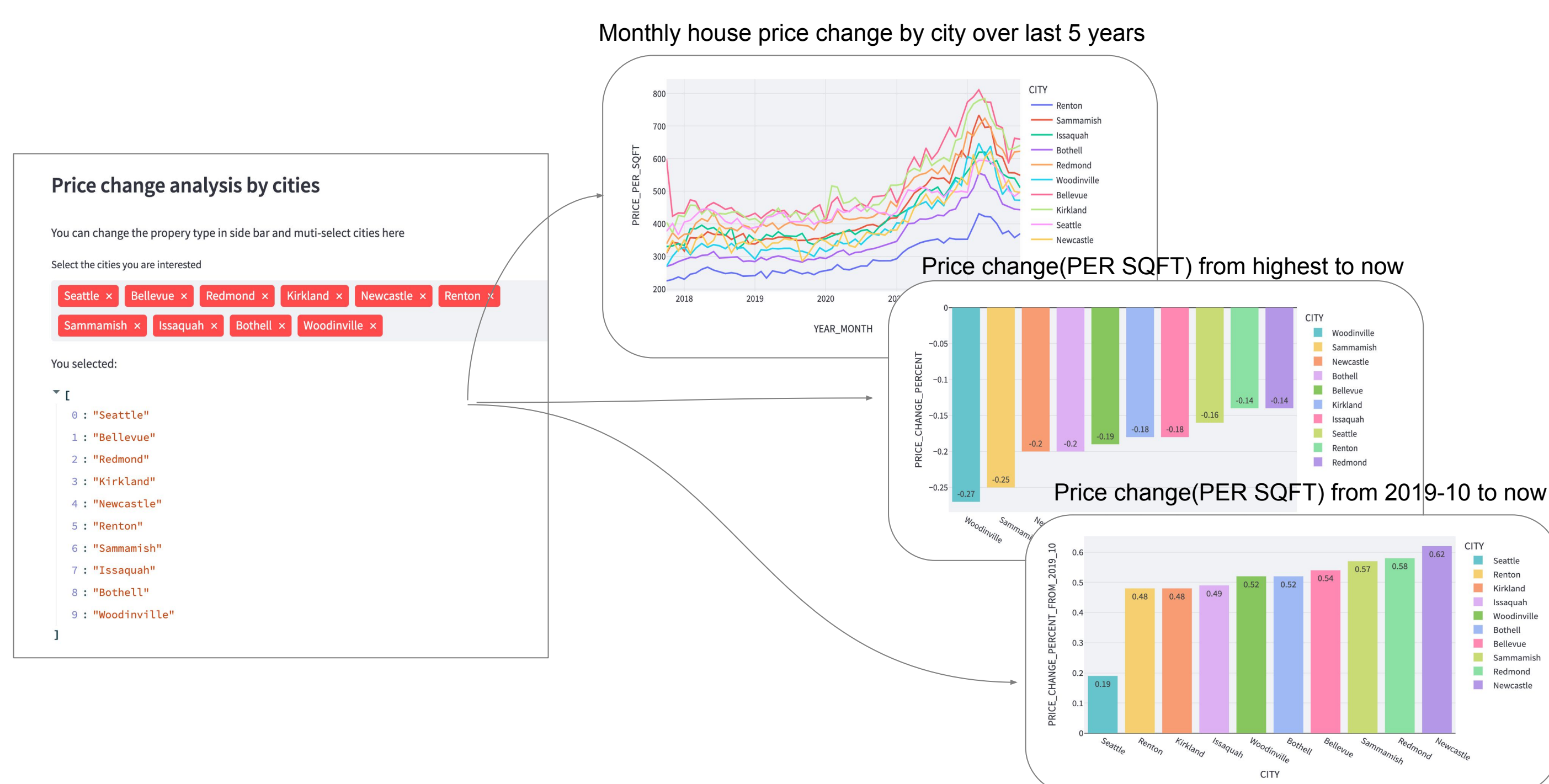
2. Visualization

Our tool provides users with:

- Heat-maps of price / sqft by city and zip code, price change yoy in Greater Seattle area, which helps buyers know which areas might be suitable for their budget.

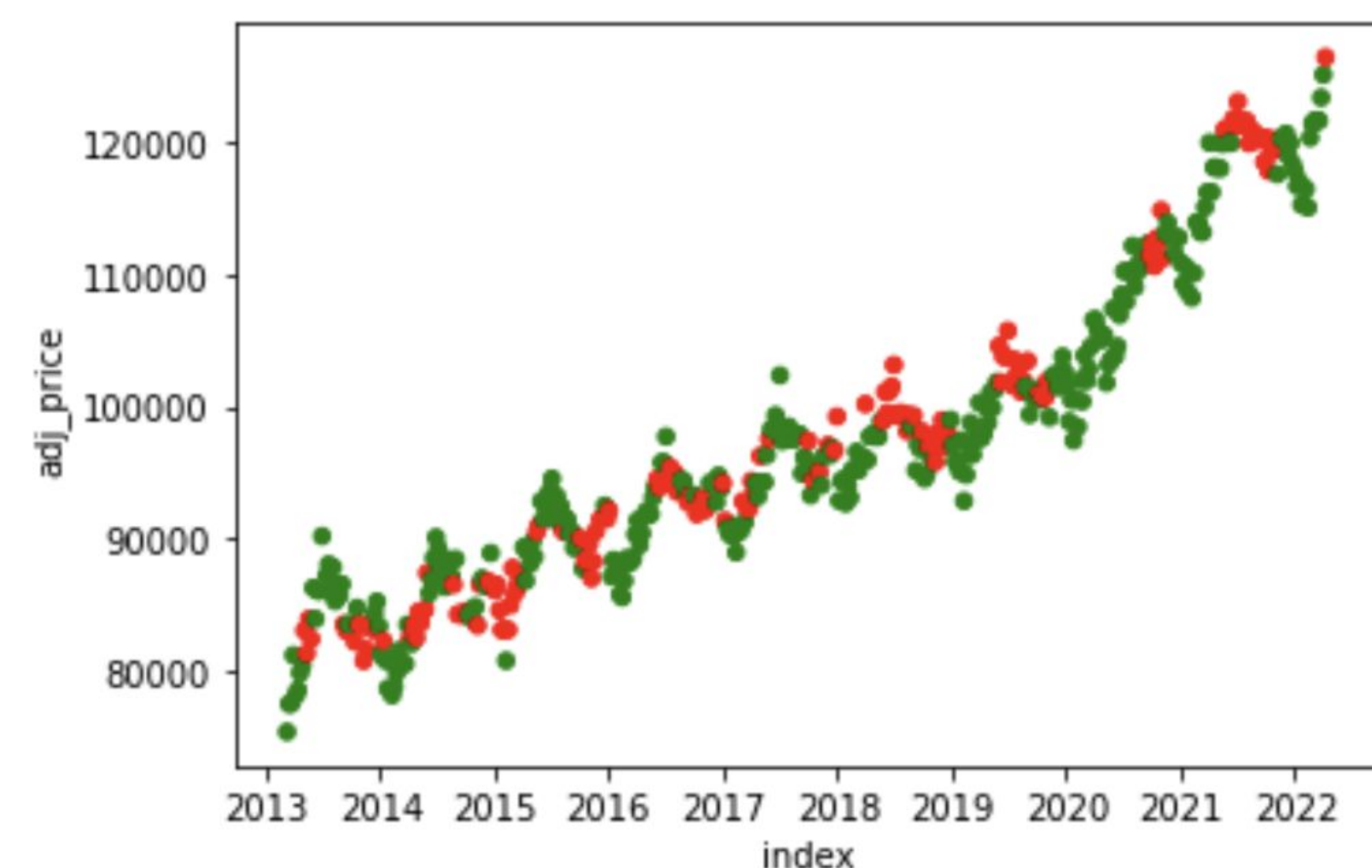


- Charts showing historical house prices in the last 5 years among cities in Greater Seattle Area, change from highest to Oct 2022 and change from the beginning of Covid-19 till now.



3. Prediction

- We built a machine learning model which used macro-economic data including monthly CPI index in the US, median house sales price and mortgage interest rate to predict the change in house price in Seattle in the next 3 months. Current accuracy rate is ~65%.



- We built a full-stack website by flask, and implemented the random forest algorithm to predict housing prices based on the conditions selected by users (e.g. property type, number of rooms, lot size and the year the house was built, etc.) We also embedded the prediction model framework into the main page for ease of use. The algorithm achieved an accuracy rate of 76.8%.

A screenshot of the 'Housing price Prediction in Seattle' form. It includes input fields for 'The Year Built', 'The Month Sold', 'The Day Sold', 'The Number of Beds', 'The Number of Baths', 'Lot Size', 'Property Square Feet', 'Bothell', and 'Condo/Co-op'. A 'Predict' button is at the bottom. A separate window shows the predicted price: 'Price Is \$980679.356K'.

4. Addressing key challenges

- Our dashboard and analysis are using historical data which we downloaded from Redfin, Fred and Zillow. Therefore, the dashboard is not automatically updated to show the latest data to users.
- Streamlit has speed issues. The entire Python script is re-run in the browser every time users interact with the application.
- Future work:** if time allows, we would love to have an API integration so that the dashboard can be automatically updated and show latest data. We also want to explore new tools which provides more flexibility and better loading speed than Streamlit.