Visualization and Analysis of the Trend of the Housing Prices in USA

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Background and Motivation:

The housing expense in the US has been increasing rapidly during the last five years, and significantly affects the living cost, especially in the Bay area and the Seattle metropolitan area where there are a lot of tech companies and have the largest job market for computer science graduates. Local housing prices has become one of the major concerns for the career choice of the fresh graduates who are going to enter the job market or want to start their own start-ups. As graduate student in computer sciences, we are interested in looking at the history of housing prices in different areas and what might be the contributing factors for the housing prices' changes.
Project Objectives:
1: What is housing prices for different locations in U.S. ?
2: How about the current housing prices compared with that in the history?
3: Which is the better choice now: owning or renting? Is it a good time for real estate investment?
4: What other factors contributing the housing prices?

Data:

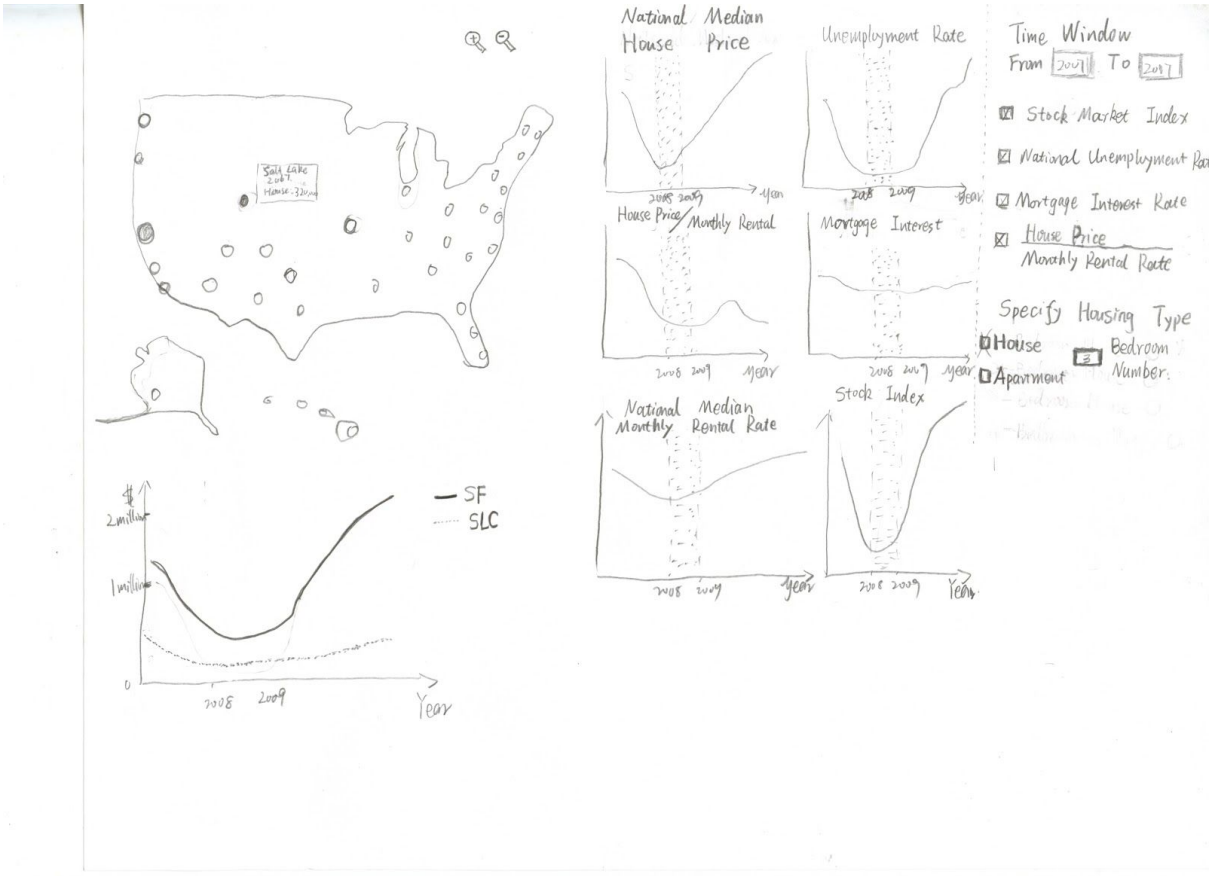
The housing price data will be from Zillow. (https://www.zillow.com/research/data/)
The stock market historical data will be from Yahoo Finance. The Dow Jones Industrial Average Index will be used.
The historical data of the unemployment rate in the US will be from the United States Department of Labor: (https://data.bls.gov/timeseries/LNS14000000).
The historical data of the mortgage rate in the U.S. will be from Freddiemac. (http://www.freddiemac.com/pmms/pmms30.html)

Data Processing:

Most of the data needed for the visualization will come from the downloaded data directly. To analyze the potential profit to own a house, one derived data will be used, which is the ratio of the House price divided by monthly rental rate.

Visualization Design:

Design 1:



There will be two major parts of this visualization: the left is the major area for the data visualization, the right will be the control panel.

On the control panel, there are several buttons and input windows, including:
1: Input window for input of the chosen time period. If no time period is specified, the default time window will the the last ten years(2007-2016).
2: Options for the visualization of: Stock market index, national unemployment rate, the mortgage interest rate, and the house price/monthly rental rate ratio. Without checking these options, the graph for these individual features will not be displayed.
3: Options to specify Housing Type, including House, Apartment, and Bedroom Number. Without specify the housing type, the default will be the median price for all houses/apartments.

In the major display area:

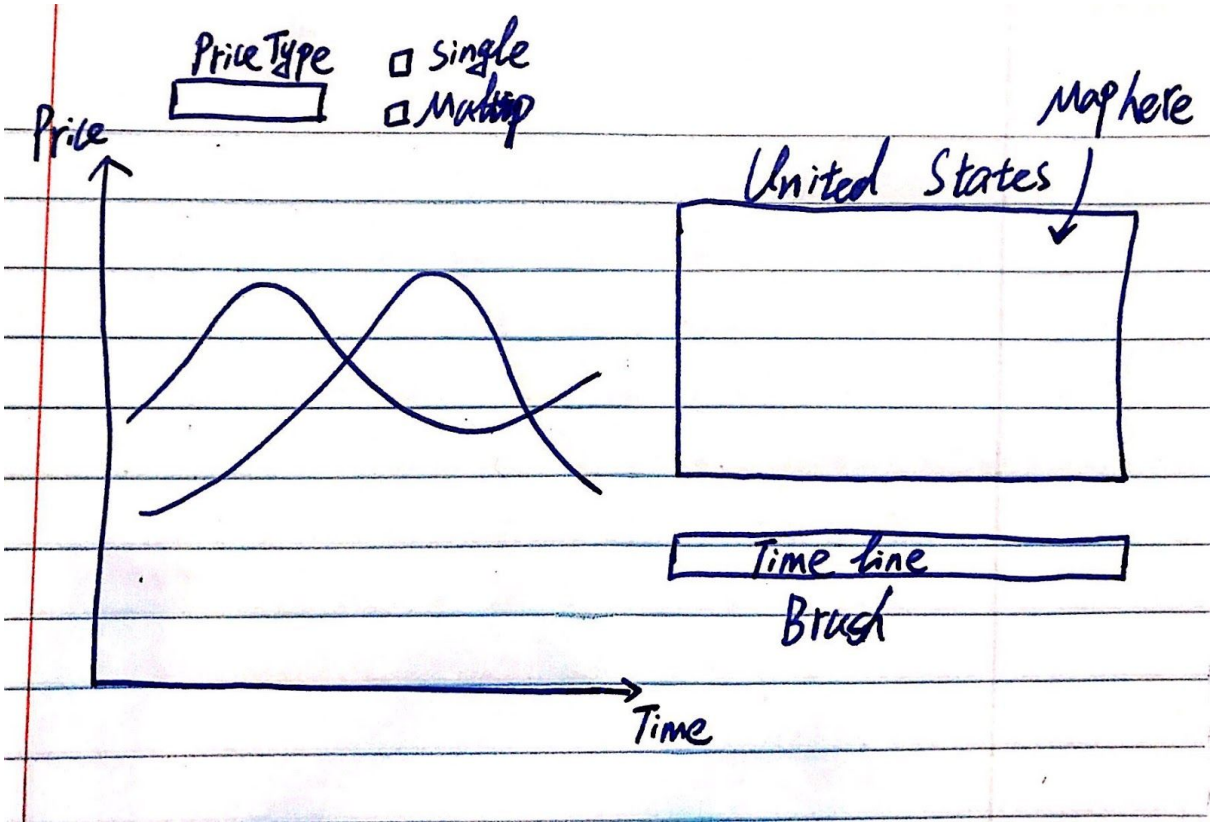
On the right, there will be graphs visualizing the National Houses Median Price and National Median Monthly Dental Rate during the input time window. If other options were chosen, such as the unemployment rate and mortgage interest, they will also be visualized in this area. The mark for these data visualization will be lines, and the channel will be position.

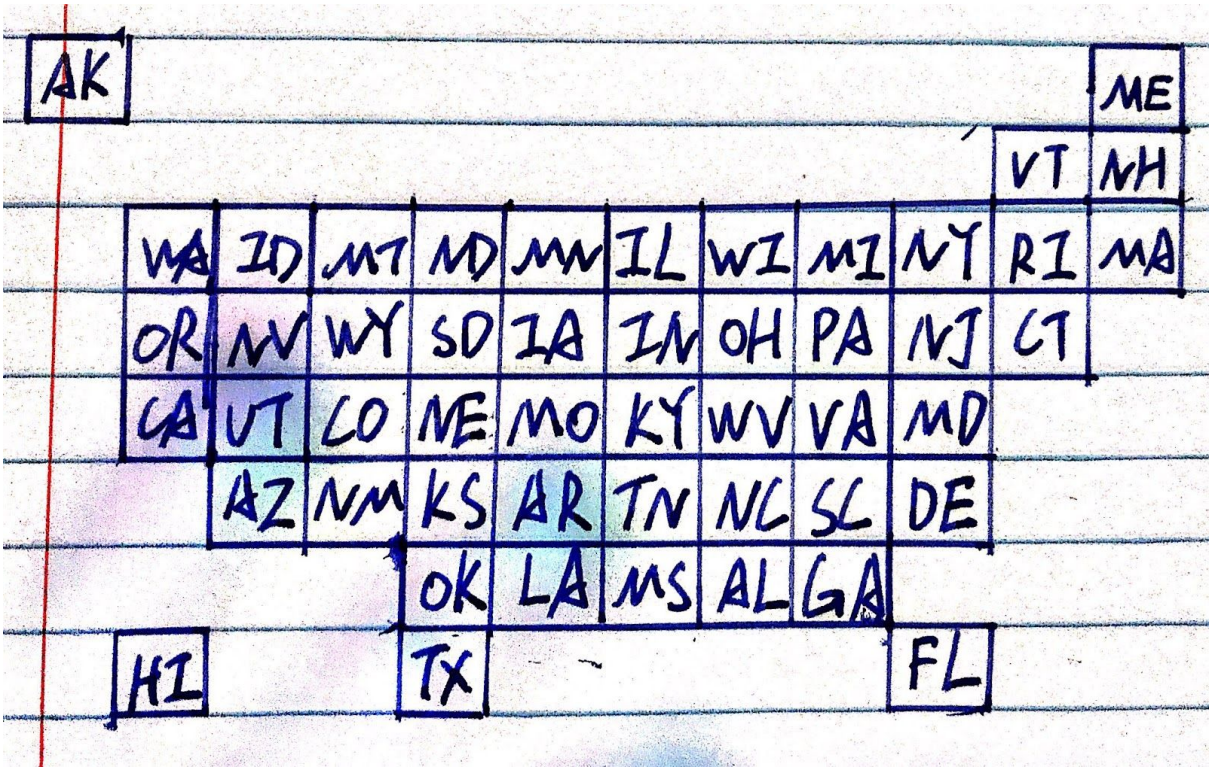
When the mouse hover on any one of the chart, the region for the corresponding year will be highlighted in all of the charts in these area. For example, if the mouse is within the range of 2008 on the National House Median Price chart, then the region for 2008 in all of the charts will be highlighted.

On the left, there will be a US map displayed, and major cities will be marked on this map. The map can be zoomed in and zoomed out. When the mouse hover on a city mark, a tool dip will be displayed which has the information of the median. You can also click on the mark of city. Click once on a city means this city is selected, click again on this city means this city unselected. You can select several cities.

Under the US map, there will be a chart for the Median price of houses of the selected cities during the chosen time window. The mark will be line, and the channel will be position. For different cities, different color will be used.

Design 2:

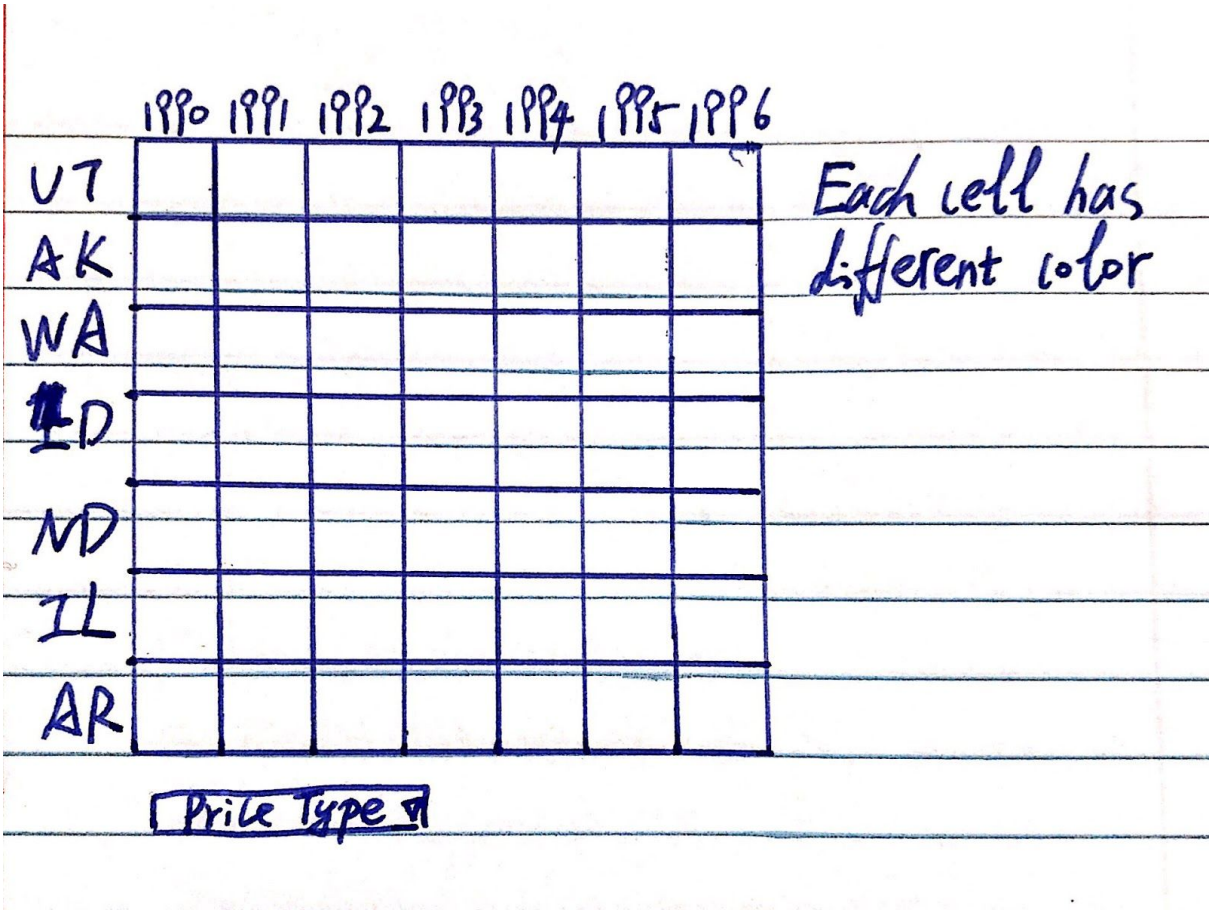




In this design, the main line chart in the center and control panel is on the right.
On the control panel, there is a state tiles of U.S. When click on the state, a drop-down menu is displayed to let user to choose one city from the chosen state. Below the state tiles, there is a time line display. A brush is designed on the time line chart to select the time period.

On the main area, there will only one line chart. Based on the selection of control panel, different line will be display in this area. The purpose of single chart is trying to make the display simple enough that help users focus on the data analysis. A drop-down menu will be placed above the line chart, which is used to indicate which price should be displayed.

Design 3:



In this design, instead of using the lines to represents the trend of housing price, we decide to use the color to embed the price information.
At same time, we also need the U.S tile chart in design 2 to choose the regions that needed to be compared.

Each cell in the table have a different color based on chosen price type.
Furthermore, when use click on one of the cells, the price of that cell will be the benchmark and all the color of other cells will change based on this.
This design will show us the what's the difference between the chosen cell and all other cells.

Must-Have Features:

1. The comparison between different locations through the time.
2. How does the housing prices change over all these years.
3. Show the connections between different factors and the housing prices.

Optional Features:

1. Display the derived data of house price, like the rate of rise.

Project Schedule:

1: Week 1 (Nov 4th):Discuss with TA to decide which design we are going to use. Have all of the data ready.
2: Week 2 (Nov 11th): The comparison between different locations through the time.
3: Week 3 (Nov 18th): How does the housing prices change over all these years.
4: Week 4 (Nov 25th): Show the connections between different factors and the housing prices.
5: Week 5 (Dec 2nd): Try to work on the optional feature(s).