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CS 416

US Housing Market Narrative Visualization Essay

Messaging

The United States Housing market is an important part of not only the US economy, but also the world economy. During the COVID pandemic, we see several interesting behaviors in the US housing market. We can see significant growth in the US new construction and existing houses demand, driven by new homeowners and existing homeowners alike. This causes a large increase in house prices all around the United States, to the point where it is common for a single home to receive multiple competing offers within the span of 7 days.

This visualization is made to help its viewers have a better understanding of this phenomenon. It uses several visualization techniques as well as D3 features to help convey its message by constructing different scenes all circulating around the subject. These three scenes all work together to help the viewers gain a better understanding of the importance of the housing market to the world economy, to learn of and see the different metrics the real estate market uses to gauge the "hotness" of the market the past 3 years and tries to explain why the market is behaving a particular way.

Narrative Structure

This visualization follows an interactive slideshow consisting of three slides. These slides are titled: Overview, Metrics Measuring Surge, and Reasons behind Surge.

Following the style of several New York Times d3 visualizations, I made the three slides be *vertically aligned* in the html webpage, where the viewers can simply scroll down to see the different scenes. To help users distinguish between the scenes, I made sure that each scene/slide be at least the size of the computer screen by using the *viewport height* property in CSS. I've also made sure that each scene has its own bolded title to show the distinction between scenes.

I've also added a navigation bar to the left of the page. This navigation bar is made to be of a fixed position, so it doesn't scroll with the visualization. Clicking any of the navigation buttons will allow the page to scroll to the div. This is not made with d3, but with simple the simple css property "*scroll-behavior: smooth*". However, this does add to the interactivity of the visualization by adding smooth transitions. Note that this transition does not work well with safari but works well with all other mainstream web browsers.

Each of this slide provides a d3 chart that the users can interact with. Each chart has a mouseover function that indicates the x and y value of the data point closest to that of the mouse position in the chart. This adds to the "drill down" aspect of a visualization, as users can opt in to see the data of the charts in greater depth, or simply skip to the next slide if this does not interest them.

Scenes

As stated before, we have three scenes in the visualization. The three scenes are reinforced by the large titles at the top of the scene and are also further emphasized by the navigation bar.

The scenes all follow a natural order of storytelling:

1) The first scene is a general overview of what the visualization is about, explaining the significance of the US housing market, and why the visualization exists in the first place. It then introduces the focus of the visualization, which is the irregular behavior of the US housing market in lieu of the COVID 19 pandemic.
2) The second drills deeper into what's going on in the past 3 years. It introduces two of the many key metrics the real estate industry uses to better understand the housing market. We're using the "Average days on Market", and the "Average home sold price above listing" metric to show the anomaly we are seeing the past 3 years. This second scene allows users to understand the anomaly better.
3) The third scene explains the reason behind the anomaly. In particular, this touches on two main things, the increased demand of houses, and the decrease of supply of houses.

Annotations

The first two slides of the visualization have annotations to indicate key points that the visualization wants to point out. For example, in the second slide's Average Days on Market metric, we highlight the fact that we see a spike in the average days in market breaking the year-to-year trend line. This is highlighted and has an annotation explaining viewers of the anomaly.

The annotations are also not shown on page load. I've added a delay to show the annotations after a specific amount of time. This allows users to read the contents of the page first, and then have their focus be guided to the d3 charts by seeing the annotations slowly transition to their viewport. I've added multiple annotation to each of the graphs. Each annotation appears one at a time with some delay in between each transition. This brings the user's focus to one annotation as a time.

The annotations also have a circle to highlight the point in time of the graph the event happened. This circle follows the same color as the graph to promote visual consistency.

Note that these annotations are self-written in D3 and **does not use the Susie Lu d3-annotation** library. (Clarification to say that we can use this library came after the visualization is created)

Parameters & Triggers

As discussed in the lectures, parameters and triggers often go hand in hand. That said, I will discuss how my visualization incorporates the two elements together.
1) Navigation Bar Parameter
   - The navigation bar is a parameter that is used to navigate through the different slides found in the visualization. Upon clicking an element of the parameter, we run the trigger to transition and scroll to the corresponding div of the scene.

2) Material Price Parameter
   - In the "Reasons behind Surge" scene, we see a "Lumber Price" and "Steel price" button that acts as parameters. These two parameters essentially trigger what will be shown in the d3 graph showing the price of the commodity. Clicking on either one of the button slowly transitions the x and y axis, y axis label, and line connecting the data points to show the correct user requested information.

3) Mouse Location Parameter
   - In all 3 of the d3 graph, I have incorporated the mouse location as a parameter that triggers an on-hover tooltip to indicate the nearest x and y value corresponding in the line graph. This is another parameter-trigger pair that adds interactivity to the visualization.

Works Cited

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