Data Visualization Course Project Proposal

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Basic Info. Visualization for FDIC Failed Bank List
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https://github.com/zzy7896321/dataviscourse-pr-fdicfailedbanks

Background and Motivation. We looked at the resources on the course web page and found this FDIC failed bank list. FDIC (Federal Deposit Insurance Corporation) was created in 1933 to restore public confidence in banking during the Greate Depression in the 1930s. It insures a depositor for up to $250,000 in a FDIC member bank in the event of a bank failure. FDIC usually find a bank that is willing to acquire a failed bank so that the deposits are simply transferred to the new bank. However, sometimes, it cannot find a acquiring bank and will send the insured funds directly to the customers. It is amazing that no depositor has ever lost FDIC insured funds since its establishment but it is also worrying that a massive wave of bank failures or a large bank failure could fail FDIC. We are curious about how reliable FDIC has been and will be in the future.

Project Objectives. We plan to visualize the spatio-temporal FDIC bank failures as well as the distribution of acquiring banks. 1) The primary goal is to get an idea about how useful and reliable FDIC has been in the past. 2) We might also want to know how likely will FDIC fail if a lot of bank or a large bank fails based on the peak period of failure in history. 3) We want to use d3 and svg to create the visualization. We also want to use brushing and linking to allow exploring the details of the data.

Data. We downloaded a detailed list of FDIC failed banks from 1934. It can be obtained by launching the select-all query at `https://www5.fdic.gov/hsob/SelectRpt.asp?EntryTyp=30&Header=1`. It includes the name, the location of the headquarter, the effective date, the total deposits, the total assets and other data of the banks.
We also have a second list of FDIC failed banks from October 1, 2000, available at `https://www.fdic.gov/bank/individual/failed/banklist.html`. In addition to the data available in the first table, it also lists the acquiring institutions of the failed banks.

Data Processing. The data in both tables are quite clean. There are a few missing values in irrelevant columns and the estimated loss column. To deal with that, we'll ignore those rows with missing values in the estimated loss column. There are 4095 records in the table, which might be too many for our purpose. We are considering restricting the data to starting from October 1, 2000. We also plan to do some aggregations over the data on the numeric columns grouped by either year or state so that we can have a spatio-temporal summary of the data. We can also compute

the statistics of failed banks each acquiring institutions acquired by joining the two table. That's the second reason why we will restrict the data in the first table to the ones after October 1, 2000.

Visualization Design. We proposed the following 3 prototype designs.

Design 1) See Figure 1.

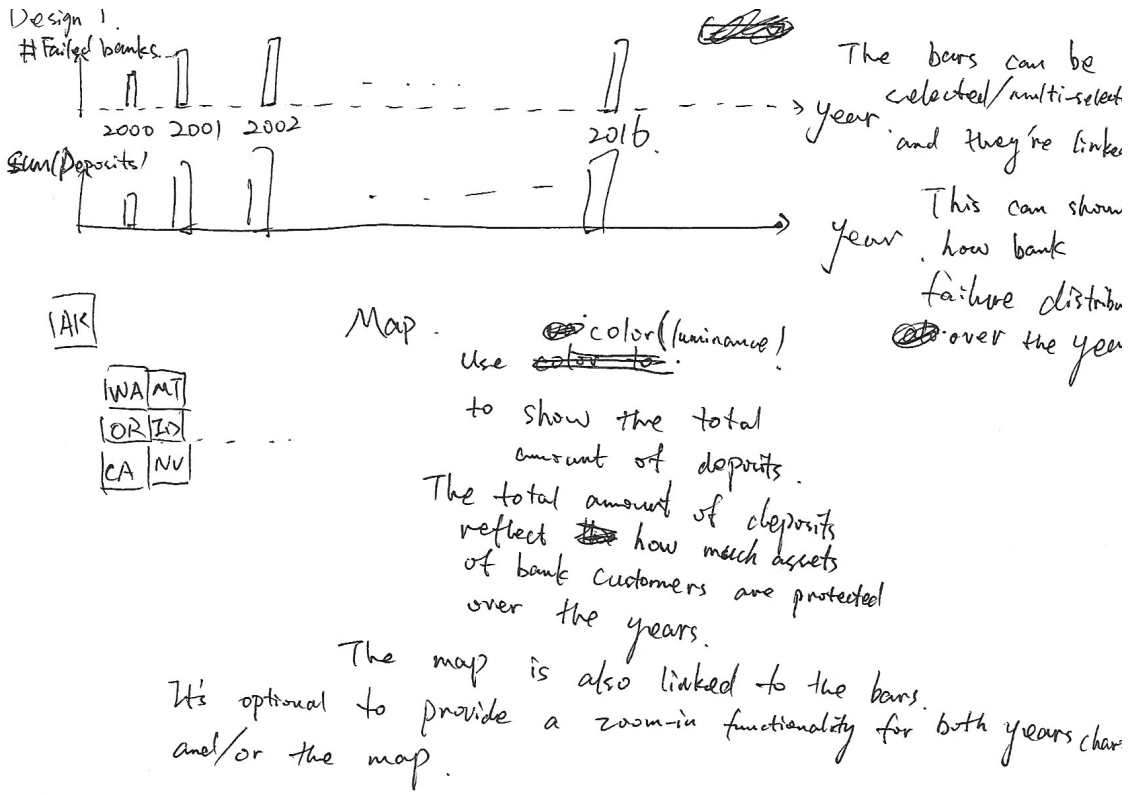

Figure 1: Design 1

Our first design consists of 3 charts: two yearly bar charts and a map.

The first bar chart is on the top, and plot the number of failed banks of each year from 2000 to 2016. The second bar chart is below the first one, and has the same x-axis. The y-axis is instead the summation of the total deposits in the failed banks in each year. These two bar charts show the failure distribution over the years in terms of both numbers and amounts. We anticipate that the two quantities are correlated but can vary a lot. For example, we expect the hike in the recent financial crisis from 2008 might be more obvious in the second bar chart since several large banks went bankcrupt. The map uses color luminance to show the total amount of deposits of the failed banks in each state. It visualizes the spatial distribution of the failed banks.

The bars in the first bar chart can be selected or multi-selected. The second bar chart and the map are linked to the first bar chart. The bars of the same years in the second bar charts are highlighted as in the first bar charts. The map is updated to display the sum of the selected years.

An optional feature of this design is to provide a zoom-in feature for both the year charts and the map to allow exploration of the details at a lower granularity.

The main advantage of this design is giving a summary of the failed banks and clearly shows the trends and distribution in both time and space. However, it lacks the ability to allow user to browse the details even if we have a zoom-in feature that allows the users to zoom-in to monthly charts or state maps.

Design 2) See Figure 2.

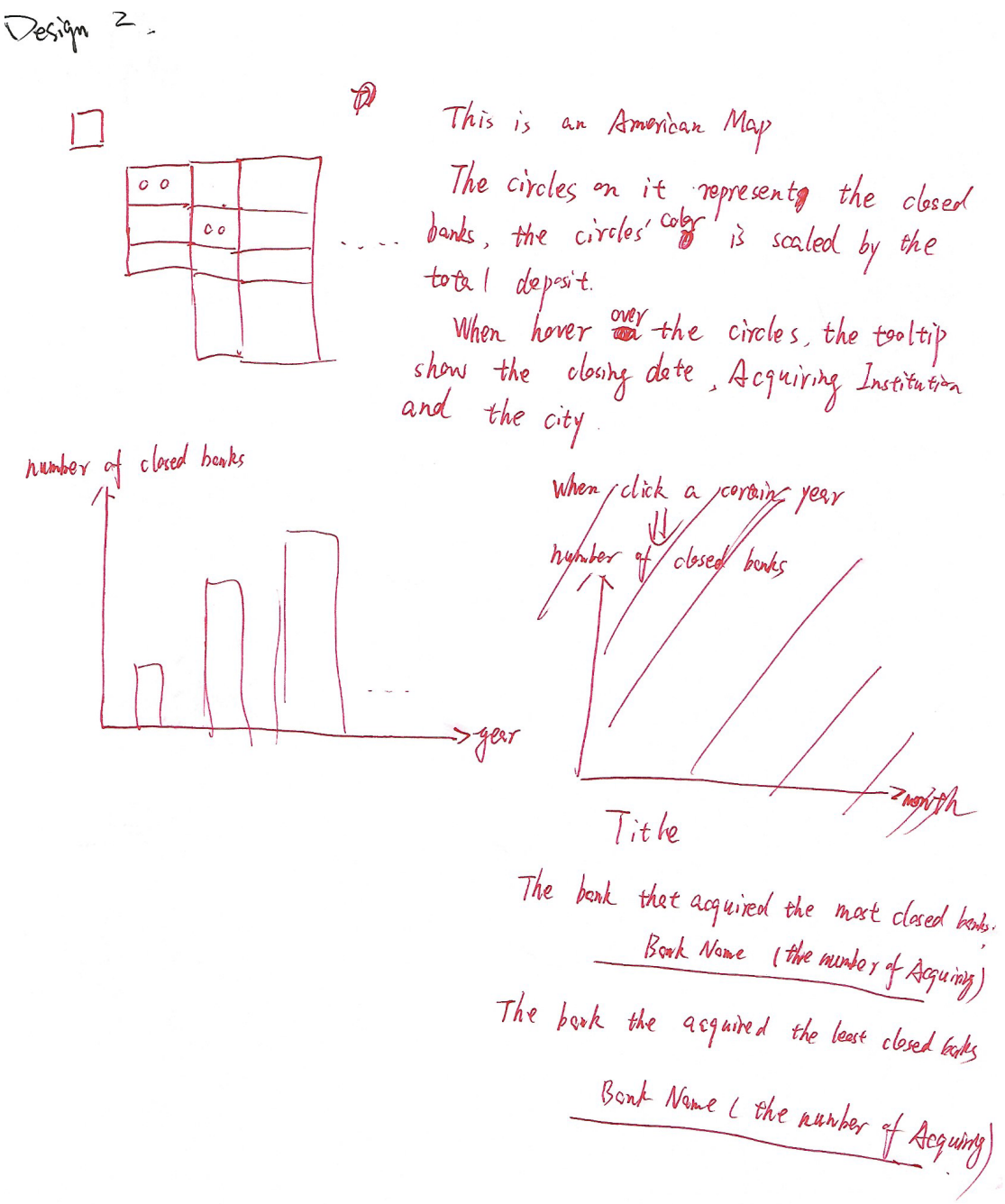

Figure 2: Design 2

The second design features a map, a bar chart and a list of top acquiring institutions.

At the top of the page is a map of the states. In each state, there are circles that represents failed banks, whose color lumination is scaled according to the total deposit. When a user hover the mouse over a circle, a tooltip is shown with the details of the failed bank.

Below the map are the bar chart ant the list. The bar chart on the left shows the number of failed banks over the years while the list on the right shows the top acquiring institions of the failed banks by the total number of failed banks they acquired over the years.

This design enables browsing details of the failed banks. But the three visualization elements are unlinked. It's hard to use it to explore the data.

Design 3) See Figure 3.

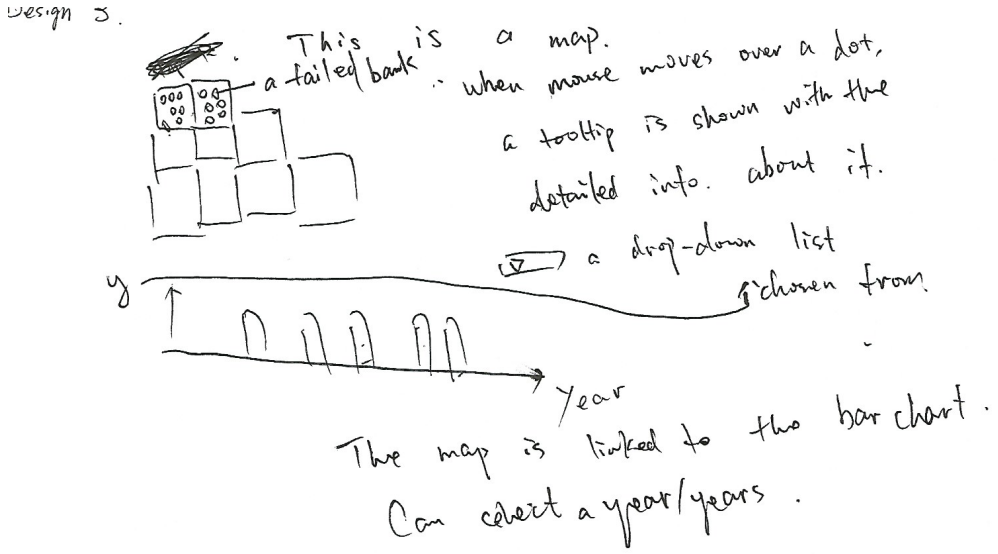

Figure 3: Design 3

The third design features a map, a bar chart with a configurable y-axis (through a drop-down list).

The map, similar to that in design 2, plots the failed banks as circles in the states. The color luminance of the circles is scaled according to the total deposits of the failed banks. When the mouse hovers over a circle, the details of that bank is shown in a tooltip.

The bar chart has year as its x-axis. The y-axis can be chosen in the drop-down list, including total deposits, number, total assets or estimated loss. This is more concise than the previous ones in the first chart and also shows different angles of the data. The bars in the bar chart can be selected as in design 1 and the map is also linked to the selections to reflect the selected years.

This design combines the benefits of the previous two and also provides a cleaner and more intuitive visualization. However, it is not as easy as a line chart would be to see the trend in the bar chart. The placement of circles in the map is also hard because there might be multiple banks in the same state. Finally, it lacks the information of acquiring banks, which can give an idea of the roles of large banks and FDIC in the process of bank failure.

After weighing the benefits and drawbacks of the ideas in each design, we decided on the following final design (see Figure 4).

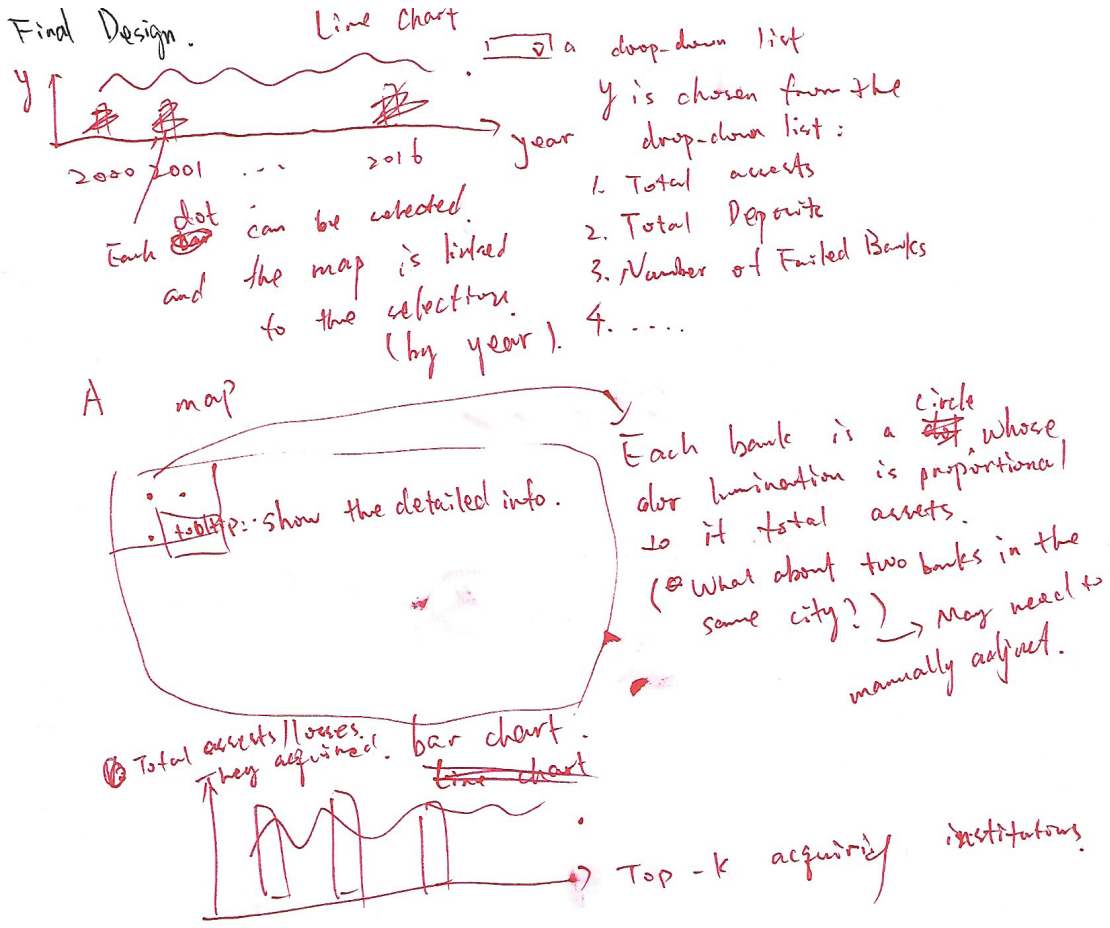

Figure 4: Final Design

The final design features a line chart, a map and a bar chart.

The line chart is similar to the bar chart in design 3. It has years as the x-axis and a configurable y-axis through a drop-down list. The dots in the year chart can be selected and the selection is linked to the other two charts.

The map uses the map with the realistic shapes instead of square grids and each bank is represented by a circle whose luminance is scaled according to the total assets/deposits (TBD). The location of the dot is at the real location of the headquarters of the failed bank. If multiple are in the same city, they will be placed around that city. To achieve this, we can either design an algorithm to automatically decide where to place the dots, or preprocess the data by hand, or a combination of the two. Each dot also has a tooltip that shows the detailed information about the failed bank. The dots shown in the map will reflect the year selections.

The last chart is a bar chart that shows the top-k acquiring institutions and the special case where there's no acquirer if it is not in the chart. The y-axis is the total assets of the failed banks that a particular institution acquired. This can show the ability of large banks and FDIC to acquire failed banks and might be able to show how concentrate the acquirings are.

Must-Have Features. The must have features include

- A line chart that shows the aggregations over the years.
- A map that shows the spatial distribution of the failed banks.
- A bar chart that shows the top-k acquiring institutions.
- They are linked together and years can be selected by clicking the bars in the first bar chart.

Optional Features. The optional features include

- Zoom-in functionality on both year charts (into month chart) and the map (into state-level maps).
- Fancy animations.

Project Schedule.

Week	Task
Oct 30 - Nov 4	Create a static html with empty divs. Start working on the charts. Zhuoyue will be responsible for the line chart and preparing the data. Ya will be responsible for plotting the map and the bar chart.
Nov 6 - Nov 11	Continue working on the charts and at least be able to show something on the webpage. Prepare the Project Milestone.
Nov 13 - Nov 24	Continue working on the charts.
Nov 27 - Dec 1	Finish everything, write the report and create the project screen-cast.