

# To Visualize the Market and Trading Information of Chinese Futures Exchanges

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## 1 Overview

In this project, we visualize the market information of all 5 Chinese Futures Exchanges from 2017 to the latest month. Together, we also visualize the trading behavior of L.F. Capital to evaluate the performance. As an overview, we divide our visualizations into several layers and design two pages to demonstrate them. The following two figures are screenshots of the two pages.

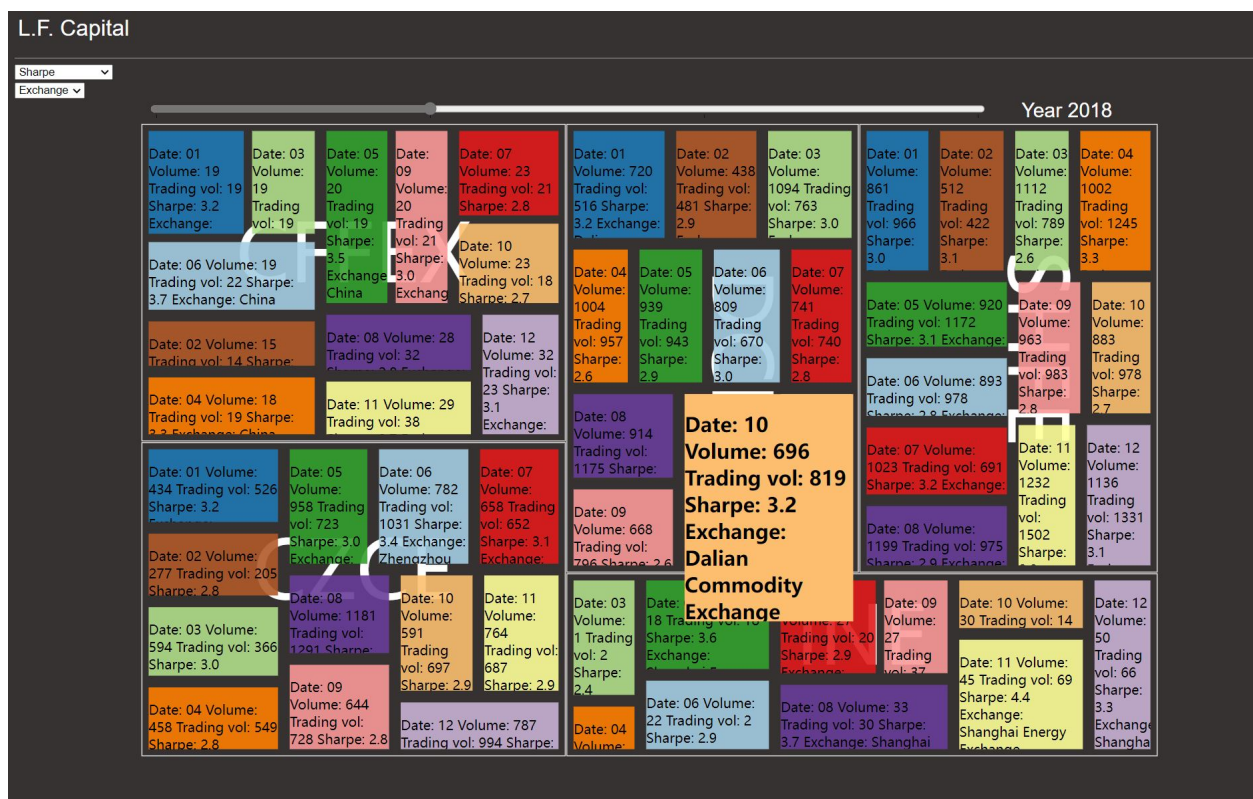


Figure 1: homepage

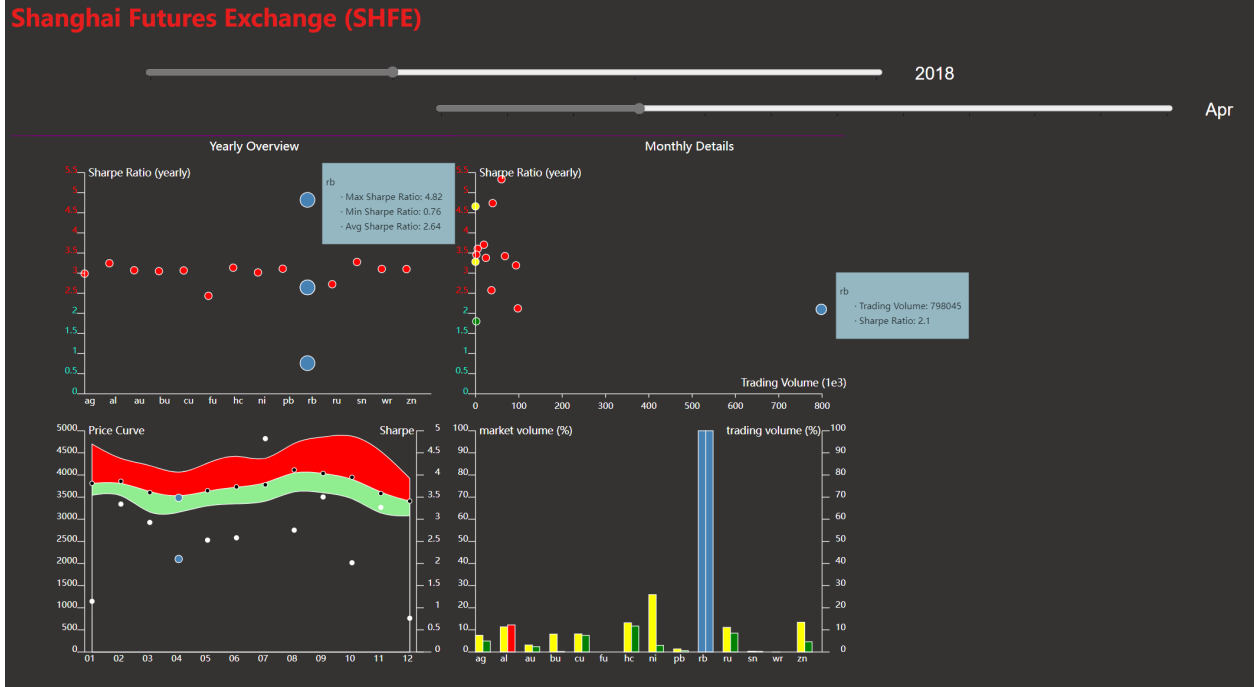


Figure 2: second page

## 2 Data Description

The data comes from L.F. Capital. Because of the concern of Non-disclosure agreement, part of the trading information is twisted or added by some noise. However, this will not affect our task of visualization and the market information is real. The range of data is from 2017-01 to 2021-11. The data has two subsets <sup>1</sup>, the first subset contains the information among exchanges with following features:

	Exchange	ym	volume	Sharpe	tradingvolume
0	CFFEX	2017-01	1729935	2.870565	17645

Figure 3: subset 1

The second subsets contains:

	Product	Exchange	ym	volume	max	low	mean	Sharpe	tradingvolume
0	IC	CFFEX	2017-01	174253	6388.600098	5606.000000	6076.230537	1.910741	1205
1	IC	CFFEX	2017-02	185088	6413.000000	5786.799805	6131.616679	2.812125	1950

Figure 4: subset 2

volume represents the cumulative volume of the certain month; max, low, average represent the price information;

<sup>1</sup>data available on gist: <https://gist.github.com/Patrick-CD>

Sharpe and trading-volume describe the trading result of the company.

The data is generated from day-level data (sum up the volumes, max/low/mean are highest/lowest/average last prices of that month). The Sharpe ratio is computed as this:

$$\text{Sharpe Ratio (yearly)} = \frac{\text{average of daily return}}{\text{standard deviation of daily return}} * 15.5$$

( $15.5 = \sqrt{240}$  where 240 is the number of trading days a year) We convert them to yearly Sharpe ratio in order to make fair comparisons. Besides, the Sharpe ratio evaluated the risk-return trade-off and is widely used in practice.

### 3 Goals and tasks

Canyu, a professional trader from L.F. Capital, is appointed to make visualization of monthly market and trading information of the futures trading in China. The visualization is made for two purposes

- Visualize the market volume and price trend together with company's trading volume and trading performance. Traders could then evaluate their performance and have a better sense of the market.
- To show investors how company performs in recent years and also show securities companies in order to negotiate for lower transaction cost.

## 4 Visualization

Our visualization mainly considers two theories: reaction theory and color theory. The design of our visualization is based on the data hierarchy (Figure.5).

(a) The choice of object (dimension 1) will lead user to different pages. The home page shows the information of exchanges. Each exchange is linked to a second page which shows information of all the products of it.

(b) For the first page, the user only chooses the year (dimension 2) and focuses on one feature at a time (dimension 3). In this sense, we choose the tree map (Figure.1) as our first view and makes options available for users to make comparisons.

(c.1) By clicking the leaves, users could jump to a second page, with **default date as the date of the leaf**. In order to keep changing one dimension at a time, we intentionally makes only three graphs available for the second page initially which guides our users to have a clockwise tour (Figure.6). (c.2) Upper left (exchanges yearly view → products yearly view). The default is from Sharpe ratio comparison between exchanges to products. We use a scatter plot to see which product perform better in this year. Besides, by putting the mouse over, you could see the

highest and lowest Sharpe ratio of that year.

(c.3) Upper right (products yearly view  $\rightarrow$  products monthly view). The default month is the month passed in from the homepage. The second scatter plot shows the relationship between trading volume and Sharpe ratio. The closer to the upper right corner, the better the product behaves.

(c.4) lower right (products monthly view  $\rightarrow$  products monthly view). Here, only the feature has changed, this double bar chart shows the portion of volumes. Combine this with the upper one, traders could have a sense of which product should we focus more.

(c.4) lower left (products monthly view  $\rightarrow$  single product detail view). By selecting a certain product, this scatter plot shows the price and Sharpe curve, according to this curve, trader can see whether the trading behavior and prices are stable in order to make some judgments.

Besides the logic, the use of the color channel is also carefully designed. Firstly, we adapt the general choice of color to the habit in China. We use black background and use warmer color (red) to represent good information and use colder one (green) to represent bad information. On the home page, we use the same color for same month/exchange in order to help users to make comparisons.

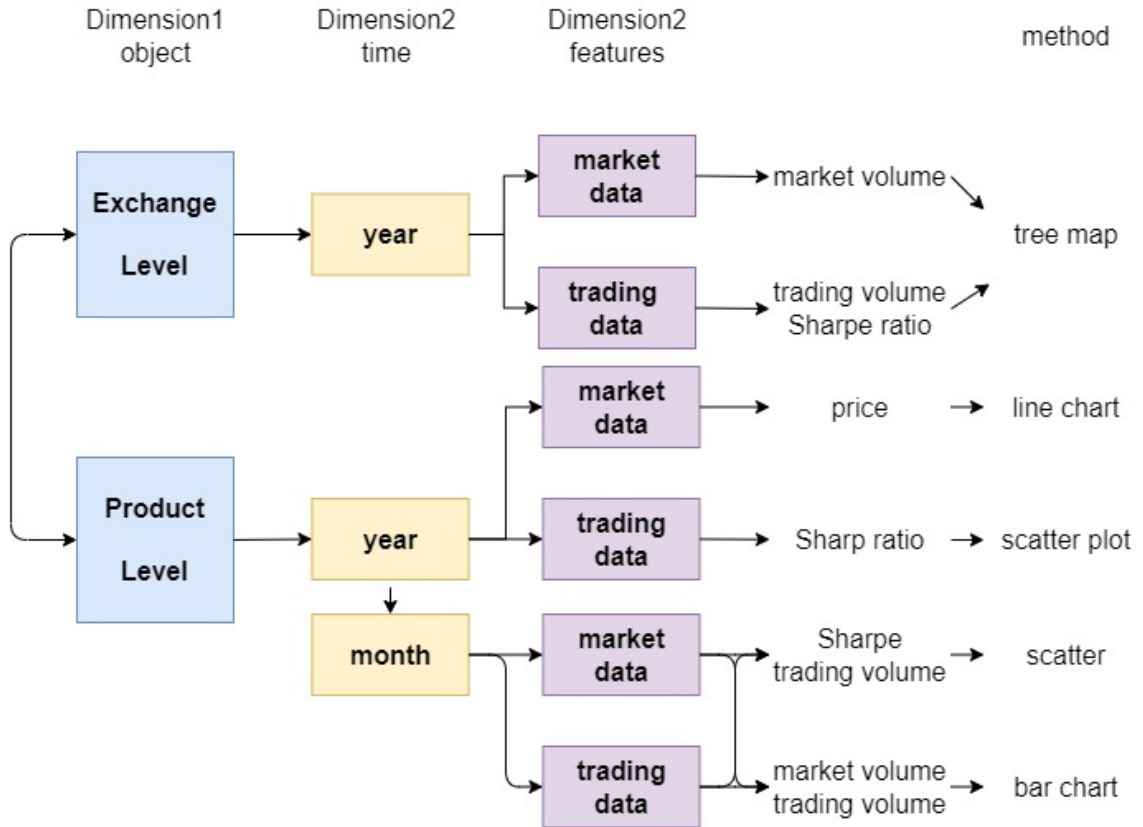


Figure 5: data hierarchy

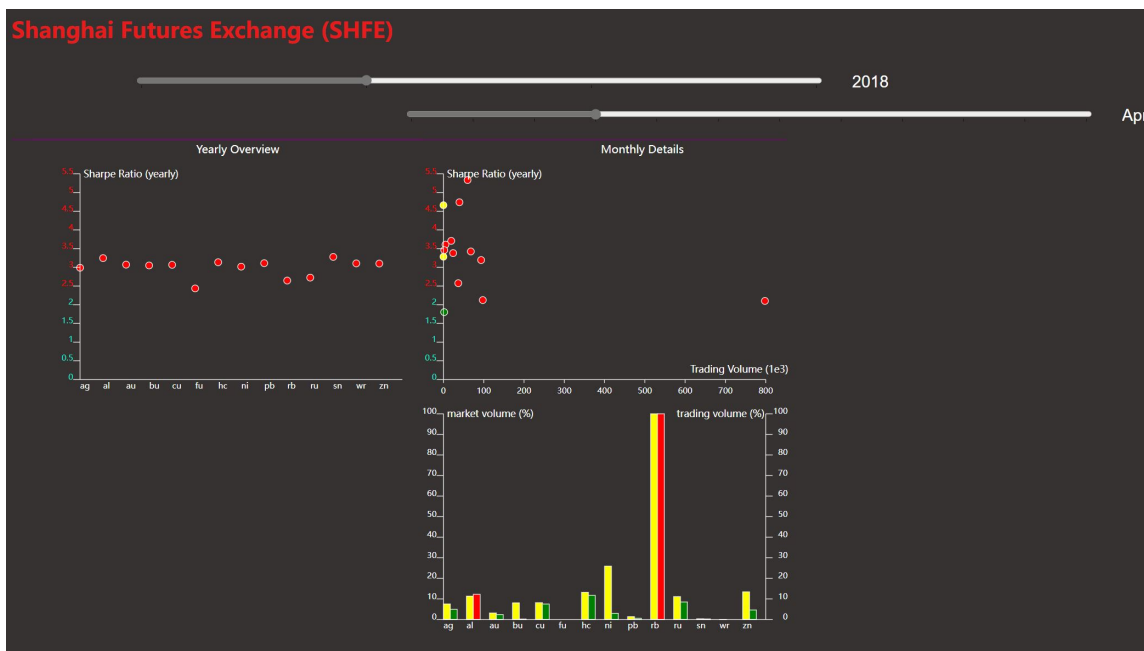


Figure 6: default view of page 2

## 5 Reflection

There are several major modifications from the original design ((Figure.7)):

- Firstly, originally we planned to put a map of China and place exchanges at their geographical locations. However, the location doesn't really convey any message that is required by our tasks. Thus, we change it to a tree map. A tree map is better for making comparisons and can have year-month pair naturally to pass to the second page.
- Secondly, the second page used to begin with the Sharpe-volume scatter (c.2) directly. However, this is against the reaction theory. Referring to the data hierarchy, if we do this, three dimensions are changed at the same time which is not friendly for users. Thus, we put our first plot as an overview instead. We also carefully design an ideal order of using the second page to make it clearer.

Besides, our visualization goal becomes clearer, as discussed in the third section, following the requirement of the two tasks, we try to make it truly useful for traders (enough complexity) but also good to present (clear logic).

Technically, we make it possible to transfer message from the first page to the second, make data available online, make the colors present more than categorical channels. I think we both learned a lot from this project.

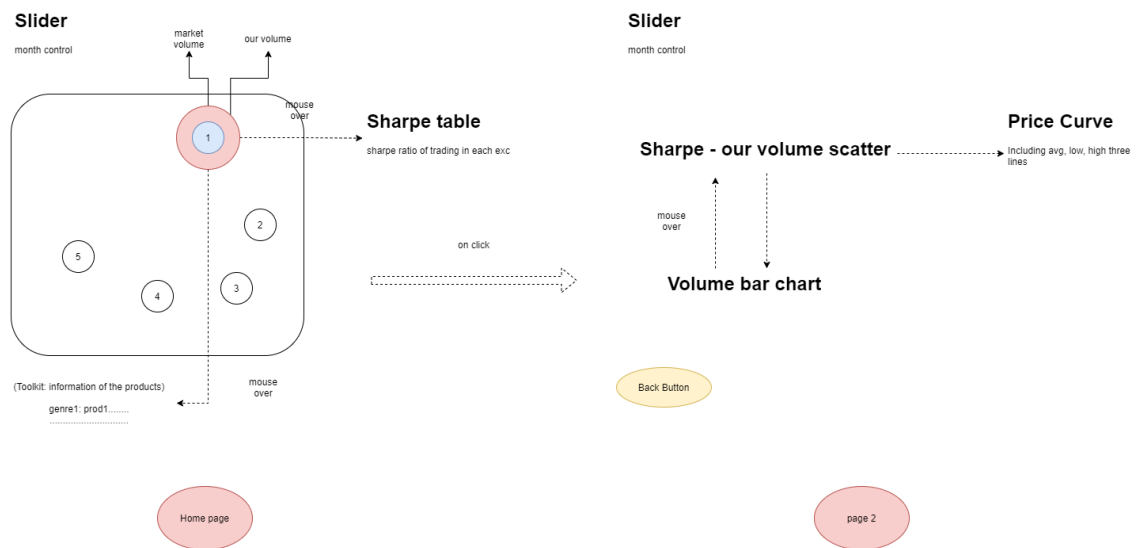


Figure 7: original design