Stock market crashes: data visualization

Definition

A **stock market crash** is a sudden dramatic decline of stock prices across a significant cross-section of a stock market, resulting in a significant loss of paper wealth. Crashes are driven by panic as much as by underlying economic factors. They often follow speculation and economic bubbles.

There is **no numerically specific definition of a stock market crash** but the term commonly applies to steep double-digit percentage losses in a stock market index over a period of several days.

Historical cases

Even tough stock market itself has its origins far before 20th century, the greatest rises well as the greatest market crashes happened excatly in the 20th century.

Here's the list of most popular and damageful cases that may be interesting for project as test cases.

- Panic of 1907
- Wall Street Crash of 1929
- October 19, 1987
- Crash of 2008–2009
- 2010 flash crash
- 2015–16 Chinese stock market turbulence

Data description

For the projet I use data on **Dow-Jones** and **S&P 500 Industrial averages** for certain time periods from Yahoo! Finance.

> **The Dow Jones Industrial Average (DJIA)** (ticker symbol **^DJI**), is a stock market index that measures the stock performance of 30 large companies listed on stock exchanges in the United States.
>
> **The S&P 500** (ticker symbol **^GSPC**) is a stock market index that measures the stock performance of 500 large companies listed on stock exchanges in the United States. It is one of the most commonly followed equity indices, and many consider it to be one of the best representations of the U.S. stock market.

As test data I chose the following cases and related data:

- Wall Street Crash
  - ^GSPC from Jan 01 until Dec 31 1929
- Black Monday Crash
  - ^GSPC from June 01 until Dec 31 1987
  - ^DJI from June 01 until Dec 31 1987
- Crisis of 2007-2008
  - ^GSPC from Jan 03 until Dec 31 2008
  - ^DJI from Jan 03 until Dec 31 2008
- 2020 Coronavirus stock market crash
  - ^GSPC from Feb 03 until Apr 01 2020
  - ^DJI from Feb 03 until Apr 01 2020

Here's a short look at sample data file:

```
sample_data <- read.csv("^DJI-sample.csv")
head(sample_data, 3)
```

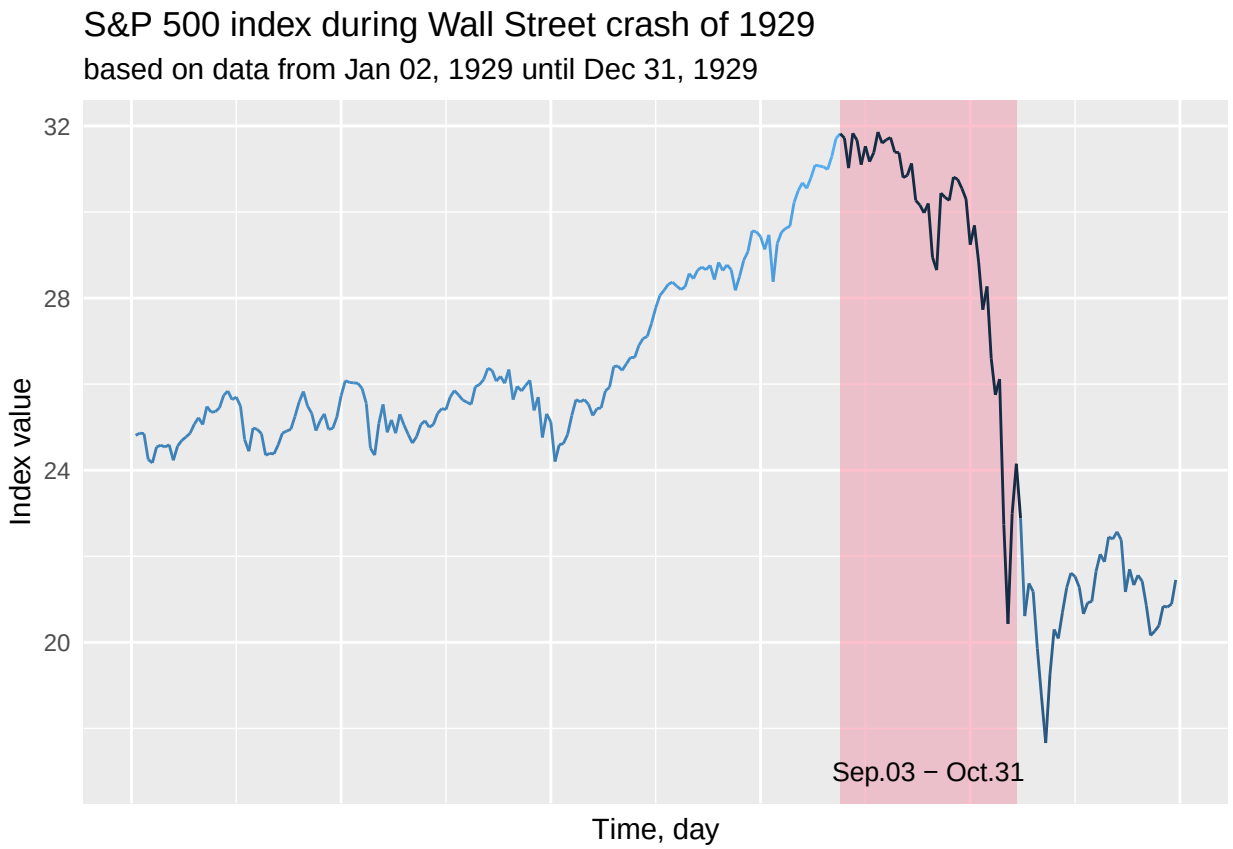
```
##         Date    Open    High     Low   Close Adj.Close   Volume
## 1 1985-01-29 1277.72 1295.49 1266.89 1292.62   1292.62 13560000
## 2 1985-01-30 1297.37 1305.10 1278.93 1287.88   1287.88 16820000
## 3 1985-01-31 1283.24 1293.40 1272.64 1286.77   1286.77 14070000
```

All the files are of **.csv** format and contain the following columns: **Date, Open, High, Low, Close, Adj.Close, Volume**.

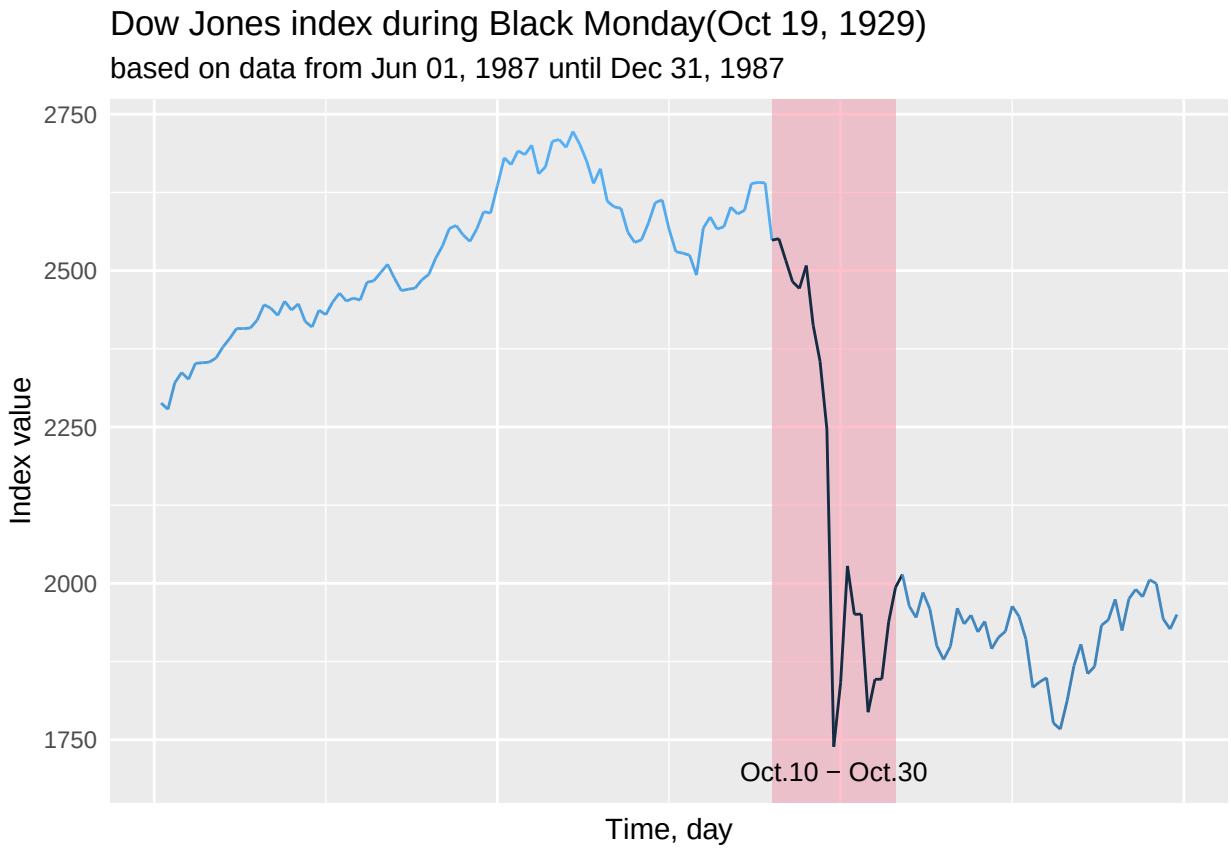
Date value corresponds to the date of day on stock market while the rest of columns except for the last one correspond to certain price values. Open column holds the strating value of stock price on the day, Close - respectively the closing price. High and Low represent respectively the greatest and lowest values of stock price in a day. Adj.Close - adjusted closing price and Volume is total numberof shares that were bought or sold on the day.

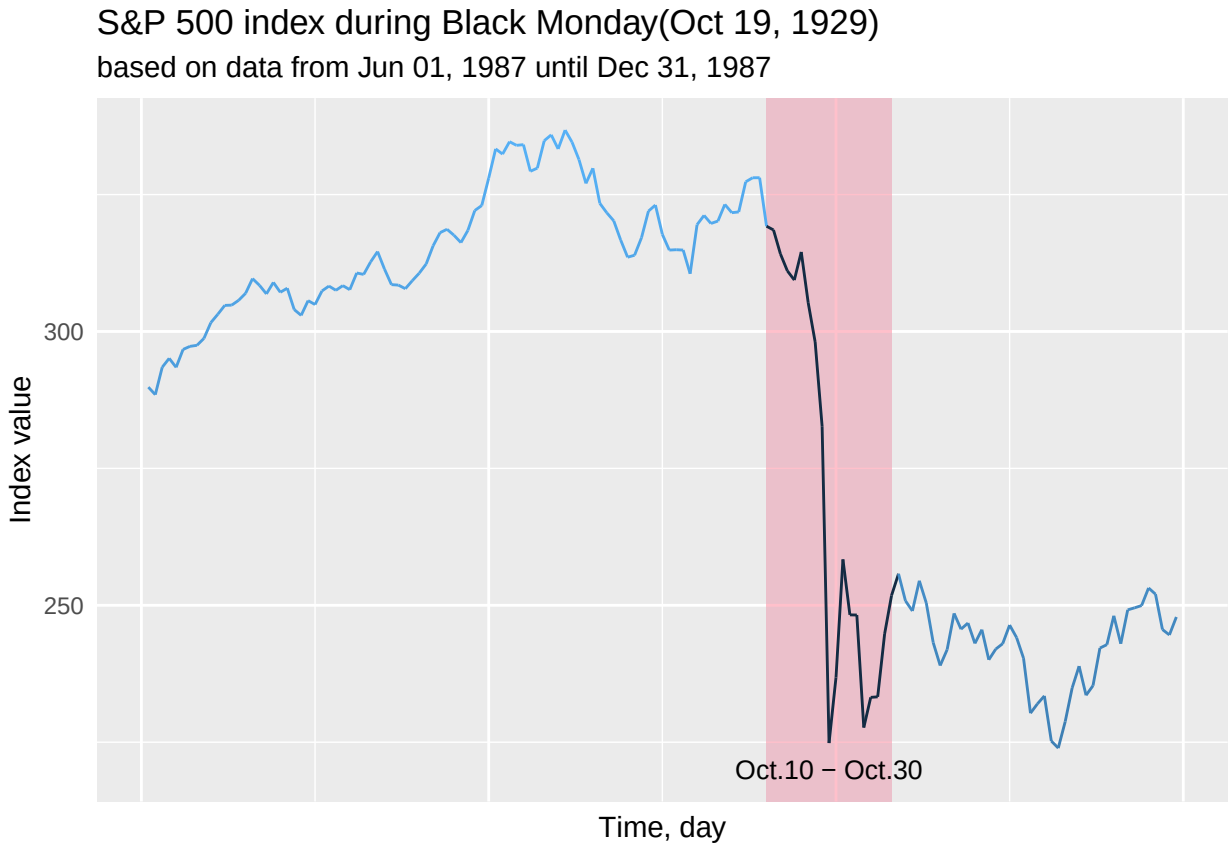
Data visualizations

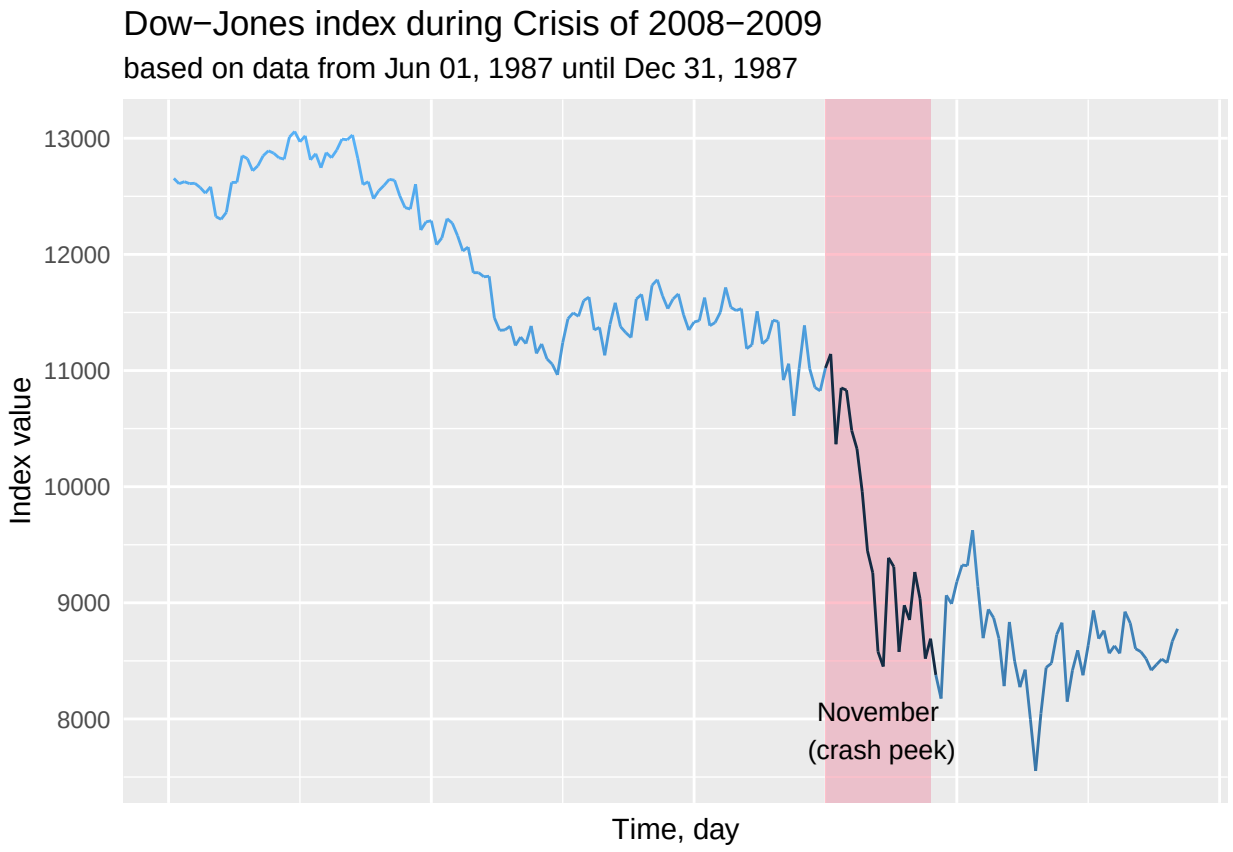
Wall Street crash of 1929

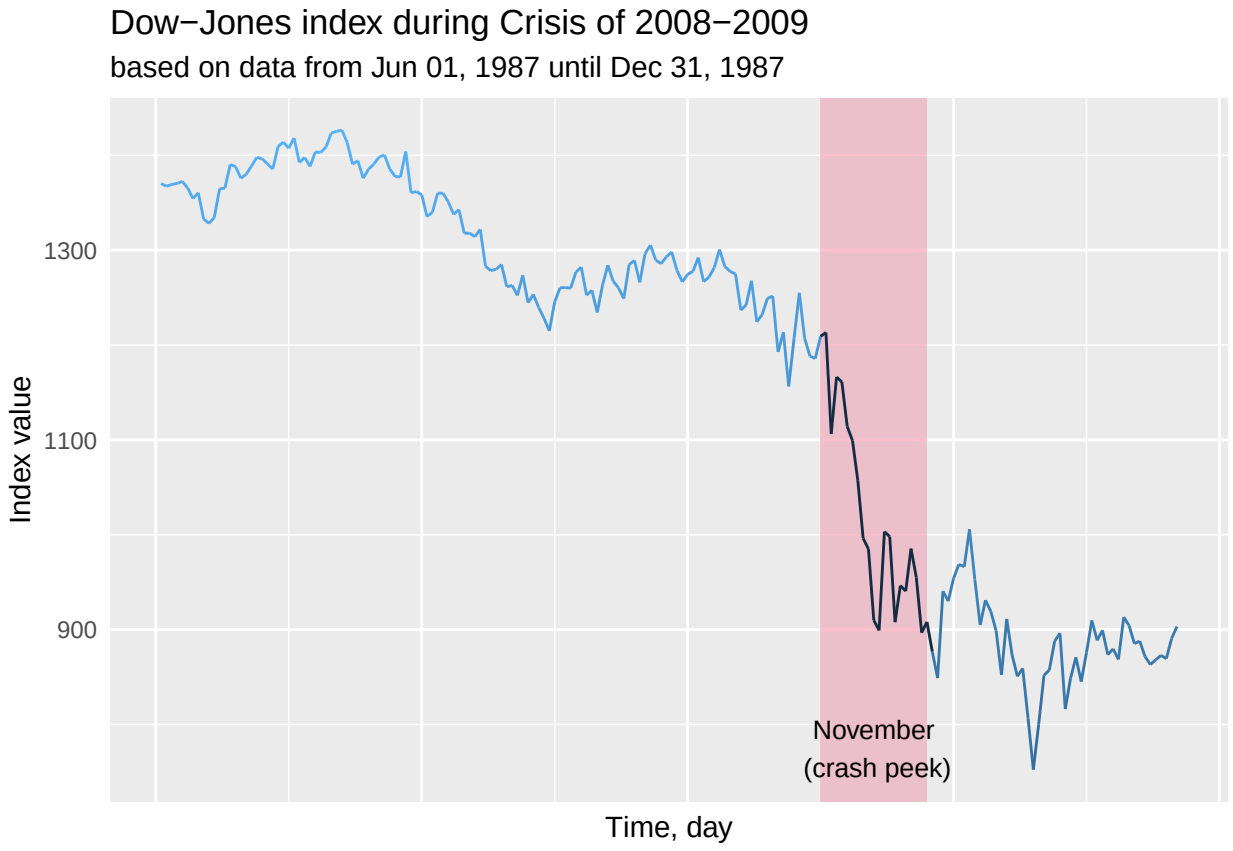


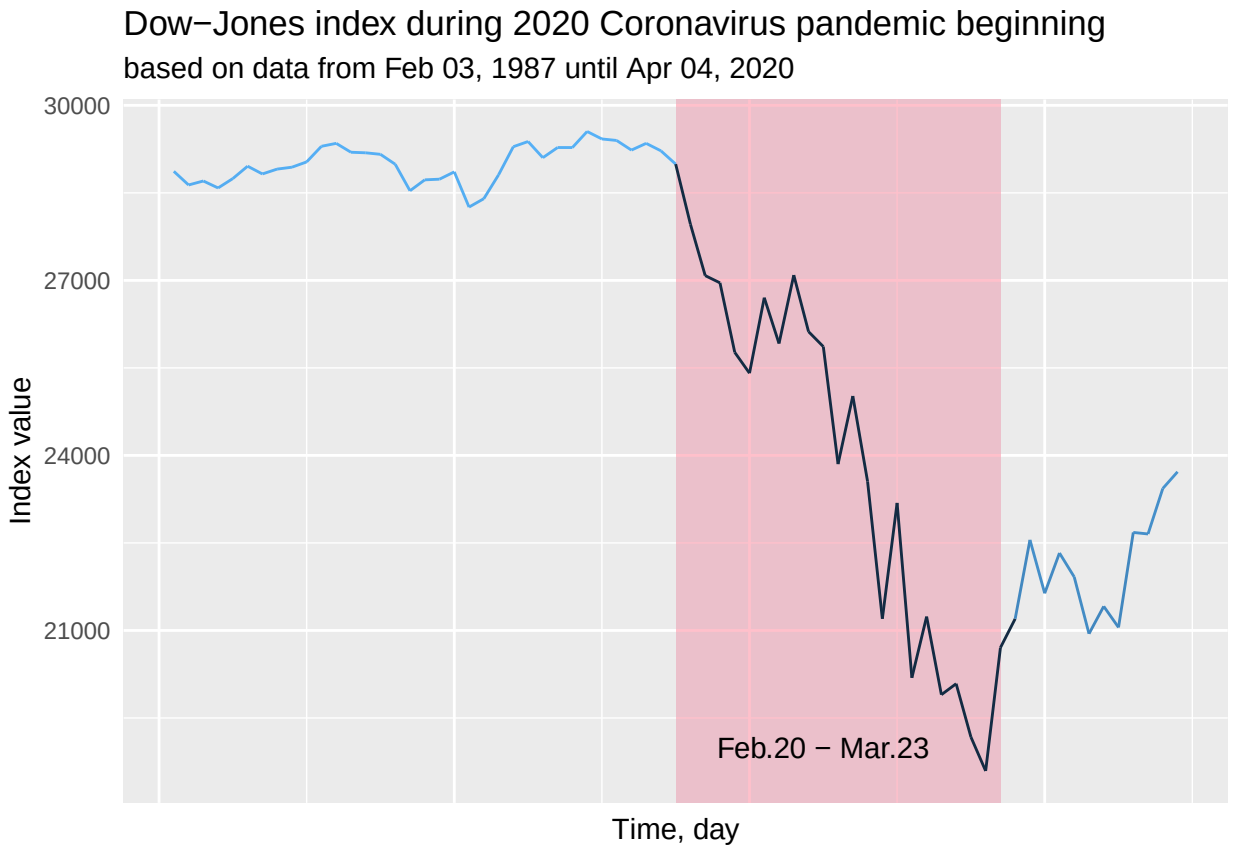
There is no visulization on **Dow-Jones index** value during Wall Street crash because the data on Dow-Jones index starts on only from 1885 on Yahoo! Finance (although the index itsef existed at that time).

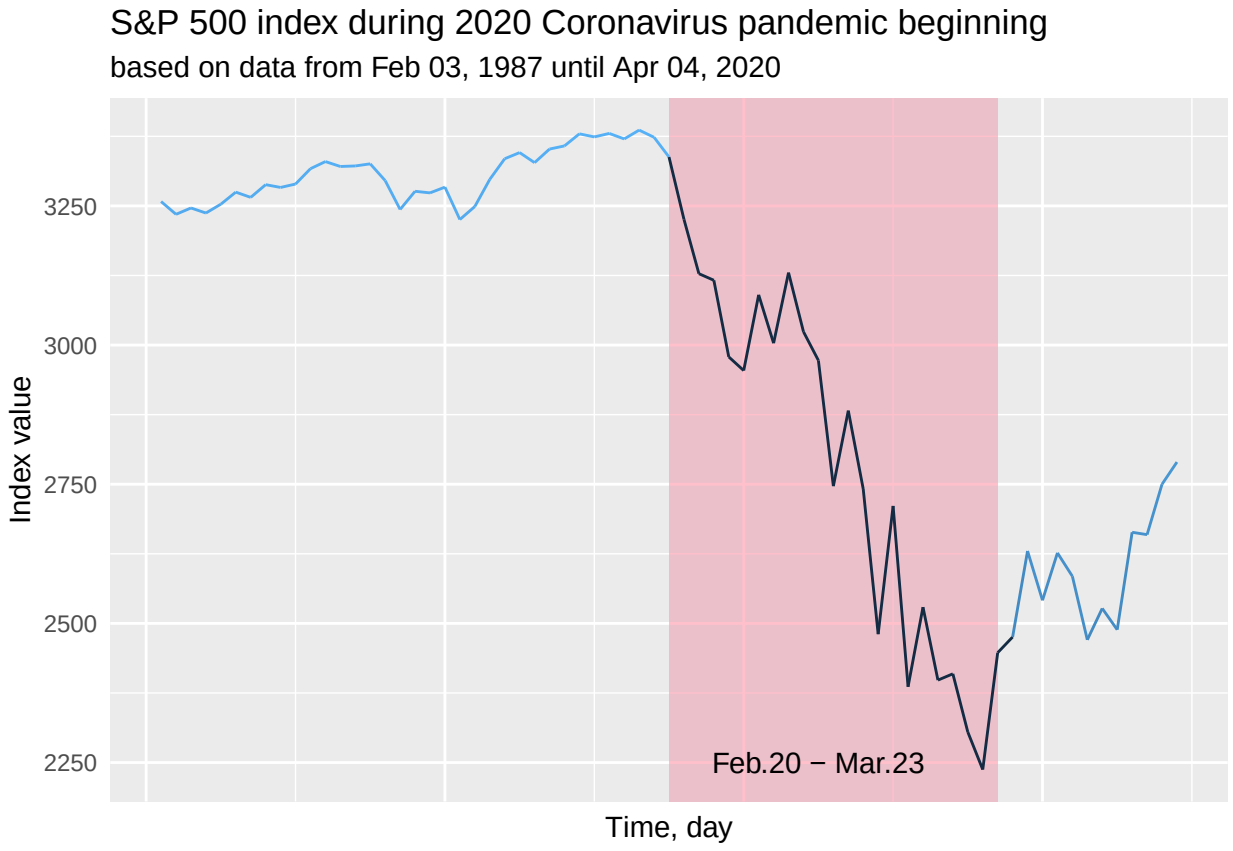

Dow Jones index during Black Monday(Oct 19, 1929)
based on data from Jun 01, 1987 until Dec 31, 1987
2750
2500
2250
2000
1750
Index value
Oct.10 − Oct.30
Time, day


S&P 500 index during Black Monday(Oct 19, 1929)
based on data from Jun 01, 1987 until Dec 31, 1987
300
250
Index value
Oct.10 − Oct.30
Time, day


Dow−Jones index during Crisis of 2008−2009
based on data from Jun 01, 1987 until Dec 31, 1987
13000
12000
11000
10000
9000
8000
Index value
November
(crash peek)
Time, day


Dow−Jones index during Crisis of 2008−2009
based on data from Jun 01, 1987 until Dec 31, 1987
1300
1100
900
Index value
November
(crash peek)
Time, day


Dow−Jones index during 2020 Coronavirus pandemic beginning
based on data from Feb 03, 1987 until Apr 04, 2020
30000
27000
24000
21000
Index value
Feb.20 − Mar.23
Time, day


S&P 500 index during 2020 Coronavirus pandemic beginning
based on data from Feb 03, 1987 until Apr 04, 2020
3250
3000
2750
2500
2250
Index value
Feb.20 − Mar.23
Time, day

References

1. **Stock market info**
2. **Dow-Jones index**
3. **S&P 500 index**
4. Data source - **Yahoo! Finance**

All the visuals are done by Solomiia Leno.