world applications (Part 9)

Building Financial Charts using Bokeh

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The world is growing rapidly. Since the internet and smartphone evolution, financial technology has grown explosively. According to this report, 1 out of 781 people on planet trade online. That’s a fairly high number when compared to other things that we humans do.

In this post, we will learn about the stock market data, how to download it from your terminal, learn about the most common chart in trading known as *candlestick chart,* and build the same from scratch with Python and Bokeh.

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Downloading the Stock Market Data

Let’s go step by step because today was the lower body day at the gym so I can’t jump. First, we install *pandas_datareader* by writing `pip3 install pandas_datareader --user` , which is a package that helps you download the stock market data. And the fun fact here is, you can do that from your terminal. No hassle. Second, we install the *datetime* library to log the time frame for which we need the data.

```
#Import libraries
from pandas_datareader import data
import datetime

#Define time-frame
start_time = datetime.datetime(2018,10,1)
end_time = datetime.datetime(2018,10,9)
```

Here, I am taking data from 1st to 9th October 2018. Now to fetch the data, the first parameter we provide is the name of the stock/company. *TSLA* is for Tesla Inc., and just like that each company has it’s own “quote” or “ticker” or simply a short name. Yahoo is a good source for financial data. Therefore we will use Yahoo as a data source. Other options include Google, FRED, Robinhood and many more. And the final two parameters are the time frame that we defined earlier.

Can you tell where it is going?

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Understanding the Stock Market Data

If you are already into the stock market, you can totally skip this step. And if you are not, I am sure you are going to one fine day. But for now, let me explain to you what this data means. We have five columns here, which pretty much is everything. You can ignore the Adj close for now.

1. **High**—The highest price at which the stock was traded
2. **Low** —The lowest price at which the stock was traded
3. **Open** —The price at which the stock started trading
4. **Close** —The price at which the last trade happened
5. **Volume** —Number of shares traded on a given day

With help of only these five columns, we can construct our own financial graph to visualize the data and draw conclusions from that, on a beginner level, of course. So what are we waiting for? Let’s do it right away. Make money, money, make money. But also remember this,

> *An investment in knowledge pays the best interest.*
>
> *— Benjamin Franklin*

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Understanding Candlestick Chart

Using Candlestick — Robinhood

Candlestick chart is a very efficient way of looking at all the columns we saw earlier, that too at once. As you can see, the green candle says the price of the stock increased today while red candle indicates that it decreased, with high and low indicated in the same candle. Here is a good article for a better understanding of candlestick charts. Just in case you need that.

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Building Candlestick Body

I believe we are on the same page. We know what candlestick charts are and we know how to download the stock market data. Now, we can build the body of candlestick charts using the `rect` method of Bokeh library. But before that, we have to create a figure in which our plot will show. It's more like an outer boundary. To do that, we will use `figure` method of Bokeh library.

```python
#Import libraries
from pandas_datareader import data
import datetime
from bokeh.plotting import figure, show, output_file

#Define time-frame
start_time = datetime.datetime(2018,10,1)
```

It will simply generate an empty box in which your chart will show later on. Moving towards the `rect` method, there are four mandatory parameters you need to pass in order to create a complete rectangle. First two are, **X-coordinate** and **Y-coordinate** of the center point of your rectangle (it's by default, weird but important). And the last two are **Width** and **Height.** Let's look at the code first.

```python
#Import libraries
from pandas_datareader import data
import datetime
from bokeh.plotting import figure, show, output_file

#Define time-frame
start_time = datetime.datetime(2018,10,1)
```

Now let me explain each parameter used in `rect` method so that you know how our first candlestick chart is prepared.

1. **X-axis—**As discussed, we need the center point of our rectangle, so for that, we need x and y-axis of that point. For x-axis, we are taking `df.index` as it contains dates.

2. **Y-axis—**For y-axis, we are taking the `(open+close)/2` for the same date so now we have the center point of our rectangle.

3. **Width—**For width, we are taking **hours** as a parameter. A day is of 24 hours. We will take 6 hours on both sides so the body of our rectangle would be of 12 hours then 12 hours gap and then the new candle. Basically, we are spacing in terms of time and not in terms of space. Bad pun. I know.

4. **Height—**The absolute difference between open and close would be the height of the body

You have reached the first milestone. You now know everything you need in order to create your first candlestick chart on data from your favorite company. My chart for TESLA looks something like this, what about you?

Not bad for us. But for Tesla, uh-oh.

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Making the chart visually appealing

No one wants to watch all blue candles, doesn't make any sense. That's why, just for this one, we will go with the flow. Green and red candles for the price up and price down respectively. Also, I have created separate functions for all the parameters in the `rect` method and later created a new column for each and stored data in it so it is easy to understand how it's all working. You can see the updated data frame below the code and the updated chart right below that.

```python
#Import libraries
from pandas_datareader import data
import datetime
from bokeh.plotting import figure, show, output_file

#Define time-frame
start_time = datetime.datetime(2018,10,1)
```

This is how the new data looks like.

Wayyy better, ain't it?

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Building Candlestick Segments

We have a visually appealing chart and the body of the candle, but we are still left with the highs and lows. Just like all our lives, these candles too have highs and lows. Look at line 41 and you'll know how to handle it, it's that easy. What if it's that simple in life too? We wish.

```
1   #Import libraries
2   from pandas_datareader import data
3   import datetime
4   from bokeh.plotting import figure, show, output_file
5
6   #Define time-frame
7   start_time = datetime.datetime(2018,10,1)
```

But hey, look, there we have it. A perfect candlestick chart for 10 days. How about we go long, for like 3 months or so? Wondering how it will look? Me too. Let's feed our curiosity. The chart you see below is created using these 60 lines of code (I've added comments so it's not even 60). Ain't it amazing?

And that's that. Looks beautiful.

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Endnotes

As we all know, we learn from visualizations far better than we learn from raw data. Building visualizations from data are really rewarding and with help of external libraries like Bokeh, Python's visualization game is stronger than ever. In this post, you learned about stock market data, how to download it, what are candlestick charts and how to create them with help of Bokeh library. If you have any doubt regarding anything from this article, feel free to reach out via Twitter, Email or Linkedin. Read my other post of this series from the links below. Happy Learning.

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Acknowledgment: I am learning through Udemy's The Python Mega Course and these posts are my sincere efforts for people who *learn-by-reading*.