



Gastronomic Guidance: Yelp Reviews as a Culinary Compass in COVID

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MSBA Committee

Agenda



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Research Question & Background

Is there a discernible pattern or correlation between [Yelp review](#) and the performance of [U.S. financial market](#) during key [COVID-19 events](#)?



Research Methodologies

Data Sources



- Yelp Dataset % Review Table % Time >= 2019-01-01
- 2,111,695 data points

1



- yfinance API % Yahoo Finance API % S&P 500 Index

2



- CDC (Centers for Disease and Control Prevention) % Data Table For Weekly Deaths

3

Research Methodologies

Step by Step Analysis

1 Python % sqlalchemy - MySQL connection

2 Python % pandas % Data reading and wrangling

3 Python % NLTK % VADER-Sentiment-Analysis %
Sentiment analysis for review text

4 Python % fastparquet % Compression &
Data Storage

5 Python % matplotlib % Data visualization

6 Tableau % Dashboard % Data visualization

```
import nltk
import pandas as pd
import matplotlib.pyplot as plt
from sqlalchemy import create_engine
from nltk.sentiment import SentimentIntensityAnalyzer
✓ 1.1s

from mysql_password import password

# Connect to MySQL database
engine = create_engine(f'mysql+mysqlconnector://root:{password}@127.0.0.1/yelp')

# Pull out review data from MySQL database, focusing on data after 2019
sql_command = """
SELECT review_id, date, stars, text
FROM review
WHERE date >= '2019-01-01'
"""
df_review = pd.read_sql(sql_command, con=engine)

nltk.download('vader_lexicon')
sid = SentimentIntensityAnalyzer()

def get_sentiment_score(text):
    return sid.polarity_scores(text)['compound']

df_review['sentiment_score'] = df_review['text'].apply(get_sentiment_score)
✓ 16m 7.5s

[nltk_data] Downloading package vader_lexicon to
[nltk_data]      C:\Users\layma\AppData\Roaming\nltk_data...
[nltk_data] Package vader_lexicon is already up-to-date!
```

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```
df_review.sort_values(by='date').reset_index(drop=True)
```

✓ 0.6s

	review_id	date	stars	text	sentiment score
0	mrWupVdlmkzbzTOD2N20CA	2019-01-01	5	You must make reservations in advance. I real...	0.9627
1	mEXW4d-N7-F0bmOS1bdfDA	2019-01-01	3	Just checked out this morning and on the fence...	0.2384
2	j3j6VpaTrq-9P0lWkvBqFw	2019-01-01	1	This was the filthiest place I ever checked in...	0.6425
3	iDbSFrKV6Od5GLo-nm1QFw	2019-01-01	5	This is one of the rare moments where I actual...	0.9536
4	Rg6qWdz6G5N_9U2BxqnWpw	2019-01-01	5	Great food. Always crowded. Mostly self servic...	0.5962
...
2111690	sOqjFAJWBNCVgRtSEaiaBw	2022-01-19	5	it's our neighborhood dive bar!	0.0000
2111691	rpQjihykzjZ5ZBV9tTEq0w	2022-01-19	5	Amazing food, super fast pick up, and always v...	0.9240
2111692	-wSoNXjzl2fm3d9yGWglQ	2022-01-19	1	WHERE DO I START ABOUT THIS INCOMPETENT SO CAL...	-0.7831
2111693	q-6N2yjdTBJBIKIXUPglZg	2022-01-19	4	As you can see in my photos they have an abund...	0.7889
2111694	i-l4ZOhoX70Nw5H0FwrQUA	2022-01-19	5	For when I'm feeling like ignoring my calorie-...	0.9982

2111695 rows × 5 columns

```
df_review.to_parquet('./review_data.parquet.zstd', compression='zstd')
```

Research Methodologies

Step by Step Analysis

1 Python % sqlalchemy - MySQL connection

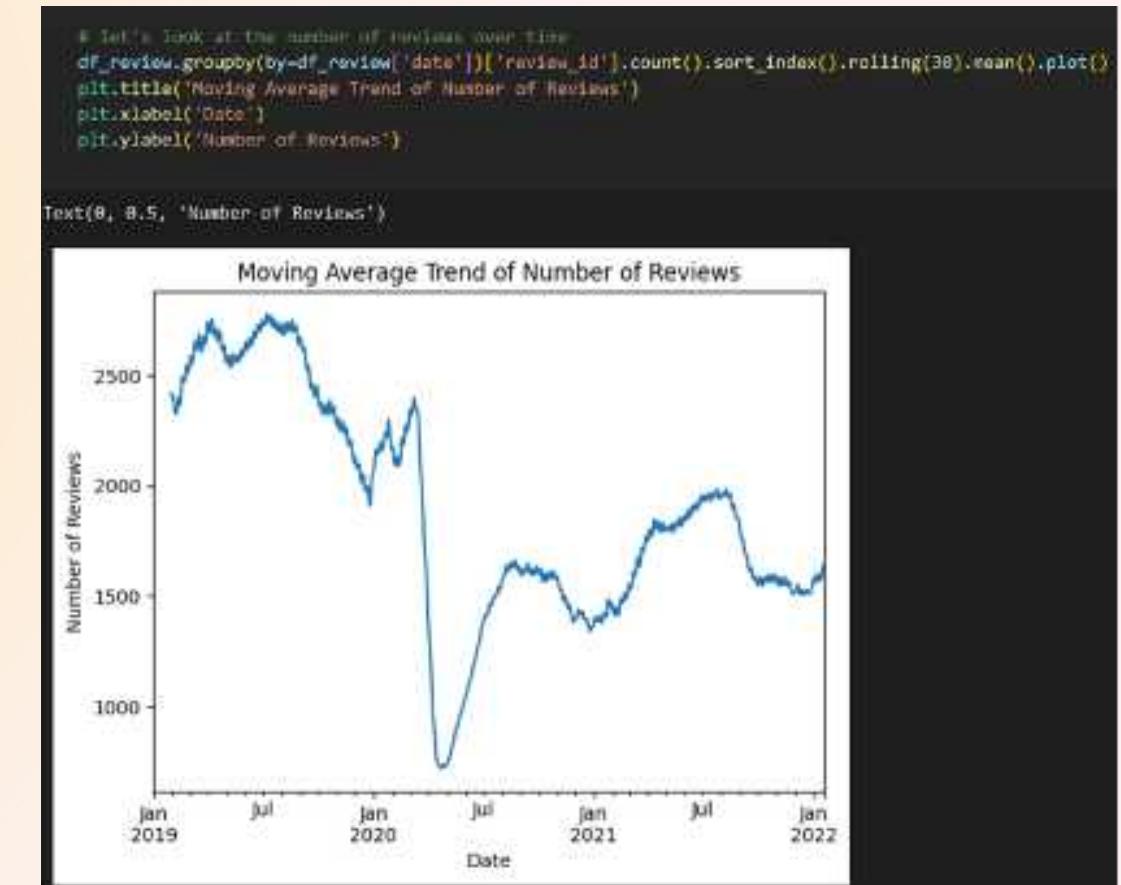
2 Python % pandas % Data reading and wrangling

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Sentiment analysis for review text

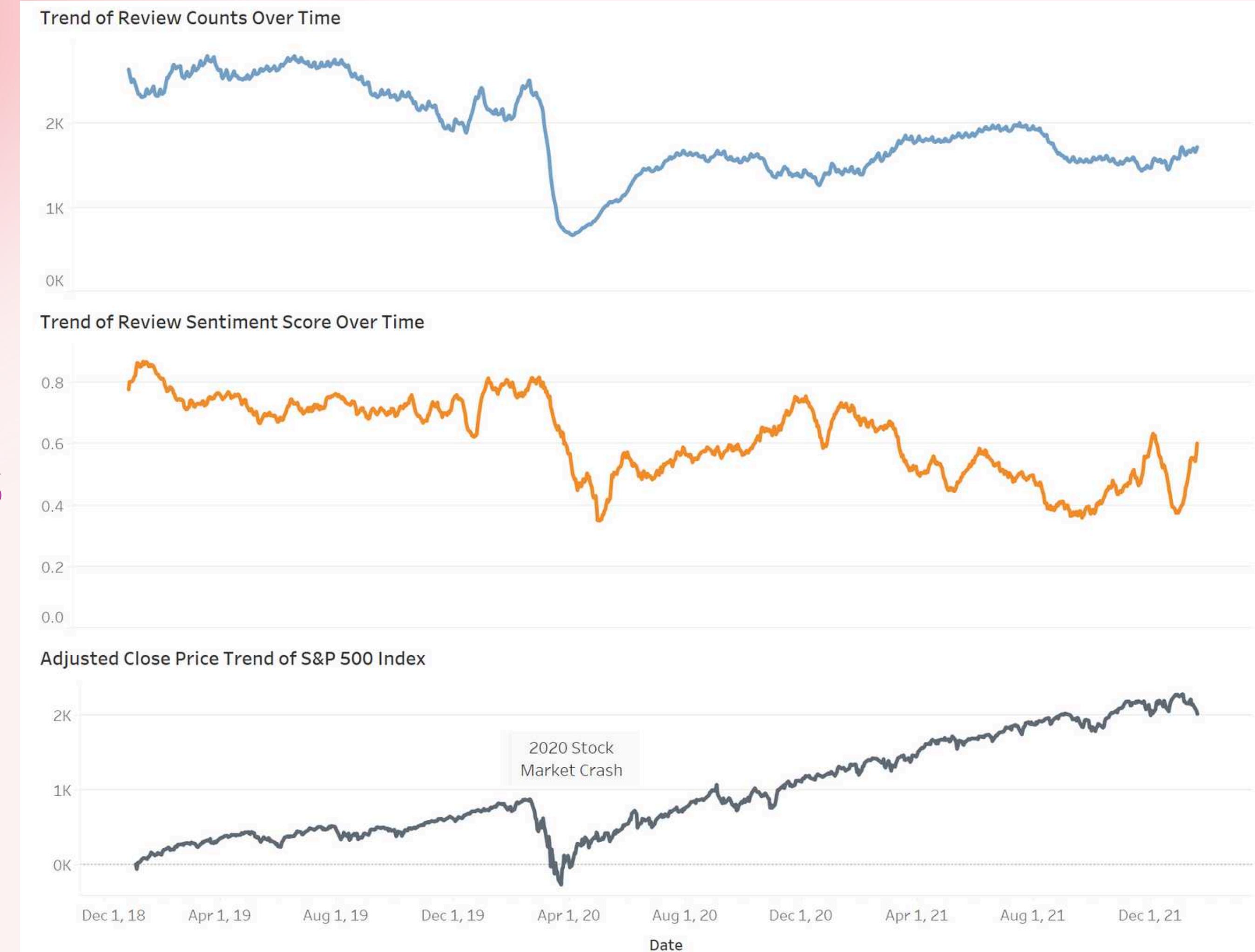
4 Python % fastparquet % Compression &
Data Storage

5 **Python % matplotlib % Data visualization**

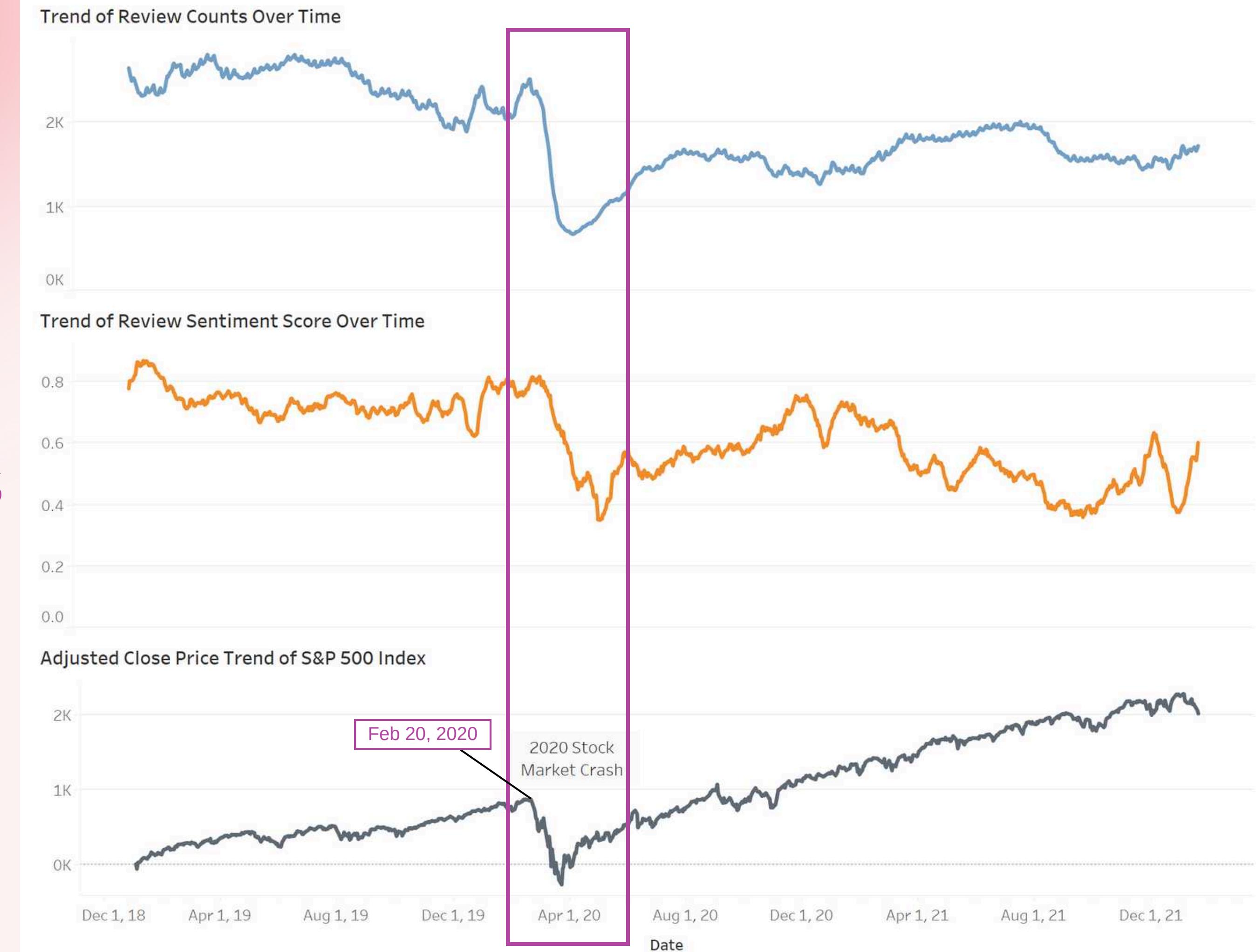
6 **Tableau % Dashboard % Data visualization**



Key Findings



Key Findings



Macro Insights: Yelp, COVID, and Lockdown



COVID-19 Emergency Declaration

English Español Français Kreyòl Italiano 日本語 한국어 Português, Brasil Русский Tagalog Tiếng Việt 简体中文

Release Date	Release Number
March 14, 2020	HQ-20-017-FactSheet

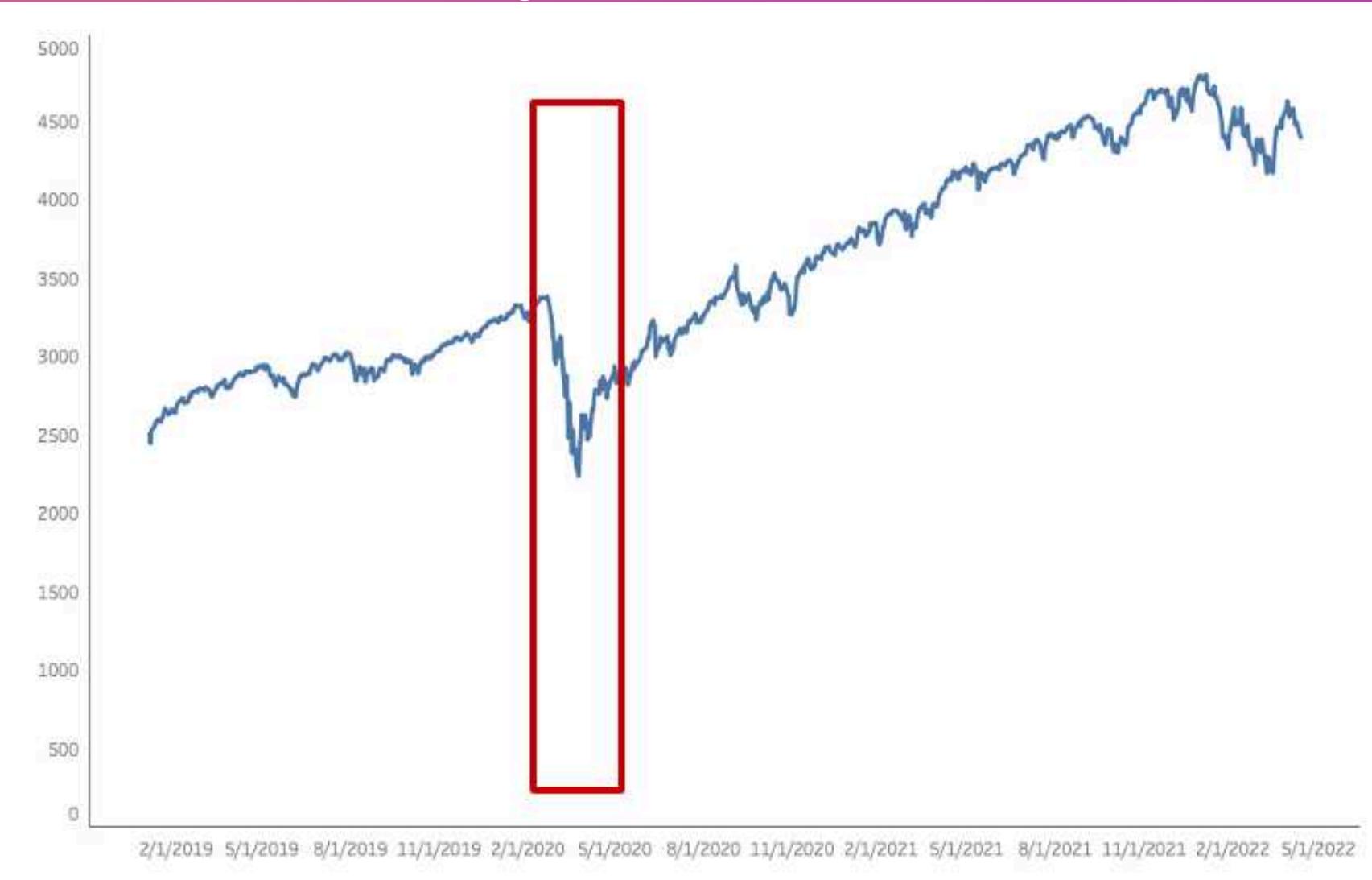
Release Date: March 14, 2020

On March 13, 2020, the President declared the ongoing Coronavirus Disease 2019 (COVID-19) pandemic of sufficient severity and magnitude to warrant an emergency declaration for all states, tribes, territories, and the District of Columbia pursuant to section 501 (b) of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121-5207 (the "Stafford Act"). State, Territorial, Tribal, local government entities and certain private non-profit (PNP) organizations are eligible to apply for Public Assistance.

Source: FEMA.gov

Decoding Customer Sentiment from Yelp Review Data

Price Changes in the S&P 500 Index



Customer Sentiment Analysis



Data Overview:

The stock prices and the customer sentiment may not have high relation between each other but still **have some pattern**

Pre-pandemic:

Both followed **smooth trajectories**, but both **sharply declined** around mid-2020

Post-pandemic:

Fluctuating customer sentiment may be tied to **altered moods** and **changes in service offerings** by impacted businesses

Microscopic Insights: Examining Specific Publicly Traded Companies

Many trends in the restaurant industry are shaped by changing customer preferences and new technologies, and stock performance will likely reflect how well the companies adapt to each.



ECE Entertainment –
Chuck E Cheese

Filed Bankruptcy
June 2020

Delisted on Stock Exchange



Jack in the Box Inc
JACK

Sales plunged 17 %
after March 8, 2020



Domino's Pizza Inc
(DPZ)

Online Ordering
& Food Delivery



Chipotle Mexican Grill Inc
(CMG)

Healthy Eating
& Technology



Facing Headwind: ECE Entertainment - Chuck E Cheese

Filed for **bankruptcy** due to financial challenges exacerbated by the COVID-19 pandemic, which led to **prolonged closures, reduced customer traffic, and constrained operations**, resulting in an inability to meet financial obligations.



1 Star Rating
2020-10-03

"I would give it a 0 if I could, went last night for the spook tacular event and it was nothing like the description.....**Chuck e never came out to dance** and the food tasted like **burnt plastic**. My daughter which is 4 yrs old said daddy this **tastes like poop**. The soda machine was **out of 4 options** and no fountain options for kids. **Very disappointed** about our experience. Chuck e cheese has really **gone down hill over the years**. I can take my child to celebration station spend more but have a better time."

Source: Yelp





Facing Headwind: Jack in the Box Inc. (JACK)

The company **suspended its stock buyback** program to preserve cash and maintain ample liquidity
Reduced marketing fees, **postponed** collection of rental payments, **delayed** franchise development agreements and **suspension** in other capital investments



1 Star Rating
2020-08-18

“Completely and genuinely the **worst restaurant** that I have ever been to. The service is truly **terrible** every time. The only time I go is when a friend wants it. It is a **running joke** that they **don't keep food there** because no matter what you try to order at this location, they **don't have it about 90% of the time.**

Don't even know how they are still open. They have the **rudest staff** ever. If I could give it **negative 5 stars** I would.”

Source: Yelp



We Do Deserve A Raise' — Jack In The Box Employee Shows Off Severely Understaffed Restaurant

Creator: 919039361464473

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Riding Tailwind: Domino's Pizza Inc. (DPZ)

- Well-positioned to meet Covid demand: Prior investments and user foundations in **digital ordering platforms** and **delivery infrastructure**
- **Contactless** delivery and carryout: **Especially appealing** during the pandemic when concerns about virus transmission were **heightened**
- Adaptability and innovation: "**Carside Delivery**"



5 Star Rating
2020-07-26



"Pleasantly surprised! I don't frequent pizza joints much at all anymore but we decided to **support** one of the nearest pizza chains and Domino's was it.

I must say, Domino's have **come a long way**. The hand tossed crust was **crispy and flavorful**. The toppings were **plentiful** and the overall quality of both pizzas was **surprising.**"

Source: Yelp





Riding Tailwind: Chipotle Mexican Grill Inc (CMG)

- Digital transformation: Well-established digital infrastructure & **online and mobile** orders
- Menu innovations and flexibility: Using fresh and high-quality ingredients resonated with consumers seeking **healthier** and **customizable** food options
- Chipotle's emphasis on convenience: **Drive-thru lanes**

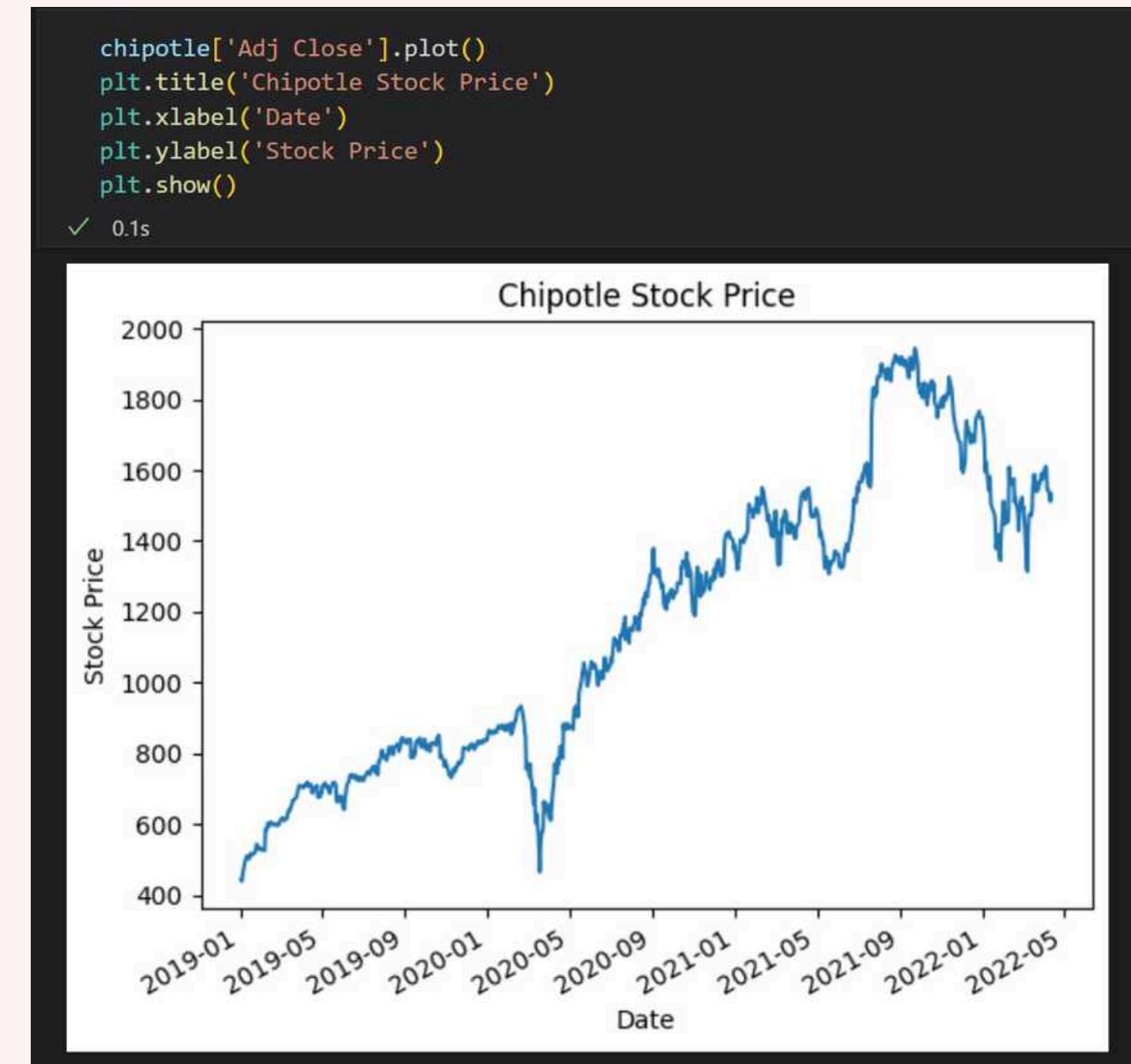


Yelp Review
2020-12-05



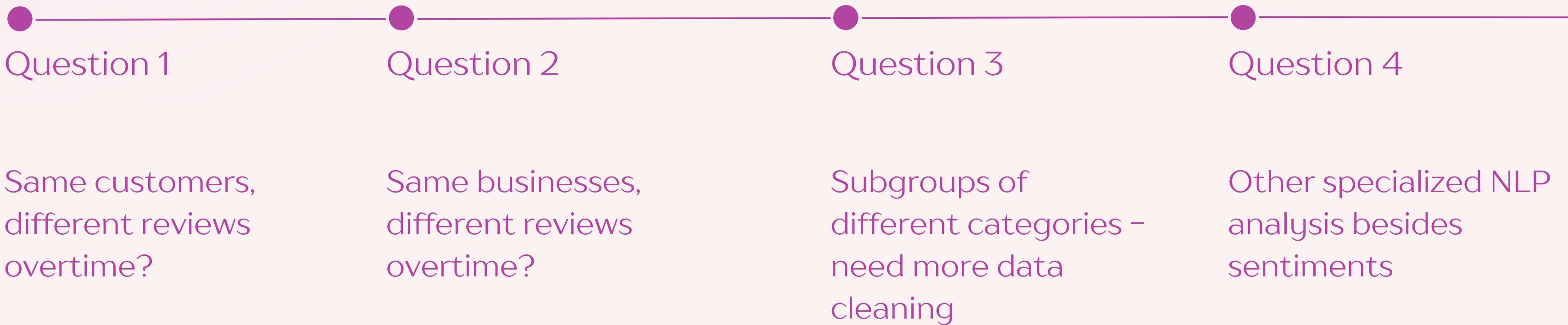
“This Chipotle is OK. Our orders have been **pretty consistent**. The guacamole is my **favorite part**, definitely **worth splurging on** extra guac. They also started selling white queso about a year ago, which is **pretty good**. I actually like yellow queso better, but either way it's a **nice option** to share with the table. They're **not shy with spice**, especially on their Sofritos so if you're averse to spice then let them know. The restaurant is literally called Chiptole, so I'd hope folks would expect some heat from that smoke jalapeno flavor, I certainly do. **Yum!**”

Source: Yelp



Future Action Steps & Recommendations

To gain a deeper understanding of causal questions related to customer sentiments and business performance over time, we consider the following:



Questions? Reach out

Thank you