ANALYSIS OF BRAND'S ONLINE REPUTATION

GROUP 4

THE TEAM

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RESEARCH PROBLEM

- In today's digital era, a brand's reputation can be made or broken through online conversations, reviews, and social media interactions.
- Hence, the research we wish to undertake is **"Analysis of brand's online reputation using NLP techniques**."

WHY?

- **In the current era, online presence of brands and companies has become a necessity. Analysing the sentiment value of the brand reputation online thus becomes essential.**
- **Why is it impactful:**
  - **Knowing the consumer perception**
  - **Detection of PR crisis**
  - **Decision making (aligned with consumer sentiments)**

RESEARCH TYPES

APPLIED RESEARCH

- Focus on solving real world problems
- Application of theoretical knowledge to practical situations
- Seeks to develop insights and tools directly applicable to businesses

QUANTITATIVE RESEARCH

- In this research, NLP techniques will be used to analyze and process large volume of unstructured data
- Aims to quantify sentiments, identify trends and extract insights

RESEARCH TYPES
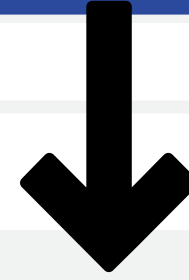
ANALYTICAL RESEARCH

- Gathering data from various data sources
- Apply NLP techniques to analyze the sentiments of the online content about a particular brand (positive, negative or neutral)

RESEARCH REVIEW

Assignment 2

ROSHNI PANDA

OBIM: A COMPUTATIONAL MODEL TO ESTIMATE BRAND IMAGE FROM ONLINE CONSUMER REVIEW

- <u>Focus</u>: Introduces a model for quantifying Online Brand Image (OBIM) based on consumer reviews.
- <u>Key Outcomes</u>: Generate a score that combines positive sentiments and commonly used words. Tested using actual Amazon mobile phone reviews.
- <u>Applicability</u>: The model helps companies figure out what people think about their brand from online reviews. It looks at how much people like the brand, how strong their feelings are, and what makes the brand special.

Mitra, S., & Jenamani, M. (2020). OBIM: A computational model to estimate brand image from online consumer review. Journal of Business Research, 114, 213-226.

ROSHNI PANDA

🔍 CONT...

- <u>Research Gap:</u>
  - The research lacks a clear way to measure how people feel about a brand using online reviews.
  - Also, not many studies explain how companies can use this measurement to make good marketing choices.

Mitra, S., & Jenamani, M. (2020). OBIM: A computational model to estimate brand image from online consumer review. Journal of Business Research, 114, 213-226.

ATHARVA KULKARNI

MULTIFACTOR ANALYSIS OF ONLINE REPUTATION OF SELECTED CAR BRANDS

- <u>Focus</u>: Analyzes the online reputation of various car brands using multiple factors such as reviews, media coverage, and social media activity.
- <u>Key Outcomes</u>: Positive consumer reviews, effective social media & a strong brand identity were vital for a good online reputation. Luxury & innovative electric vehicle brands generally had a more robust online reputation.
- <u>Applicability</u>: Use this information to improve their online reputation and marketing strategies. Serves as a valuable reference for other industries.

Dorčák, P., Markovič, P., & Pollák, F. (2017). Multifactor analysis of online reputation of selected car brands. Procedia engineering, 192, 719-724.

ATHARVA KULKARNI

🔍 CONT...

- <u>Research Gap:</u>
  - Mentions that the study calculates scores and percentages for different reputation determinants but does not mention any statistical analysis or significance testing
  - Lack of rigorous statistical analysis to support the findings and conclusions of the study.

Dorčák, P., Markovič, P., & Pollák, F. (2017). Multifactor analysis of online reputation of selected car brands. Procedia engineering, 192, 719-724.

JINAV GALA

A BERT-BASED DEEP LEARNING APPROACH FOR REPUTATION ANALYSIS IN SOCIAL MEDIA

- Focus: Centers on utilizing a BERT-based deep learning approach for social media reputation analysis
- Key Outcomes: The proposed approach leverages the BERT language model for classifying text based on reputation polarity. Experimental results showcase significant improvements: a 5.8% enhancement in accuracy
- Applicability: The approach introduced in the paper can be applied to analyze reputation in social media.

Rahman, M. W. U., Shao, S., Satam, P., Hariri, S., Padilla, C., Taylor, Z., & Nevarez, C. (2022, December). A BERT-based Deep Learning Approach for Reputation Analysis in Social Media. In 2022 IEEE/ACS 19th International Conference on Computer Systems and Applications (AICCSA) (pp. 1-8). IEEE.

JINAV GALA

🔍 CONT...

- <u>Research Gap:</u>
  - Absence of comprehensive comparative studies that assess the effectiveness of BERT against other existing methods for reputation analysis in social media, highlighting the need for a rigorous evaluation of BERT's advantages and drawbacks in this specific domain.

Rahman, M. W. U., Shao, S., Satam, P., Hariri, S., Padilla, C., Taylor, Z., & Nevarez, C. (2022, December). A BERT-based Deep Learning Approach for Reputation Analysis in Social Media. In 2022 IEEE/ACS 19th International Conference on Computer Systems and Applications (AICCSA) (pp. 1-8). IEEE.

NIDHI DAHIYA

⚲ MINING MULTI-BRAND CHARACTERISTICS FROM ONLINE REVIEWS FOR COMPETITIVE ANALYSIS

- <u>Focus</u>: Utilizing online reviews to understand customer opinions on products/services.
- <u>Key Outcomes</u>: Offers insights into competitive brand strengths and weaknesses. Guides brand managers and marketers with valuable insights.
- <u>Applicability</u>: Beneficial for decision-making in brand management and marketing. Can enhance brand competitiveness.

Guo, Y., Wang, F., Xing, C., & Lu, X. (2022). Mining multi-brand characteristics from online reviews for competitive analysis: A brand joint model using latent Dirichlet allocation. Electronic Commerce Research and Applications, 53, 101141.

NIDHI DAHIYA

🔍 CONT...

- <u>Research Gap:</u>
  - Proposed research focuses on mining multi-brand characteristics from online reviews for competitive analysis, there are several areas where the research may lack depth or exploration. Some potential research gaps include: Aspect-Based Sentiment Analysis, Comparative Analysis Methods and Ethical Consideration

Guo, Y., Wang, F., Xing, C., & Lu, X. (2022). Mining multi-brand characteristics from online reviews for competitive analysis: A brand joint model using latent Dirichlet allocation. Electronic Commerce Research and Applications, 53, 101141.

PURVESH KHALATKAR

🔍 FOOD INSUFFICIENCY AND TWITTER EMOTIONS DURING A PANDEMIC

- <u>Focus</u>: This study focuses on using real-time tweets to help food providers target urgent food needs during the pandemic
- <u>Key outcomes</u>: The study found that specific emotions in tweets are linked to food insufficiency rates. It suggests a new way to measure well-being.
- <u>Applicability</u>: This study can be applied to help policymakers and groups that provide food assistance. By studying people's feelings in real-time tweets, we can find out where there might be a lack of food.

Goetz, S. J., Heaton, C., Imran, M., Pan, Y., Tian, Z., Schmidt, C., ... & Mitra, P. (2023). Food insufficiency and Twitter emotions during a pandemic. Applied Economic Perspectives and Policy, 45(2), 1189-1210

PURVESH KHALATKAR

🔍 CONT...

- <u>Research Gap:</u>
  - <u>Comparison with Other Platforms</u>: The paper primarily focuses on sentiment and text analysis of Twitter data. Could explore patterns and sentiment distributions on other social media platforms like FB, YT.
  - <u>Machine Learning Approaches</u>: While the paper uses the VADER approach, considering other advanced machine learning techniques for sentiment analysis can be done

Goetz, S. J., Heaton, C., Imran, M., Pan, Y., Tian, Z., Schmidt, C., ... & Mitra, P. (2023). Food insufficiency and Twitter emotions during a pandemic. Applied Economic Perspectives and Policy, 45(2), 1189-1210

HYPOTHESES

Assignment 3

HYPOTHESIS 1

IMPACT OF SENTIMENT ON ONLINE BRAND REPUTATION

NULL HYPOTHESIS (H0)

The sentiment of online customer reviews is no different from the reputation of the brand.

ALTERNATIVE HYPOTHESIS (HA)

The sentiment of online customer reviews is different from the reputation of the brand.

HYPOTHESIS 1

IMPACT OF SENTIMENT ON ONLINE BRAND REPUTATION

⚙ **DATA SOURCES**

Data Scraping from e-commerce websites like Amazon or google reviews

⚙ **TEST THAT CAN BE USED**

Either finding the corelation coefficient or using the independent samples t-test

HYPOTHESIS 2

RELATIONSHIP BETWEEN BRAND PERCEPTION AND STOCK PRICE

NULL HYPOTHESIS (H0)

There is no correlation between how the brand is perceived online and its stock price.

ALTERNATIVE HYPOTHESIS (HA)

A correlation exists between how the brand is perceived online and its stock price.

HYPOTHESIS 2

RELATIONSHIP BETWEEN BRAND PERCEPTION AND STOCK PRICE

✿ **DATA SOURCES**

Data Scraping from various social media platforms and yahoo stock dataset for stock prices

✿ **TEST THAT CAN BE USED**

Either finding the Pearson correlation coefficient or using the independent samples t-test
Also can do Regression Analysis

HYPOTHESIS 3

BRAND IMAGE VARIATION AMONG COMPETITORS

NULL HYPOTHESIS (H0)

There are no differences in the brand image among multiple companies within the same industry.

ALTERNATIVE HYPOTHESIS (HA)

There are significant differences in the brand image among multiple companies within the same industry.

HYPOTHESIS 3

BRAND IMAGE VARIATION AMONG COMPETITORS

✿ DATA SOURCES

Data Scraping from various social media platforms and using specific APIs like Twitter API and YouTube API

✿ TEST THAT CAN BE USED

ANOVA (Analysis of Variance) test

HYPOTHESIS 4

EFFECT OF COVID ON BRAND REPUTATION

NULL HYPOTHESIS (H0)

The brand reputation remains unaffected by the presence of COVID.

ALTERNATIVE HYPOTHESIS (HA)

The brand reputation undergoes changes as a result of the influence of COVID.

HYPOTHESIS 4

EFFECT OF COVID ON BRAND REPUTATION

✿ DATA SOURCES

Data extraction by using Twitter API

✿ TEST THAT CAN BE USED

Paired sample t-test for the comparison of means

Even chi-square test of independence if we consider the categories

HYPOTHESIS 5

MARKETING CAMPAIGN METRIC

NULL HYPOTHESIS (H0)

The specific marketing campaign did not have an impact on brand reputation.

ALTERNATIVE HYPOTHESIS (HA)

The specific marketing campaign had an effect on brand reputation.

HYPOTHESIS 5

MARKETING CAMPAIGN METRIC

✿ **DATA SOURCES**

Data extraction by using Twitter API or YouTube API. Also by scraping news websites

✿ **TEST THAT CAN BE USED**

Paired sample t-test for the comparison of means
Or can use chi-square test of independence if we keep the categories (positive, negative and neutral)

RESEARCH DESIGN

Assignment 4

OVERALL STATISTICAL DESIGN

Collect Data → Pre-process Data → Convert to sentiment score → Test the hypothesis → Conclude

Pre-process Data:
Lowercasing
Tokenization
Removing stop words
Removing sepcial characters
Stemming/Lemmatization
Vectorizing

Convert to sentiment score:
Train and evaluate multiple techinques on existing labelled data:
Lexicon-Based
ML Methods
Pre-trained Models
Large-Language models
Hybrid-approaches
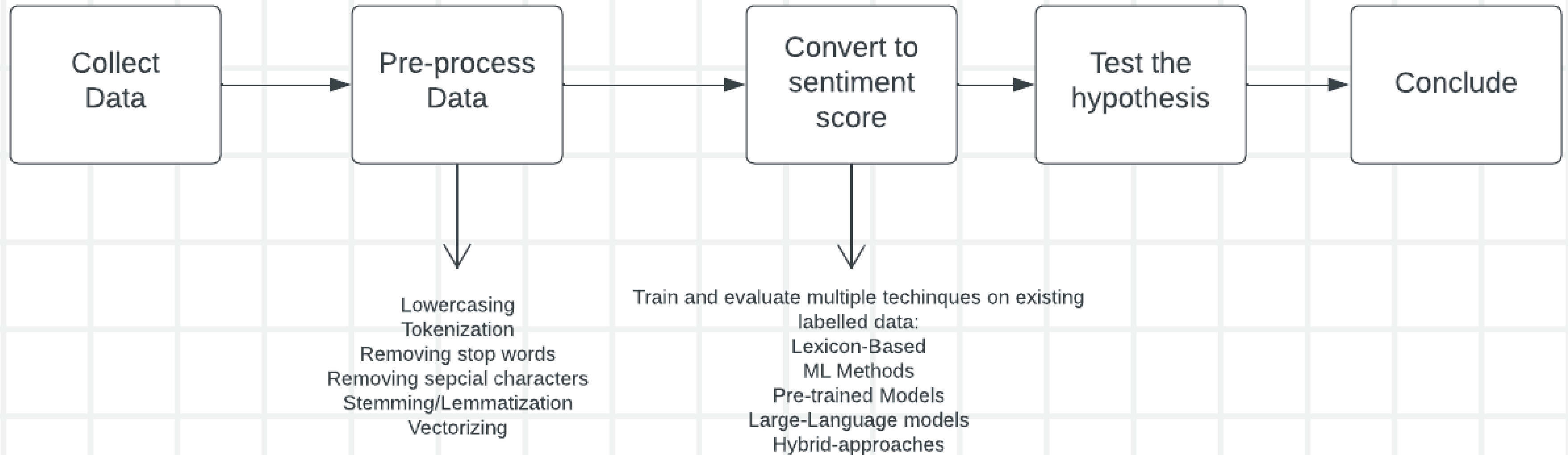
IMPACT OF ONLINE BRAND SENTIMENTS ON ACTUAL REPUTATION (HYPO - 1)

Design

Sampling Design	Brand selected: McDonald's Reviews sampled from major Mumbai outlets' online info-card
Observational Design	Collect reviews data using web scraping tools. Use Google Forms to conduct a survey (Questionnaire covered in the next section)
Statistical Design	Analyse sentiment-reputation relationship using correlation analysis and using the independent samples t-test.
Operational Design	Employ Python for data collection and analysis, implement data preprocessing for quality control, and visualize findings using charts and graphs.

IMPACT OF ONLINE BRAND SENTIMENTS ON ACTUAL REPUTATION (HYPO – 1)

SAMPLING OVERVIEW
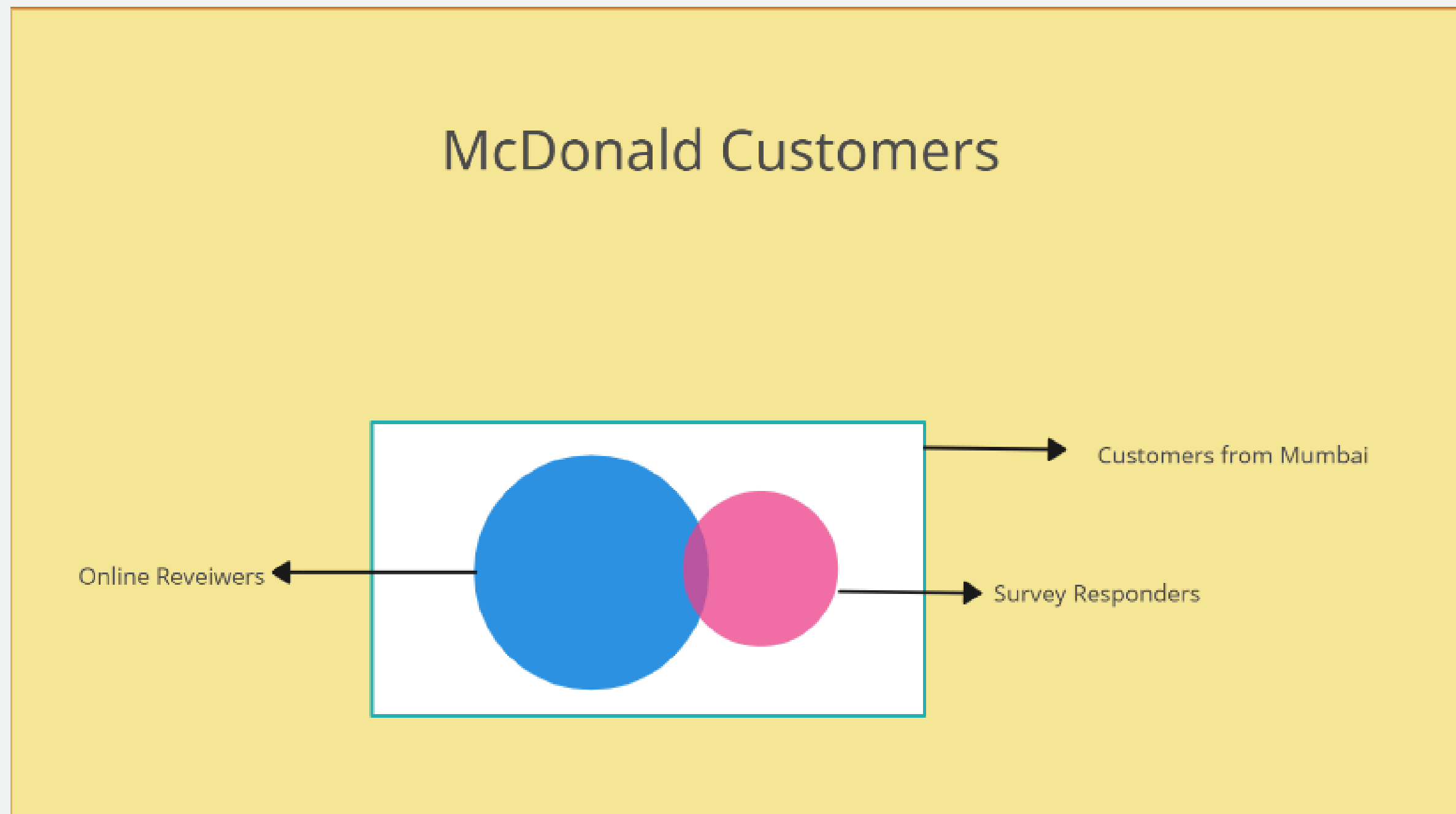
RELATIONSHIP BETWEEN BRAND PERCEPTION AND STOCK PRICE (HYPO - 2)

Design	
Sampling Design	Brand selected: Coca Cola Company Data collected for period: 1st August 2022 - 1st August 2023
Observational Design	Analyze sentiment data from social media platforms (e.g., Twitter) and stock price movements from yahoo stock price api
Statistical Design	Use regression analysis to assess the relationship between brand perception (sentiment scores) and stock price changes, controlling for relevant factors.
Operational Design	Employ Python and financial APIs for data collection and analysis, preprocess data for consistency, and visualize results through daily stock price charts.

BRAND IMAGE VARIATION AMONG COMPETITORS (HYPO - 3)

Design

Sampling Design	Brands selected: Xiaomi, Samsung, Oppo Latest 10 models will be considered considering all the series under the brand
Observational Design	Scraping the data from Amazon and Flipkart Market places
Statistical Design	Utilize ANOVA or t-tests to compare mean brand image scores among competitors, identifying significant variations.
Operational Design	Use online survey tools for data collection, and present findings through comparative charts and summary statistics.

EFFECT OF COVID ON BRAND REPUTATION (HYPO - 4)

Design

Sampling Design	Brand selected: IKEA One year before and after COVID is the sample we're considering
Observational Design	Collecting tweets for IKEA by the users within the period using API and Scraping methods
Statistical Design	Use paired t-tests or non-parametric tests to compare pre-COVID and COVID-affected sentiment scores, determining the changes in brand reputation.
Operational Design	Automate data collection with web scraping tools, preprocess text data, and visualize results through before-and-after sentiment trend graphs.

MARKETING CAMPAIGN METRIC (HYPO - 5)

Design

Sampling Design	Brand selected: Tanishq Ekatvam Ad Campaign 2020
Observational Design	Data extraction by using Twitter API or YouTube API. Also by scraping news websites. Period: Before and After the campaign
Statistical Design	Paired sample t-test for the comparison of means or can use chi-square test of independence if we keep the categories (positive, negative, neutral).
Operational Design	Implement data collection through web analytics tools, automate report generation, and visualize results through dashboards for real-time monitoring.

PILOT SURVEY QUESTIONNAIRE

Survey: Analysis of customer review on McDonald's

Welcome to the McDonald's Customer Review Analysis survey, a part of our data science research project. We're interested in understanding your perception of McDonald's as a brand. Your input will contribute to valuable insights for our research. The data will be kept discreet.

Email *

Valid email

This form is collecting emails. Change settings

What is your Name? *

Short answer text

Question 2

What is your age range? *

○ Below 16

○ 16 to 25

○ 25 to 40

○ 40 and above

Why? The age range question is important to ask in a brand online reputation survey because it can help to identify different customer segments and understand how they perceive the brand differently.

Question 3

How often do you visit McDonald's? *

◯ Daily

◯ Weekly

◯ Monthly

◯ Rarely

◯ Recent First-time visit

◯ Never

Why ? :- Brand loyalty
This question helps to understand how often customers interact
with the brand and how likely they are to return.

Question 4

(Only for those who don't select never in previous question)

How do you typically place your McDonald's orders? *

○ In-person at the restaurant

○ Drive-thru

○ Mobile app or website

○ Delivery (third-party service)

○ Other...

Why? Customer experience
These questions help to understand how customers prefer to interact with the brand
and how they perceive their experience.

Question 5

Please rate your recent experience when ordering at McDonald's on a scale of 1 to 5, with 1 being "Very Dissatisfied" and 5 being "Very Satisfied."

	1	2	3	4	5
Overall dining e…	○	○	○	○	○
Cleanliness of …	○	○	○	○	○
Speed of service	○	○	○	○	○
Quality of food	○	○	○	○	○
Friendliness of …	○	○	○	○	○

Why? This question helps brands to understand how customers perceive their experience. For example, did customers have a long wait time? Was the food prepared to their liking? Was the staff friendly and helpful? This information can be used to identify areas where the brand can improve its customer service and food quality.

Question 6

Please rate your recent experience when ordering at McDonald's on a scale of 1 to 5, with 1 *
being "Very Dissatisfied" and 5 being "Very Satisfied."

	1	2	3	4	5
Ease of placing...	○	○	○	○	○
Accuracy of yo...	○	○	○	○	○
Variety of men...	○	○	○	○	○
Value for the pr...	○	○	○	○	○

Why? This question helps brands to understand how customers perceive their experience. For example, did customers have a long wait time? Was the food prepared to their liking? Was the staff friendly and helpful? This information can be used to identify areas where the brand can improve its customer service and food quality.

Question 7

What feeling comes to mind when you think about McDonald's as a brand/company? *

○ Positive vibes

○ Negative vibes

○ Chaotic vibes

○ Peaceful vibes

○ Other...

Why? This question helps brands to understand the emotional connection that customers have with their brand. For example, do customers associate McDonald's with happiness, nostalgia, or convenience? This information can be used to develop marketing campaigns and create brand experiences that resonate with customers on an emotional level.

○ Positive

○ Negative

Why ? "What sentiment does the brand 'McDonald's' or the image strike?" to get a better understanding of how people perceive the brand on an emotional level. This is important because brands that can evoke positive emotions in their customers are more likely to be successful.

Data SnapShot

Link to the google sheet:
https://docs.google.com/spreadsheets/d/1usUirmo_SRbbVHjzr6DZHAfxFOfJlHqtVrfXHl65lQs/edit?usp=sharing

Cronbach's alpha Analysis of the questionnaire

- Cronbach's alpha: 0.8915
- Strong internal consistency in McDonald's dining experience survey.
- High reliability: Survey items effectively measure the same underlying aspects.
- Valuable tool for assessing customer satisfaction and experiences at McDonald's.

Link to the google colab notebook:

https://colab.research.google.com/drive/1ml7_3yBYGgy3peZbmea9njw3DBafVuaz?usp=sharing

Sentiment Analysis Technique

We used Vader-Lexicon to score the sentiments.
It is a rule-based and context-based algorithm to score the polarity.

HYPOTHESIS 1

IMPACT OF SENTIMENT ON ONLINE BRAND REPUTATION

Test	Paired T-test
p-value	0.0000003
Conclusion	Google review sentiments are significantly different than the surveyed review sentiments.

HYPOTHESIS 2

RELATIONSHIP BETWEEN BRAND PERCEPTION AND STOCK PRICE

Test	Regression Analysis
Correlation	0.23
Conclusion	There is no correlation between the sentiments of tweets and stock price changes

HYPOTHESIS 3

BRAND IMAGE VARIATION AMONG COMPETITORS

Test	ANOVA(Analysis of Variance)
p-value	0.304
Conclusion	Fail to reject null hypothesis. There is no significant difference in the sentiments of mobile reviews for the given brands

HYPOTHESIS 4

EFFECT OF COVID ON BRAND REPUTATION

Test	Paired T-test
p-value	0.736
Conclusion	Failed to reject null hypothesis. There is no significant effect of sentiments in regards to IKEA of COVID-19 pandemic

HYPOTHESIS 5

MARKETING CAMPAIGN METRIC

- The Instagram comments were scraped of Tanishq before and after their Ekatvam campaign
- The comments were short, and had no sense of interaction with the product/brand
- The comments consisted of queries for cost, thus not useful for sentiment analysis

CONCLUSION

- Evaluating sentiments of consumers on online platforms can used for certain cases:
- Where surveys don't usually portray the true brand perception
- Where you want to compare two or more brands in terms of consumer perception
- However, sentiments are not found to be correlated with stock price of the company as various other factors affect the stocks too
- Effects of certain events/campaigns may be assessed using the consumer sentiments

RESEARCH LIMITATIONS

- This study stuck to a single method of scoring sentiments
- It was an overview of the topic of sentiment and it's impact on brand.. it doesn't delve into one particular area and dig deeper
- Only one primary data source was considered

FUTURE RESEARCH

- Various sentiment analysis methods can be applied and evaluated
- Deep learning and transformer based models can be used
- Primary data collection can be implemented to enrich the research
- Focus on one particular area of the hypothesis and delve deeper for better conclusions