Sentiment Analysis Data Visualization tool – Case Study Final Presentation

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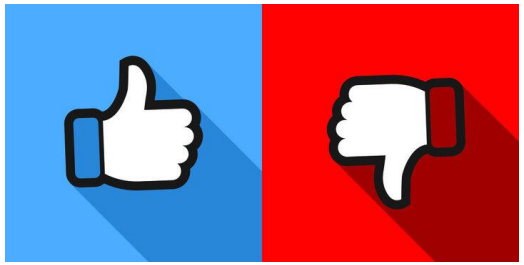
Introduction to the Problem[1] Tony Smith

What is a Sentiment Analysis Tool?

- Mine opinions
- Gain customer insights on products
- Using likes and dislikes



What Are Sentiment Analysis Tools Used for Currently?

- Popularity and virality
- Gaining attention
- Getting noticed online

B, Prabadevi & Reddy, Nandyala & B., Deepa. (2019). Heart rate Encapsulation and Response Tool using Sentiment Analysis. International Journal of Electrical and Computer Engineering (IJECE). 9. 2585. 10.11591/ijece.v9i4.pp2585-2592.

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Introduction to the Problem[1] Tony Smith

Who Could This Benefit?

- NGOs (Non-Government Organizations)
- Emergency Response Teams

Why?

- Increase effectiveness of activism
  - Highlight social issues from insights
  - Employees exploitation
- Crisis Prevention
  - Emergencies such as earthquakes

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Problem Definition [2] Tony Smith

Problems with Sentiment Analysis Tool

- Binary data
  - Likes / Dislikes
  - Hearts
- Measuring comments and statements
  - Tweets
  - Social media comments
  - News reports
  - Idioms
  - Sarcasm
- Visualizing opinions
  - Joy, sad, anger, fear?
  - 2D? 3D?

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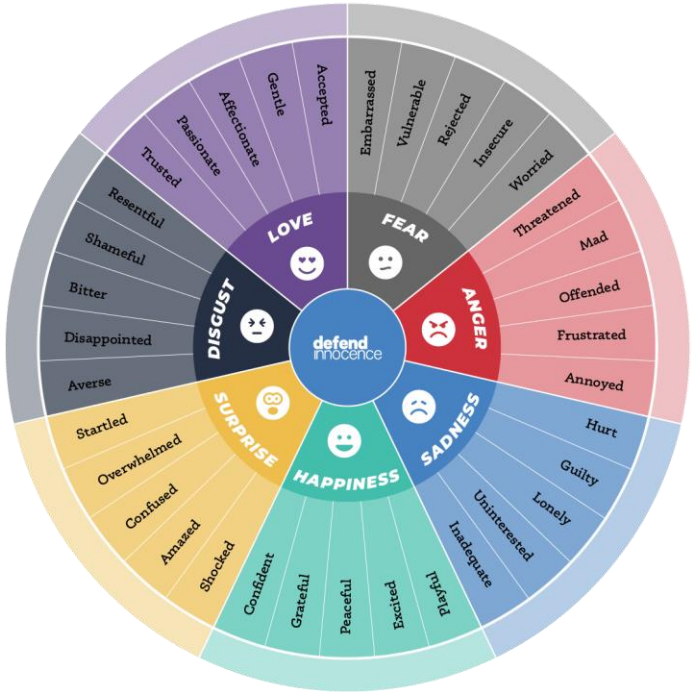
Significance – Why do we need such a tool? [1] Vikas

- **Tailoring Communication Strategies –** By understanding the sentiment of their audience, NGOs can craft messaging that resonates, fostering dialogue and engagement.

- **Deeper Audience Insight –** A comprehensive sentiment analysis tool provides a more nuanced picture of audience sentiment, enabling NGOs to adjust their strategies accordingly.



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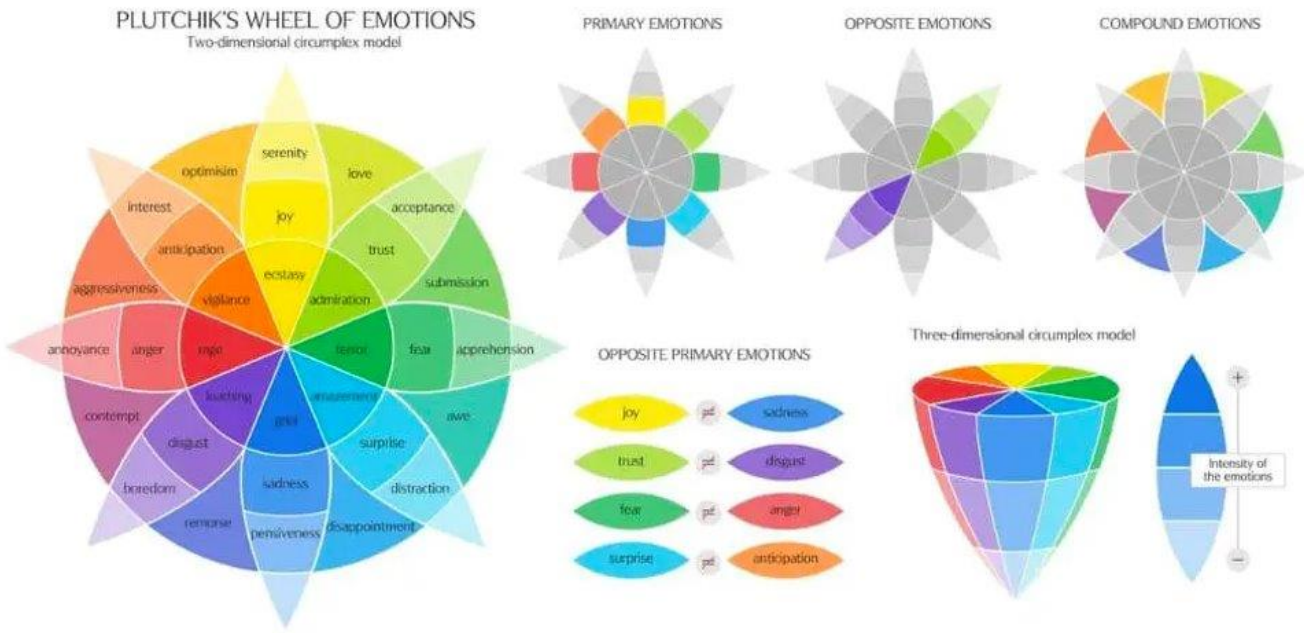
Significance – Why do we need such a tool? [1] Vikas

- **Beyond Online Activism** – NGOs require real-world action for tangible impact. Better understanding of audience sentiment can help NGOs design effective calls to action.

- **Data-Driven Decision Making** – With more nuanced and comprehensive sentiment data, NGOs can make informed decisions that maximize their impact.



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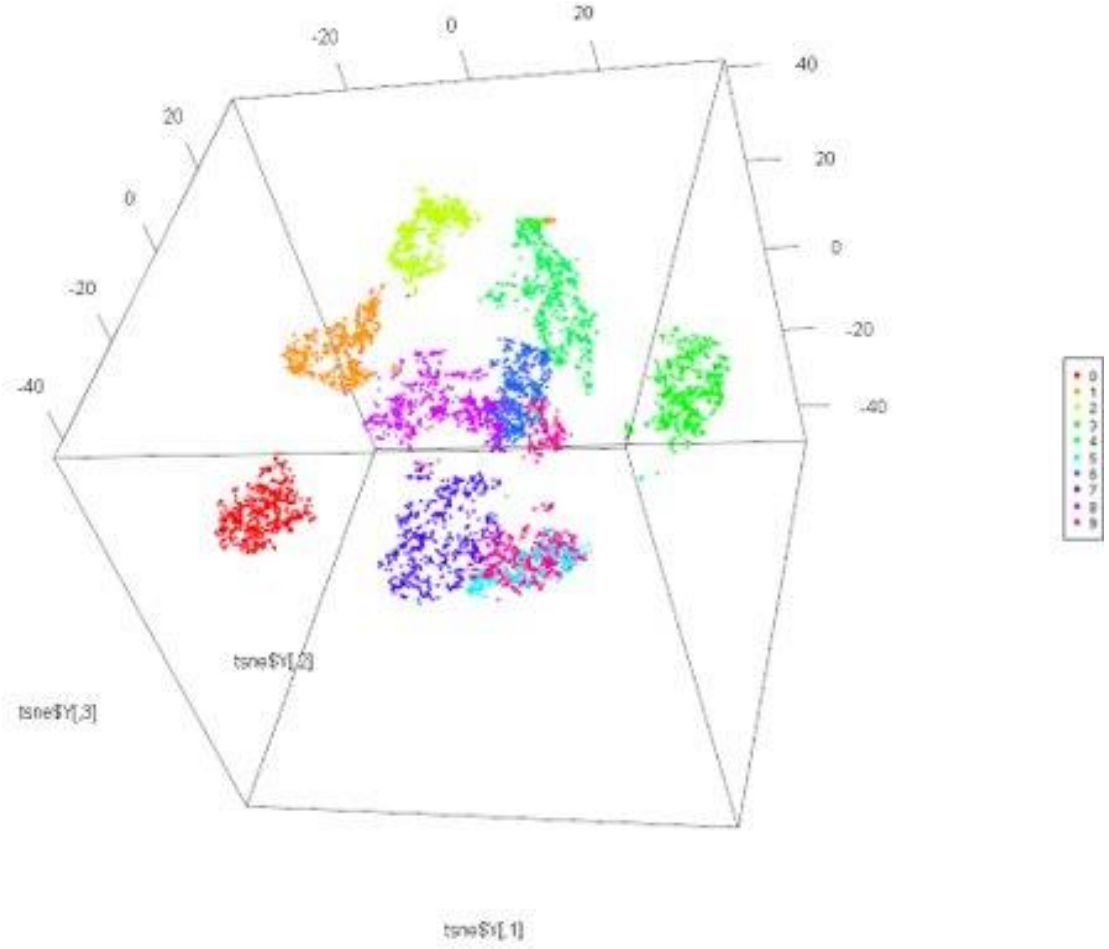
Proposed Data-Driven Solution[1] Amay



- Our Solution: The Advanced Sentiment Analysis Tool – An AI-based solution capable of analyzing a full spectrum of emotional reactions and plots emotions on a 3D matrix.

- ML methods & algorithms: The tool will use advanced machine learning techniques such as supervised learning algorithms (like SVMs or Naive Bayes) for sentiment classification and NLP techniques (like Tokenization, Stemming, and TF-IDF) for text preprocessing. The reason behind choosing these algorithms is their proven effectiveness in text and sentiment analysis tasks.

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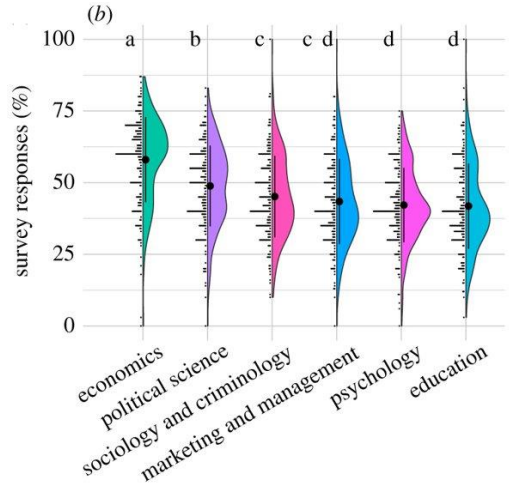
Proposed Data-Driven Solution[1] Amay

- **Benefits:** A more nuanced understanding of audience sentiment enabling NGOs to craft more effective campaigns and calls to action. Better insights into the impact of their campaigns with improved emotional data analysis.

- **Ethical Considerations:** While our solution is designed to enhance NGOs' outreach, it also respects user privacy and confidentiality. It adheres to FATE principles - Fairness (avoiding bias in sentiment analysis), Accountability (responsible use of the tool), Transparency (clear understanding of how sentiment analysis results are derived), and Ethics (protecting user data and respecting privacy).



- Liu, B. (2012). Sentiment Analysis and Opinion Mining. Synthesis Lectures on Human Language Technologies, 5(1), 1–167. Link
- Ferrara, E., & Yang, Z. (2015). Quantifying the effect of sentiment on information diffusion in social media. PeerJ Computer Science, 1, e26. Link
- Mittelstadt, B., Allo, P., Taddeo, M., Wachter, S., & Floridi, L. (2016). The ethics of algorithms: Mapping the debate. Big Data & Society. Link
- Kitchin, R. (2017). Thinking critically about and researching algorithms. Information, Communication & Society, 20(1), 14-29. Link

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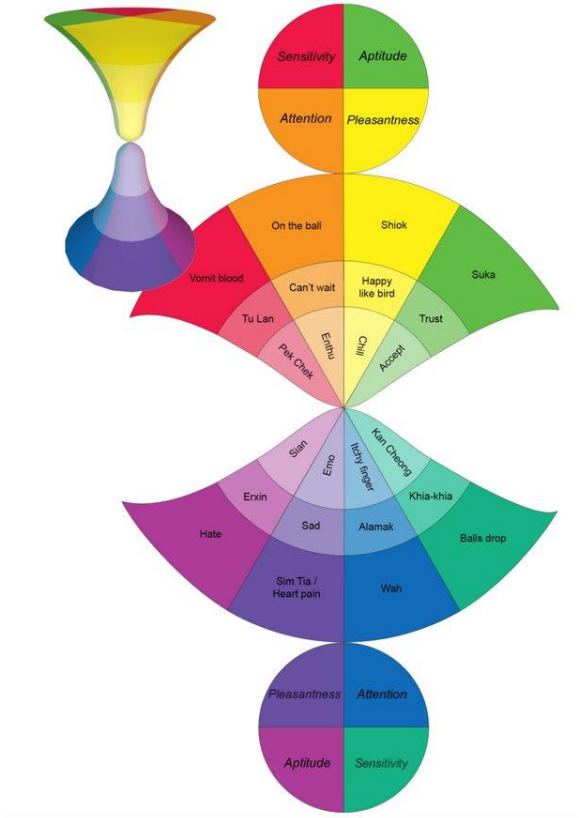
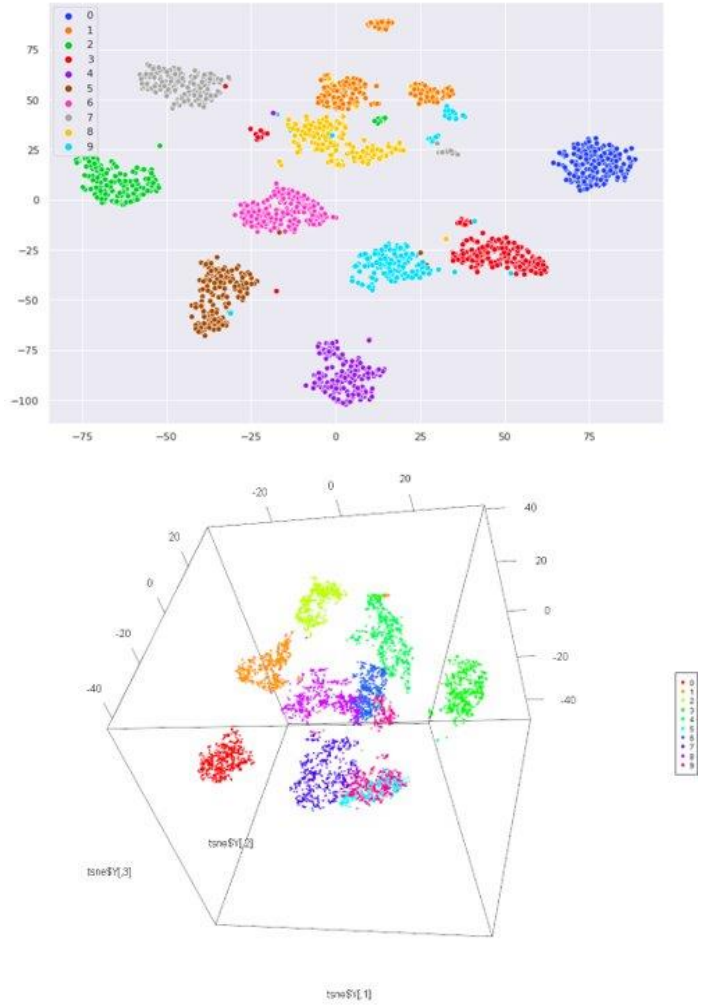
Methodology: Methodology & Data Collection[2] Amay

- **Data Collection:** Data will be collected from publicly available online platforms where NGOs interact with their audience, like social media posts, public comments, and online forums, ensuring the collected data is anonymized and used ethically.
- **Data Analysis:** The collected text data will be pre-processed using NLP techniques, and sentiments will be extracted using supervised learning techniques.
- **Prototyping ML algorithms:** We'll start by implementing a basic model (e.g., Decision Tree & TSNE), assess its performance, then iterate and enhance it through techniques like feature engineering and hyperparameter tuning.





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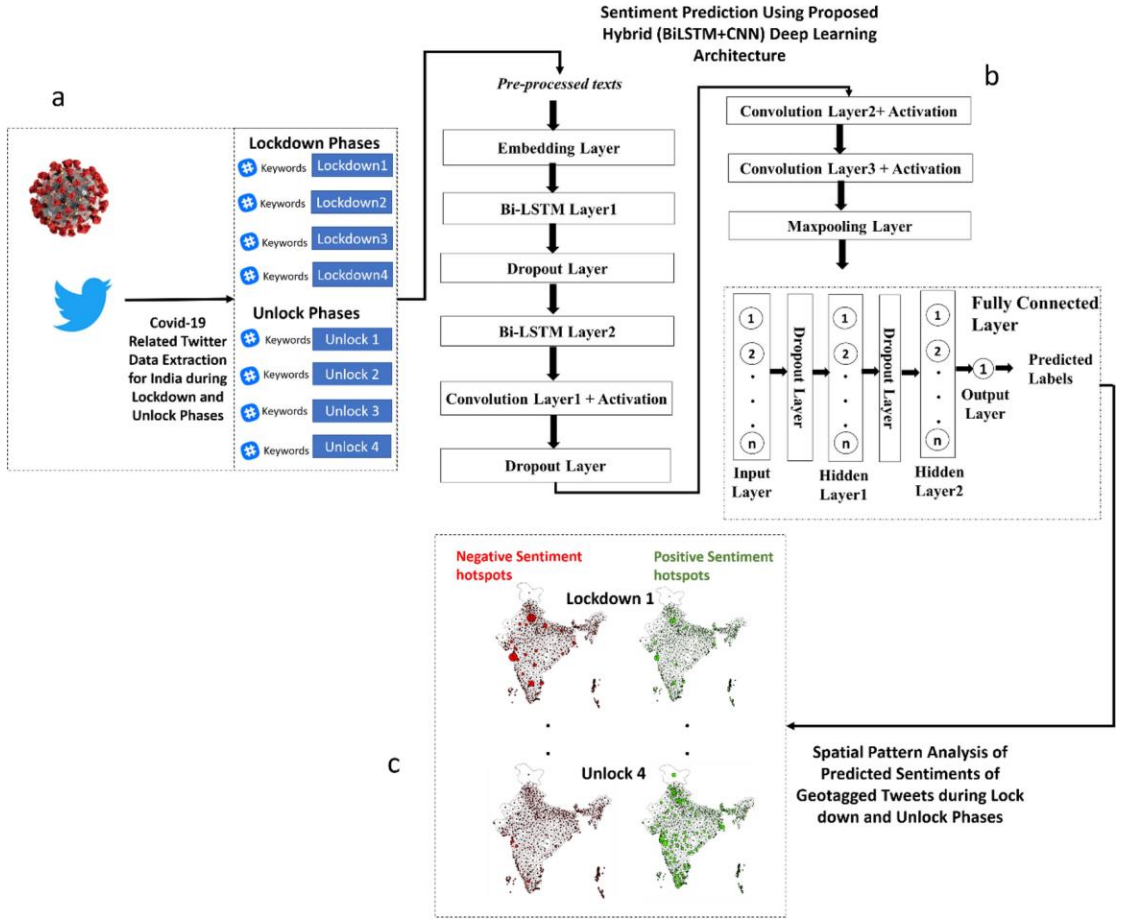
Methodology: Evaluation, Data Privacy, and Governance[3] Amay

- **Evaluation:** The solution will be evaluated using appropriate metrics such as accuracy, precision, recall, and F1-score. Also, we'll conduct A/B testing to compare its performance with existing tools.
- **Ensuring Data Privacy and Trust:** All data will be anonymized to ensure privacy. We will adhere strictly to GDPR guidelines and any other relevant data privacy laws.
- **Data Governance:** The tool will be designed with transparency in mind. We will ensure that it does not inadvertently favour any emotion, ensuring fairness. Users will be informed about what data is being collected and how it's being used.



- Pang, B., & Lee, L. (2008). Opinion mining and sentiment analysis. Foundations and Trends® in Information Retrieval, 2(1–2), 1-135. Link
- Alpaydin, E. (2020). Introduction to machine learning. MIT press. Link
- Baeza-Yates, R. (2018). Bias on the web. Communications of the ACM, 61(6), 54-61. Link
- Mittelstadt, B., Allo, P., Taddeo, M., Wachter, S., & Floridi, L. (2016). The ethics of algorithms: Mapping the debate. Big Data & Society. Link

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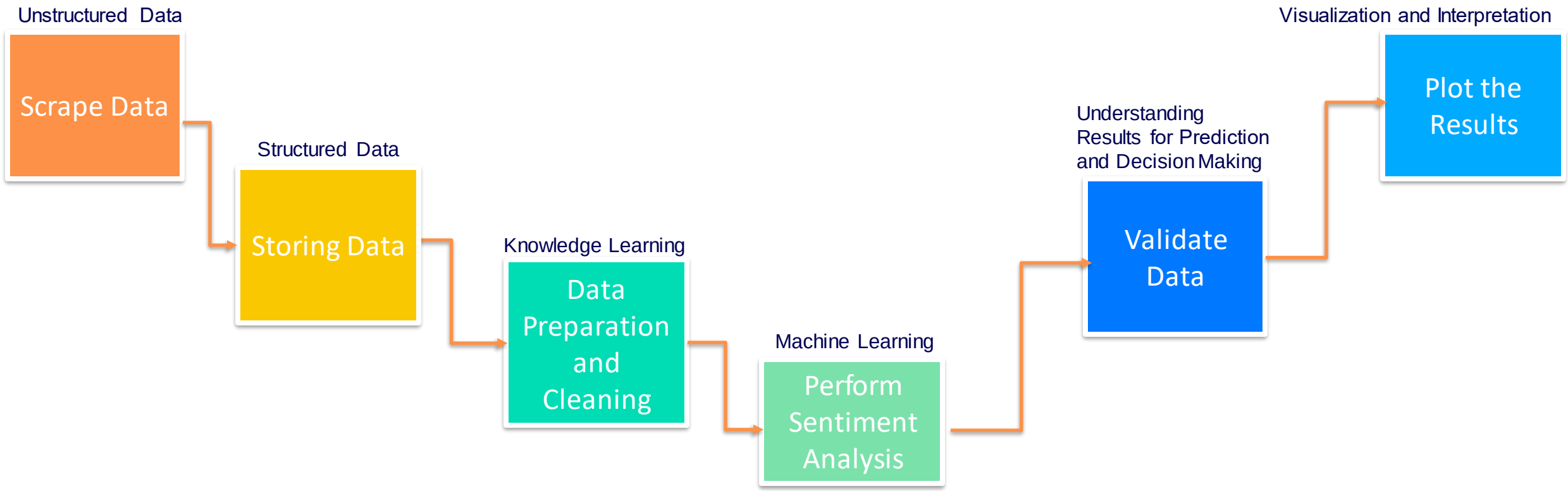
Design Prototype[1] Tabrez



Importance of Data Literacy: https://www.researchgate.net/figure/Block-Diagram-of-Real-Time-Sentiment-Analysis-provides-the-step-by-step-design-of-the_fig1_329392422

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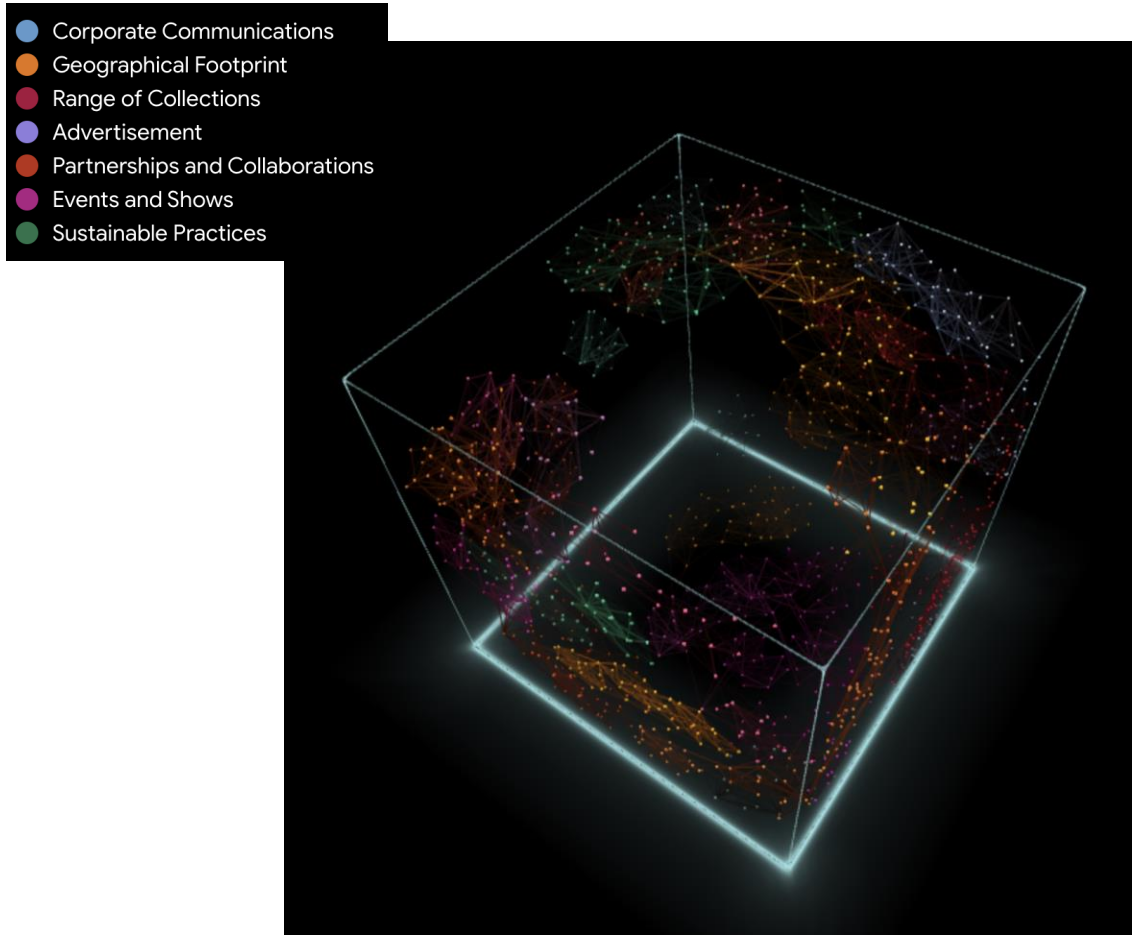
Conclusion[2] Tabrez

- The shortcomings of current sentiment analysis tools make it imperative to develop a 3D matrix visualization, harnessing the full spectrum of emotions. This approach aligns with the FATE principles (fairness, accountability, transparency, ethics, and explain-ability) and offers NGOs and other organizations a more insightful, nuanced understanding of sentiment data.
- A 3D matrix visualization enhances the balance of emotion rating systems. By presenting emotions in a spatial, relational format, it prevents the undue prioritization of specific emotions like anger and encourages a more comprehensive analysis of sentiment data.
- A 3D matrix visualization can serve as a powerful tool for data literacy and transparency. It provides users with a visual, intuitive understanding of the sentiment landscape, encouraging them to consider the full range of emotional responses and understand the impact of these emotions on data analysis and decision-making.
- Addressing ethical implications is crucial in the development and use of a 3D matrix visualization for sentiment analysis. Ensuring that the visualization doesn't exploit specific emotions or unfairly allocate resources is key to responsible use, fostering trust in the tool, and ultimately driving positive impact for organizations and the communities they serve.



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