Meme Trend Analysis System: Interactive Meme Analysis and Toxicity Dashboard

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Abstract

This proposal outlines the design and implementation of an interactive dashboard to analyze and explore meme trends and toxicity dynamics using the data collected in previous projects. Building on the Meme Trend Analysis System and Dataset Measurements and Analysis, this project will focus on answering key research questions and enabling user-driven exploration of meme dissemination, toxicity, and sentiment trends. The dashboard will support parameterized querying of analyses, empowering users to investigate the cultural and harmful aspects of memes interactively.

Keywords

Data Science, Meme Analysis, Reddit, 4chan, Toxicity, Sentiment Analysis, Data Collection, API Integration

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1 Introduction

In Project 1, a system was built to collect meme data from Reddit and 4chan, and in Project 2, this data was analyzed to measure toxicity, sentiment, and cross-platform dissemination patterns. However, to make this data actionable and accessible, an interactive tool is required for exploring and answering research questions.

This project proposes the creation of an interactive dashboard to visualize analyses conducted in Project 2 and provide a platform for answering the research question: How does the spread of toxic memes differ between Reddit and 4chan, and what factors influence their propagation dynamics?

This tool will also enable dynamic parametrization of analyses, allowing deeper exploration of meme trends.

2 Research Question to Be Answered

The project will address the following research questions:

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2.1 How does the spread of toxic memes differ between Reddit and 4chan, and what factors influence their propagation dynamics?

- This builds on toxicity analysis and cross-platform dissemination trends from Project 2 to understand how harmful content circulates between platforms.

2.2 Are specific meme templates more likely to be associated with toxic or negative sentiments?

- This question leverages the template analysis and sentiment data from Project 2 to explore potential correlations between meme format and sentiment.

2.3 What are the temporal trends in meme toxicity and sentiment during significant cultural or political events?

- This extends the temporal analysis from Project 2, focusing on fluctuations in toxicity and sentiment during high-engagement periods, such as elections or breaking news events.

3 Interactive Analyses from Project 2

The following analyses from Project 2 will be implemented in the interactive tool:

3.1 Toxicity and Engagement Analysis

- This analysis examines the relationship between meme toxicity levels and engagement metrics such as upvotes, comments, and reposts across Reddit and 4chan.
- **Parameters for Interactivity:** Users will be able to filter results based on time range, subreddit/board, and toxicity thresholds. This will enable detailed exploration of how user interactions vary with content toxicity.

3.2 Cross-Platform Dissemination Trends

- This analysis explores the spread of memes between Reddit and 4chan, focusing on the origin platform, toxicity levels, and temporal propagation patterns.
- **Parameters for Interactivity:** Users can select specific platforms (e.g., Reddit or 4chan) as the source or destination, and adjust time intervals or toxicity thresholds to understand propagation dynamics during specific periods, such as the 2024 elections.

3.3 Template Evolution and Sentiment Trends

- This analysis tracks the usage of specific meme templates over time and correlates them with sentiment (positive, negative, or neutral) and toxicity levels.
- **Parameters for Interactivity:** Users can select a particular meme template and view its evolution over a customizable time range, along with sentiment and toxicity trends. This enables identification of cultural shifts and associations tied to specific templates.

By integrating these analyses into the interactive dashboard, the tool will empower users to explore key aspects of meme dynamics and toxicity in a flexible, user-driven manner.

4 Tools and Frameworks

4.1 Web Framework

- **Flask:** Lightweight framework for building the interactive dashboard.
- **Django (optional):** For more robust query handling if needed.

4.2 Visualization Libraries

- **Plotly/Dash:** For interactive, parameterized visualizations.
- **Matplotlib:** For static charts as needed.

4.3 Data Processing

- **Pandas/NumPy:** For data manipulation and preprocessing.
- **MongoDB:** For storing and querying meme metadata, toxicity scores, and sentiment data.

4.4 Deployment

- Hosted on a university-provided VM, ensuring compliance with no third-party hosting restrictions.

5 Challenges and Mitigation Strategies

Following could be some of the potential challenges:

- Handling API rate limits or downtimes.
- Managing large datasets for real-time interactivity.
- Ensuring robustness and scalability of the interactive tool.

Some strategies to address these could be, using MongoDB indexing for faster queries or designing the system to handle API outages gracefully.

6 Expected Outcomes

Prediction of potential insights this tool and analyses could reveal:

- Evidence of higher toxicity propagation in specific meme formats.
- Correlation between template use and sentiment dynamics.
- Patterns of increased toxicity during political events.

7 Future Applications

How the findings and the interactive tool could be extended or applied:

- As a framework for studying other digital platforms.
- To support AI-driven moderation or content curation systems.

8 Conclusion

This proposal outlines the design of an interactive tool to analyze meme dynamics and toxicity. By answering a critical research question and enabling dynamic exploration of data, this project will bridge the gap between raw data and actionable insights. The final deliverable will provide a user-friendly platform for understanding the cultural and toxic dynamics of memes across Reddit and 4chan.

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