Social Media Analytics: Reddit

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Course: Big Data Analytics (Group 2)

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Introduction

Social Media Analytics

The domain we are focusing on is social media analysis, specifically related to Reddit. Social media analytics is the practice of gathering, analysing, and interpreting data from social media platforms to extract valuable insights that inform decision-making processes. By leveraging various tools and methodologies, organizations can track metrics such as engagement, reach, sentiment, and demographics to understand their audience better and optimize their social media strategies accordingly. This process involves monitoring conversations, trends, and behaviours across different platforms, enabling businesses to measure the effectiveness of their campaigns, identify emerging opportunities, and address potential challenges promptly. Social media analytics plays a crucial role in shaping marketing efforts, enhancing customer experiences, and ultimately driving business growth in the digital age.

Here are some keyways social media analytics works with artificial intelligence:

- **Sentiment Analysis** - AI-powered sentiment analysis helps understand people's opinions and feelings towards brands, products, topics, and ideas expressed on social media. It analyses large volumes of text data to classify sentiments as positive, negative, or neutral.
- **Topic Modelling** - AI tools use techniques like latent Dirichlet allocation to discover the main topics being discussed in social media conversations. This gives insights into trending themes and what content resonates most with audiences.
- **Influencer Detection** - AI helps identify influential users and brand advocates on social platforms based on their engagement levels, follower counts, retweets etc. This helps target marketing and engagement efforts.
- **Trend Prediction** - By analysing historical social data and metadata, AI algorithms can predict future trends and viral behaviours. This enables brands to jump on emerging trends proactively.
- **Customer Segmentation** - Social media conversations provide a wealth of customer profile data. AI uses this for accurate segmentation into personas and understanding each group's preferences.
- **Post Engagement Prediction** - AI helps benchmark the potential success of new social content before publishing, based on hashtags, visuals, days/timings used in past high-performing posts.
- **Privacy Risk Identification** - AI detects and flags any privacy/regulation risks from user data being collected or inappropriate ad targeting in social campaigns.

Therefore, machine learning brings powerful analytics capabilities to understand audiences and optimize engagement on social media at scale.
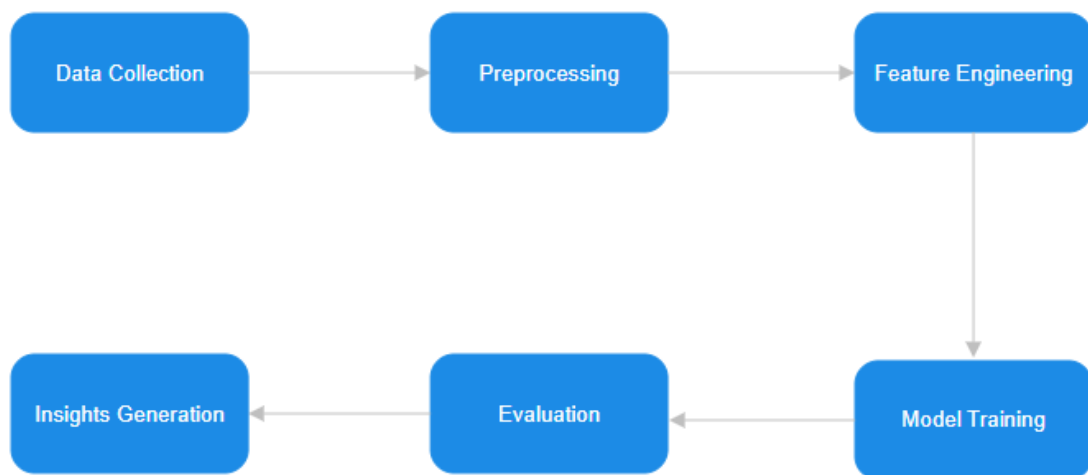
Figure 1: Flow Chart for Social Media Analytics

Reddit

Reddit is a popular online platform where users can create communities known as subreddits to discuss various topics of interest. The platform allows users to submit posts and engage in discussions through comments and upvotes/downvotes. Users gain "karma" points for the number of upvotes their posts/comments receive from the community. Unlike the other social platforms, Reddit mandates adherence to site-wide rules along with the specific regulations for individual subreddits. In addition, Reddit users enjoy the liberty to craft pseudonyms, enabling uninhibited expression of viewpoints.

To understand the dynamics of the industry, several research studies and surveys have been conducted. For example, a study by SEMrush on Reddit indicates that 58.81% of the app's users are Americans, followed by 4.98% Canadians and 4.29% Brits.

Country	All devices		Desktop	Mobile
🇺🇸 United States	58.81%	4.45B	21.37%	78.63%
🇨🇦 Canada	4.98%	376.72M	24.42%	75.58%
🇬🇧 United Kingdom	4.29%	324.67M	28.06%	71.94%
🇮🇳 India	2.97%	224.83M	13.3%	86.7%
🇦🇺 Australia	2.88%	217.59M	25.86%	74.14%

Figure 2: Reddit User Demographic Information

According to Statista, Reddit boasts a predominantly young user base, with 44% of its users falling within the 18 to 29 age bracket. To add on, 31% of users belong to the 30-49 age group, highlighting the platform's appeal to a wide spectrum of younger adults. Furthermore, data from Enterprise Apps Today reveals that out of Reddit's 440 million monthly active users, 65% are men and 35% are women. Notably, 42% of Reddit users are college graduates, and 40% have initiated their college education, indicating a high level of educational attainment among the user base.

As per Pew Research Centre study, Reddit users' have heightened political engagement (Top 5th Subreddit) and active participation in online communities compared to users of other social media platforms. This characteristic aligns with Reddit's reputation as a hub for discussions on a wide range of topics, including politics, current events, and world news. Within this domain, the Russia-Ukraine war has been a topic of significant discussion, with users sharing opinions, news articles, and personal experiences. Enterprise Apps Today quotes that an impressive 82% of Gen Z users perceive Reddit as a trustworthy platform, reflecting the platform's credibility and influence among younger generations. Moreover, a study conducted by Cornell University found that discussions on Reddit often reflect real-world events and sentiments, making it a valuable source for understanding public opinion.

Reddit users exhibit a strong inclination towards discovering new content and websites relevant to their interests. As evidenced by Reddit's internal statistics, postings containing external links garner significantly more engagement, with over 16,000 upvotes compared to text-only posts. This preference for diverse and curated content underscores Reddit's role as a discovery platform, where users actively seek out fresh and engaging material tailored to their preferences.

In conclusion, Reddit stands out as a dynamic social media platform characterized by a young, educated user base with a penchant for political engagement and community interaction. The platform's emphasis on content discovery and curated discussions has solidified its position as a trusted source of information and a vibrant online community. Understanding the demographic composition and engagement patterns of Reddit users is essential for researchers seeking to leverage the platform's vast potential for reaching and engaging with diverse audiences.

Problem Definition

In the context of the Russia-Ukraine war discourse on Reddit, identifying controversial posts is a significant challenge due to the sheer volume and diversity of discussions. The problem stems from the difficulty platform faces in discerning which posts are likely to generate debates, disagreements, or heated discussions. These controversial posts often represent diverse perspectives and conflicting opinions, providing valuable insights into the complexities of public sentiment.

Challenges

- Information Overload: With a multitude of posts and comments on Reddit related to the Russia-Ukraine war, users may feel overwhelmed by the sheer volume of information. It becomes challenging to sift through the noise and identify posts that truly encapsulate debatable viewpoints.
- Diverse Opinions: The discourse surrounding geopolitical events like the Russia-Ukraine war tends to be polarized, with users expressing opinions on a wide range of topics. Controversial posts may not be easily distinguishable, making it challenging for users to engage in meaningful discussions with those holding opposing views with respective to a specific issue.
- Efficiency in Navigation: Users interested in gaining a nuanced understanding of the ongoing conflict desire an efficient way to navigate through discussions. Identifying and prioritizing controversial posts streamlines the navigation process, allowing users to engage with diverse perspectives more effectively.
- Intersectionality of Issues: Overlapping nature of topics related to the Russia-Ukraine war often shape the overall discourse and complexity of conversation. For instance, discussions on the war typically intersect with geopolitical dynamics and international relations, whereas human rights violations happening during the war associates the geopolitical conflict with humanitarian principles.

Target Consumer

The target consumer for this project includes:

- General Public: Individuals seeking to comprehend the sentiments and controversies surrounding the Russia-Ukraine war on Reddit.
- Researchers: Academics and analysts studying online discourse and public opinion on geopolitical events.
- Media Professionals: Journalists and media analysts aiming to gauge public sentiment and identify trending controversies.

Value Proposition

By predicting the controversiality of posts, the project offers a valuable tool for users to:

- Navigate Efficiently: Users can focus on posts that are likely to generate discussions, enabling a more efficient exploration of diverse opinions and controversies.
- Understand Diverse Perspectives: The tool aids users in engaging with a variety of viewpoints, fostering a deeper understanding of the complex and multifaceted nature of the Russia-Ukraine war discourse.
- Facilitate Informed Discussions: Users can participate in discussions with a clearer understanding of which topics are considered controversial, promoting more informed and constructive conversations.

Measurable Outcome

The target consumer benefits by having a tool that highlights controversial content while revealing factors influencing the content's controversiality, enabling them to engage in more informed discussions and comprehend diverse perspectives on the conflict.

In essence, the project addresses the need for a tailored solution that goes beyond generic sentiment analysis, honing in on the specific challenge of identifying and predicting controversial posts within the context of the Russia-Ukraine war discourse on Reddit.

Unique Value Proposition

Our solution offers a unique approach by focusing specifically on predicting controversiality within the context of discussions on the Russia-Ukraine war on Reddit. While generic sentiment analysis tools provide a broad overview of positive, negative, or neutral sentiments, our model goes a step further. It hones in on posts that are likely to spark debates, providing users with a nuanced understanding of the discussions. This capability sets our solution apart, as it enables users to engage with content that represents diverse viewpoints, promoting a more comprehensive and insightful exploration of online discourse.

Customization and Adaptability

In the realm of online discussions, the diversity of topics and the evolving nature of discourse demand a solution that can adapt to different contexts. We plan to build a model which excels in customization and adaptability, offering users an experience that extends beyond the initial focus on the Russia-Ukraine war.

1. One-Size-Fits-All Solutions:
   Many existing tools and models in the sentiment analysis domain often adopt a generalized approach, providing insights that might be applicable to a wide range of topics but lack specificity. These one-size-fits-all solutions may overlook the nuances inherent in different discussions, leading to less accurate predictions and insights.

2. Tailoring for Geopolitical Contexts:
   Our model is initially crafted to analyse and predict controversiality within the discussions related to the Russia-Ukraine war on Reddit. This specificity ensures that the model is finely tuned to capture the unique dynamics and language associated with this geopolitical event. However, recognizing that online conversations span a multitude of topics, our model offers users the flexibility to customize its parameters and features.

3. Relevance in Dynamic Environments:
   Online discussions are dynamic, with the nature of conversations evolving over time. Our model's adaptability ensures that it remains relevant in the face of changing trends and emerging topics. Users can modify the model to suit the current discourse landscape, guaranteeing that it continues to provide accurate predictions and valuable insights in dynamic online environments.

4. Spectrum of Subjects:
   The model's adaptability extends across a broad spectrum of subjects, accommodating the diverse interests and preferences of users. By allowing customization, our solution empowers users to explore controversial posts in areas that align with their specific interests, thereby enhancing the relevance and applicability of the tool to a wide range of online discussions.

Transparent Decision-Making

Transparency in decision-making is a key feature of our model. Rather than providing black-box predictions, our solution offers insights into the features influencing the controversiality of a post. Users can understand the factors that contribute to a post being labelled as controversial, fostering a transparent and informed online environment. This transparency not only builds trust in the model's predictions but also empowers users to critically assess and engage with the content. In an era where online discussions can be susceptible to misinformation, our model contributes to a more discerning and aware online community by shedding light on the reasons behind the controversiality classification.

Data Gathering

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The dataset used appears to contain information related to Reddit posts and comments about the Russia-Ukraine war. Here's an explanation of the columns in the dataset:

1. comment_id: A unique identifier for each comment.
2. score: The score assigned to the comment, indicating the net number of upvotes and downvotes.
3. self_text: The text content of the comment.
4. subreddit: The subreddit to which the post or comment belongs, representing the specific discussion community on Reddit.
5. created_time: The timestamp indicating when the comment was created.
6. post_id: A unique identifier for the post associated with the comment.
7. author_name: The username of the individual who created the comment.
8. controversiality: A binary variable (0 or 1) indicating whether the comment is considered controversial.
9. ups: The number of upvotes received by the comment.
10. downs: The number of downvotes received by the comment.
11. user_is_verified: A boolean value indicating whether the user's account is verified.
12. user_account_created_time: The timestamp indicating when the user's Reddit account was created.
13. user_awardee_karma: The karma points awarded to the user.
14. user_awarder_karma: The karma points awarded by the user.
15. user_link_karma: The karma points associated with the user's links.
16. user_comment_karma: The karma points associated with the user's comments.
17. user_total_karma: The total karma points of the user.
18. post_score: The score assigned to the associated post.
19. post_self_text: The text content of the post.
20. post_title: The title of the post.
21. post_upvote_ratio: The ratio of upvotes to total votes received by the post.

22. post_thumbs_ups: The number of thumbs up received by the post.
23. post_total_awards_received: The total number of awards received by the post.
24. post_created_time: The timestamp indicating when the post was created.

This dataset provides a comprehensive view of user interactions, post characteristics, and relevant metadata in the context of discussions about the Russia-Ukraine war on Reddit. The controversiality column seems to be a crucial target variable for your predictive modelling project.

The dataset comprises post content, comments, timestamps, upvotes, and user information. Textual data undergoes preprocessing to handle noise, remove irrelevant information, and tokenize for analysis.

Project Wireframes

The detailed explanation of each project component:

1. Data Collection Module
   - Objective: Gather relevant posts and comments related to the Russia-Ukraine war from Reddit discussions.
   - Process: The dataset used in this project was obtained from Kaggle, a platform hosting various datasets for research and analysis purposes.

2. Pre-processing Module
   - Objective: Cleans and tokenizes textual data, handles missing values, and removes noise.
   - Process:
     - Text Cleaning: Removes HTML tags, special characters, URLs, punctuations and irrelevant symbols.
     - Tokenization: Splits text into individual words or tokens.
     - Lemmatization/Stemming: Reduce words to their canonical form
     - Normalization: Converting uppercase letters to lowercase and handling accents/abbreviations/acronyms to lessen text variations
     - Removing Stopwords: Eliminating frequently occurring words in a language without contributing any significant meaning
     - Noise Removal: Filters out irrelevant information to enhance the quality of the dataset.

3. Feature Engineering Module
   - Objective: Extracts features such as sentiment scores, word frequency, and user engagement metrics.
   - Process:
     - Sentiment Analysis: Determines the sentiment of posts and comments (positive, negative, neutral).
     - Word Frequency: Identifies key words and their frequencies in posts
     - User Engagement Metrics: Calculates metrics like upvotes, downvotes, and user karma to capture engagement levels.

4. Machine Learning Model
   - Objective: Trains a model to predict controversiality based on the extracted features.
   - Process:
     - Model Selection: Chooses a suitable machine learning algorithm for predicting controversiality (e.g., logistic regression, decision trees, or neural networks).
     - Training: Utilizes labelled data to train the model on features extracted during the feature engineering stage.
     - Validation: Tests the model's performance on a separate dataset to ensure generalizability.

5. Evaluation Module
   - Objective: Assesses model performance using accuracy, precision, recall, and F1 score.
   - Process:
     - Accuracy: Measures the overall correctness of the model.
     - Precision: Evaluates the accuracy of positive predictions.
     - Recall: Measures the model's ability to identify all relevant instances.
     - F1 Score: Balances precision and recall to provide a comprehensive evaluation.

6. Visualization Dashboard
   - Objective: Presents insights, highlighting controversial posts and their features.
   - Features:
     - Controversiality Trends: Visualizes the trend of controversial posts over time.
     - Feature Importance: Illustrates the significance of different features in predicting controversiality.
     - User Engagement Visuals: Displays graphs or charts depicting user engagement metrics.

7. User Interface
   - Objective: Enables users to interact with the model, explore predictions, and customize for different topics.
   - Features:
     - Search Functionality: Allows users to search for specific topics or keywords.
     - Prediction Exploration: Permits users to explore model predictions for individual posts or comments.
     - Customization Options: Provides settings to customize the model for different geopolitical contexts or topics of interest.

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Thank You!