**Literature Review**

This chapter explores existing literature and resources relevant to the development of the sentiment analysis dashboard for content creators. It examines various aspects, including software development methodologies, natural language processing (NLP) and sentiment analysis, data visualization, technology selection, and existing research in related domains. The review also considers ethical considerations, data privacy concerns, and gaps in existing literature to highlight the unique contributions of this project.

**Software Development Methodology**

For this project, an Agile software development approach is adopted due to its flexibility and iterative nature (Dingsøyr, Dyba, & Moe, 2010). Among the Agile methodologies, **Scrum** has been chosen, as it provides an effective framework for a single-developer project, ensuring structured development while allowing adaptability.

Scrum divides development into **sprints**, each lasting approximately two weeks. The project sprints include:

* **Sprint 1-2:** Backend setup and sentiment analysis model integration.
* **Sprint 3-4:** Frontend development and database integration.
* **Sprint 5-6:** API implementation for social media data retrieval.
* **Sprint 7-8:** Refining UI and implementing real-time sentiment tracking.
* **Sprint 9-10:** Implementing advanced insights and chatbot integration.
* **Sprint 11-12:** Testing, deployment, and final documentation.

Using **sprints** ensures incremental progress, mitigating risks such as API limitations or unforeseen issues in model performance. The choice of Scrum is further supported by previous successful implementations in single-developer environments (Sommerville, 2011).

**Natural Language Processing and Sentiment Analysis**

Sentiment analysis has been widely applied in business, finance, and healthcare but remains underutilized for evaluating social media content effectiveness (Balahur et al., 2022). Most sentiment analysis research focuses on **stock market predictions** (arXiv preprint arXiv:2202.03829) or **health-related sentiment analysis** (Zhou et al., 2021).

For this project, the **CardiffNLP Twitter RoBERTa Base Sentiment Model** has been chosen due to its superior performance in analyzing social media data (Hugging Face, 2023). The model is pre-trained on Twitter data and provides **high accuracy in sentiment classification**, making it well-suited for analyzing audience engagement on platforms such as Twitter, YouTube, and Reddit.

Other sentiment analysis tools such as **VADER (Hutto & Gilbert, 2014)** and **TextBlob (Loper & Bird, 2002)** were evaluated but found to be less effective in handling complex sentiment structures such as sarcasm or mixed sentiment expressions. However, recent advancements in **transformer-based NLP models**, such as RoBERTa, have significantly improved sentiment classification accuracy (Devlin et al., 2019).

**Ethical Considerations and Data Privacy**

Given the use of social media data, ethical considerations and data privacy are crucial concerns. Previous studies have highlighted the importance of compliance with **General Data Protection Regulation (GDPR)** and ethical guidelines for handling user-generated content (Mikal et al., 2021). This project ensures:

* **Only publicly available comments** are analysed.
* **No personally identifiable information (PII) is stored or processed.**
* **Clear terms of use** define how data is collected and used.

These measures align with existing research on ethical AI and data protection (Floridi & Taddeo, 2016).

**Data Visualization and Interpretation**

Data visualization plays a crucial role in conveying sentiment trends to users. **Chart.js**, a widely used JavaScript library, has been selected to create dynamic visual representations of sentiment analysis results. The application will feature:

* **Hexagonal radar charts** to visualize the distribution of sentiments (positive, neutral, negative, constructive, indifferent).
* **Engagement score rankings** to compare audience interactions over time.
* **Real-time sentiment tracking** using interactive pie and bar charts.

Research on sentiment data visualization (Kaur et al., 2021) indicates that interactive charts improve user engagement and comprehension, making **Chart.js** an optimal choice for this project (IEEE Xplore, <https://ieeexplore.ieee.org/abstract/document/9377048>).

**Technology Selection**

The technology stack was carefully chosen to balance efficiency, scalability, and ease of integration. The selected technologies include:

* **Backend:** Flask (Python) for handling API requests and sentiment analysis.
* **Database:** PostgreSQL for scalable storage and retrieval of sentiment results.
* **Frontend:** HTML, CSS, and JavaScript to create an interactive web-based dashboard.
* **Data Processing:** Twitter RoBERTa model for sentiment analysis.
* **Visualization:** Chart.js for interactive graphs and dashboards.

PostgreSQL was chosen over MySQL due to its **superior performance in handling complex queries** and **better support for AI-driven applications** (<https://link.springer.com/article/10.1007/s00521-018-3442-0>). Although SQL Workbench could be used as an administrative tool, **PostgreSQL remains the core database engine** due to its ability to handle large-scale datasets efficiently.

**Similar Work in Sentiment Analysis**

Existing research highlights various applications of sentiment analysis:

* **Stock Market Prediction:** Real-time sentiment analysis of tweets is used to predict stock price movements (Balahur et al., 2022).
* **Health Sentiment Analysis:** COVID-19 sentiment analysis helped governments track public perception and misinformation trends (Zhou et al., 2021).
* **Brand & Product Review Analysis:** Businesses use sentiment classification to assess customer satisfaction (Kumar & Ravi, 2021, <https://d1wqtxts1xzle7.cloudfront.net/70593446/14375-libre.pdf>).

However, there is limited research on **sentiment analysis tailored for content creators**. Existing tools such as YouTube Analytics provide **basic engagement metrics** but lack **contextual sentiment analysis**. This project aims to fill that gap by providing:

* **Detailed breakdowns of user sentiment in comments.**
* **AI-driven insights on content effectiveness.**
* **Personalized recommendations for improving audience engagement.**

**Conclusion**

This literature review highlights key methodologies, technologies, ethical concerns, and existing research relevant to sentiment analysis applications. While current sentiment analysis models serve finance and healthcare well, their use in content creation remains underexplored. By leveraging **state-of-the-art NLP techniques**, this project aims to provide content creators with actionable insights to refine their digital strategies.

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