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Unified Social Media Management System with Ai-Based Comment Analysis

Mrs. Veerendeswari J[1], Mrs. Celin Julie B[2], Gokula Krishnan K[3], Hariprasath S[4], Madhan M[5]
[1]*Assistant Professor (SG), Department of Information Technology, Rajiv Gandhi College of Engineering and Technology, Puducherry, India*
[2]*Assistant Professor, Department of Information Technology, Rajiv Gandhi College of Engineering and Technology, Puducherry, India*
[3,4,5]*UG, Department of Information Technology, Rajiv Gandhi College of Engineering and Technology, Puducherry, India*
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***Abstract*—In today's fast-paced digital world, managing multiple social media platforms can be time-consuming and inefficient. The proposed system integrates Instagram, Facebook, and LinkedIn APIs into a single React-based platform, enabling users to seamlessly manage their social media presence in one place. This unified solution allows users to post and track their activities across platforms, ensuring a consistent and professional digital identity. Additionally, the system enhances user engagement by supporting image, audio, and video uploads. Users can comment on feeds, which are processed using BERT to classify content for better insights. This feature helps users filter relevant interactions, improving content management and audience engagement. The platform is particularly beneficial for job seekers, enabling them to maintain a professional online presence, showcase achievements, and streamline networking efforts. By consolidating and optimizing social media interactions, the system maximizes efficiency, strengthens personal branding, and enhances career growth in a competitive digital landscape.**

***Index Terms*—Social Media Integration, React-Based Platform, API Integration, Instagram, Facebook, LinkedIn, Content Management, BERT, Feed Classification.**

I. INTRODUCTION

Social media has revolutionized communication, interaction, and information-sharing in the modern digital world. It encompasses various online platforms that allow users to create, share, and engage with content, facilitating both personal and professional connections. Platforms such as Facebook, Instagram, Twitter, LinkedIn, and TikTok serve distinct purposes, catering to different user needs. Whether sharing personal experiences through images and videos or building professional networks, social media has become an essential part of daily life, connecting people across the globe seamlessly.

One of the key advantages of social media is its ability to connect users regardless of geographical boundaries. It enables individuals to interact with friends, family, and colleagues through posts, messages, and video calls. Additionally, social media serves as a real-time information hub, keeping users updated on global events, news, and trends. This instant connectivity fosters a sense of community, allowing people to maintain relationships and discover new networks, both locally and internationally. From a professional perspective, social media has transformed networking, job searching, and personal branding. Platforms like LinkedIn allow professionals to showcase their skills, experiences, and accomplishments while connecting with industry experts and potential employers. Businesses also leverage social media for marketing, customer engagement, and brand visibility. Influencers and content creators use these platforms to build audiences, generate income, and establish authority in their respective fields. The vast reach of social media presents significant opportunities for professional and entrepreneurial growth.

Moreover, social media plays a crucial role in education and awareness. Institutions, businesses, and non-profits use these platforms to share knowledge, promote events, and raise awareness about social and

environmental causes. Fundraising campaigns, advocacy efforts, and disaster relief initiatives can spread rapidly, driving collective action. Additionally, learners can access tutorials, online courses, and expert communities, making education more dynamic and accessible. Despite its benefits, social media poses challenges such as cyberbullying, privacy risks, and misinformation. Excessive usage has been linked to mental health concerns like anxiety, depression, and low self-esteem, particularly among younger users. Addressing these issues requires responsible usage, improved platform regulations, and digital literacy education. While social media continues to shape communication, learning, and career development, promoting positive engagement and ethical use is essential to maximizing its benefits and mitigating its challenges.

II. LITERATURE SURVEY

Tanushree Sanwal; Sapna Yadav; Sandhya Avasthi; Ayushi Prakash [1] This study explores the impact of social media on higher education, particularly among students in Delhi-NCR. Platforms like YouTube, Facebook, wikis, and blogs enhance learning by providing diverse educational resources and fostering interactive engagement. The research examines why students use social media for education, its benefits, challenges, and the need for traditional teaching methods to evolve. Using an online questionnaire, the study gathers student perspectives on social media's role in reshaping learning experiences. While social media promotes collaboration and accessibility, issues like distractions, misinformation, and digital inequality pose challenges. The study emphasizes the need for a balanced approach to integrating social media into education. Erenis Ramadani;

Agon Memeti; Florinda Imeri [2] This paper presents a mobile platform designed to streamline task management and event tracking by integrating multiple social media APIs. In today's fast-paced digital world, users often juggle information from various social networks, which can become cumbersome and time-consuming. The proposed platform addresses this issue by consolidating event details and updates from networks like Facebook, LinkedIn, and Twitter, allowing users to access all their event-related information in one place. This eliminates the need to switch between different applications and keeps users informed about upcoming events and tasks in real time.

A key feature of the platform is its ability to generate personalized to-do lists based on events sourced from selected social media platforms. Users can set custom notification times, making the system adaptable to their schedules and priorities. The platform is mobile-based, offering portability and ensuring that users can manage their tasks anytime, anywhere. This combination of flexibility, portability, and social media integration not only enhances productivity but also simplifies the process of staying on top of daily events. By centralizing notifications and task management, the platform provides users with a modern, efficient, and user-centric solution for maintaining an organized and productive day-to-day life.

Jyoti Singh; Manju [3] social media has become an influential technology, reshaping personal connections, communication, and business practices globally. Platforms like Facebook, with over 2.7 billion users in 2020, highlight the widespread adoption of social networking services. These platforms facilitate social interaction, entertainment, and communication, making them integral to daily life. For teenagers, social media has become a central part of their routine, with studies showing that around 25% of young people engage with social networks approximately 70 times per week. Mobile phones play a key role, as most teenagers access these platforms multiple times daily, further amplifying social media's impact on their interactions and trends. Beyond personal connections, social media has transformed business practices, offering new marketing, branding, and customer engagement opportunities. However, this pervasive use of social media brings both positive and negative effects. While it offers learning, networking, and socializing opportunities, there are concerns about its impact on mental health, privacy, and excessive screen time. As social media continues to evolve, it is essential to understand its influence on society, especially the younger generation, to address the challenges and maximize its benefits responsibly Kumaragurubaran T; T. S. Ragavender; Senthil Pandi S [4] Social media platforms have become vital for communication, marketing, knowledge sharing, and decision-making. However, the challenge lies in the accuracy and reliability of data, particularly in

sentiment analysis due to informal language, slang, and noisy data. Sentiment analysis, which determines the emotional tone behind text, is essential for understanding public opinions and trends on platforms like Twitter. However, social media data is often unstructured, complicating analysis. To improve accuracy, advanced word embedding techniques categorize words based on contextual meaning. This paper proposes a sentiment analysis approach applied to social media data, focusing on tweets related to specific events or topics. A key innovation is the introduction of "trend favorability," a feature that tracks how a topic is discussed over time, identifying shifts in sentiment. This approach helps businesses, policymakers, and researchers better understand public perception, enabling them to make informed decisions based on evolving social media conversations.

Hardeep Singh; Bikram Pal Singh [5] Social networking sites (SNS) have become integral to modern communication, providing platforms for individuals to connect based on shared interests, activities, or backgrounds. These sites foster online communities where users can exchange ideas, collaborate, and engage with others. Technological advancements have driven the growth and success of SNS, continuously shaping how people interact, socialize, and access information. In recent years, SNS have become essential for staying updated on current events, connecting with peers, and engaging with brands. Despite their advantages, SNS come with challenges such as privacy concerns, cyberbullying, and the spread of misinformation. This paper aims to explore the concept of SNS, highlighting both their benefits such as enhanced communication and easy connectivity and their risks, such as security issues and harmful online behavior. The research methodology includes both primary and secondary data to assess users' perspectives on SNS. Ultimately, the paper seeks to inform readers about the complex impact of SNS and raise awareness of the importance of responsible use in balancing their benefits and challenges.

Krishna Roy; Shilpi Singh; Shraddha Ratra [6] This paper examines the impact of social networking sites (SNS) on students' academic learning. While SNS provide benefits such as fostering collaboration, knowledge sharing, and easy access to educational content, they also present challenges, including distractions and reduced face-to-face interactions that may hinder academic focus. Based on research conducted with undergraduate students from Symbiosis International University, the paper explores the frequency of SNS use and its effect on academic performance. The findings aim to provide insights into how SNS influence student learning and guide both educators and students in managing the use of these platforms for educational purposes.

III. PROPOSED SYSTEM

The proposed system combines Instagram, Facebook, and LinkedIn Apis into a single React-based platform, offering users a seamless way to manage their social media presence across multiple networks. By integrating these popular platforms into one interface, users can easily post updates, track their activities, and maintain a consistent online identity without having to switch between apps. This integration simplifies content management, ensuring that users' digital presence is unified and professional across various social media platforms. One of the standout features of the system is its ability to support diverse content uploads, including images, audio, and video, allowing users to share different types of media directly from the platform.

The system also includes an advanced content classification feature using BERT (Bidirectional Encoder Representations from Transformers), which processes comments and interactions to categorize them and provide users with relevant insights. This helps users engage more effectively with their audience by filtering and managing interactions, ensuring they focus on valuable conversations and content that align with their goals. The platform is especially beneficial for job seekers and professionals looking to strengthen their personal brand and network effectively. By streamlining their social media interactions, users can maintain an up-to-date and polished online presence, showcase achievements, and connect with potential employers or collaborators. In a competitive digital landscape, the system enhances efficiency, boosts user engagement, and supports career growth, making it an essential tool for managing and optimizing social media presence.

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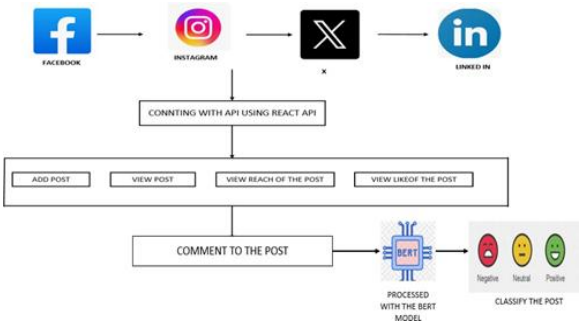
a. Architecture Diagram of the Proposed System:



The architecture diagram depicts a system designed to integrate various social media platforms Facebook, Instagram, X (formerly Twitter), and LinkedIn using a React API. The system enables users to interact with posts in several ways, such as creating new posts, viewing existing ones, and checking metrics like reach and likes. A significant feature of this system is the ability for users to comment on posts. These comments are processed using a BERT (Bidirectional Encoder Representations from Transformers) model, which performs sentiment analysis on the comments. The sentiment is classified into three categories: negative, neutral, or positive. This enables the system to automate sentiment analysis for user interactions across the integrated social media platforms, providing valuable insights into user engagement and helping with content moderation. The diagram also contains a couple of typos: "CONNTING" should be corrected to "CONNECTING," and "LIKEOF" should be changed to "LIKES OF" to accurately reflect the system's functionality. This integration and automated sentiment analysis contribute to a more efficient and insightful management of content across multiple social media platforms.

b. React API Integration:

The React API Integration serves as the backbone of the platform's user interface, built with React. This framework enables seamless communication between the platform and various social media APIs, including Instagram, Facebook, and LinkedIn. React allows for a responsive, dynamic user experience, where users can easily interact with their social media accounts. Whether it's posting new updates, tracking the performance of their posts, or interacting with their networks, reacts component-based architecture ensures that these actions are smooth and real-time. This module is crucial for maintaining a fluid, integrated experience when managing multiple social media platforms from one unified interface.

c. Social Media APIs (Instagram, Facebook, LinkedIn):

These modules serve as the direct link to Instagram, Facebook, and LinkedIn, providing the necessary infrastructure to interact with each platform's features. Users can create posts (text, images, videos, and audio), track the reach of their content, and analyze engagement metrics such as likes, shares, and comments. Additionally, these APIs facilitate user authentication, ensuring secure access to users' social media accounts. The integration with each platform's API allows for smooth interaction with users' profiles, posts, and feeds, ensuring they can manage their social media presence without switching between different applications.

d. Content Upload and Interaction:

The Content Upload and Interaction module is responsible for handling media uploads and interactions. This module supports a wide variety of media formats, including images, audio files, and videos. It enables users to post content across multiple platforms, ensuring that their multimedia content reaches their audience effectively. In addition to posting, users can interact with their followers by commenting on posts, fostering engagement and community. The system ensures that these interactions are captured and tracked across all connected platforms, making it easier for users to manage and respond to their audience in one place.

e. BERT (Bidirectional Encoder Representations from Transformers):

BERT, a state-of-the-art natural language processing (NLP) model, is implemented to analyze and classify the sentiment of comments and interactions on posts. This model helps to understand the emotional tone behind text data, categorizing it as positive, neutral, or negative. BERT's advanced contextual understanding allows for more accurate sentiment analysis than traditional methods. By processing user comments and engagements, BERT provides valuable insights into how audiences feel about the content. This functionality not only helps improve content management but also aids users in making informed decisions regarding how to respond to or improve their

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interactions, ensuring content resonates positively with the audience.

f. Content Management:

The Content Management module consolidates and streamlines the management of users' social media presence. This module allows users to maintain a consistent digital identity by managing their posts, interactions, and profiles from a single, integrated platform. Users can track the performance of their content across multiple social media sites, ensuring that their brand remains coherent and that their engagement is optimized. The module also facilitates interaction with followers, helping users respond to comments, messages, and other engagements in a unified manner. This consolidation reduces the time spent managing individual accounts and improves the overall efficiency of social media usage.

g. Job-Seeking Features:

This module is specifically tailored to job seekers, offering a unique advantage by integrating professional networking features from platforms like LinkedIn. Users can build and enhance their personal brand by showcasing their achievements, skills, and expertise. The system makes it easy to maintain an updated and professional online presence that resonates with potential employers or collaborators. It also simplifies networking efforts by allowing users to connect with professionals and organizations that align with their career goals. By streamlining the management of professional profiles and interactions, the platform helps users increase their visibility and career opportunities in the digital space.

h. Analytics and Insights:

The Analytics and Insights module leverages the data from BERT's sentiment classification to provide users with valuable information about their social media engagement. By analyzing the sentiment of comments and interactions, users can better understand their audience's reactions to their content. The insights provided help in identifying trends in user engagement, such as shifts in audience sentiment or the popularity of specific topics. This data empowers users to refine their content strategy, tailor their messaging, and enhance their audience engagement. Ultimately, the platform helps users create more targeted, relevant content that aligns with their audience's preferences, boosting both interaction and overall effectiveness of their social media presence.

IV. RESULT AND DISCUSSION

The integration of Instagram, Facebook, and LinkedIn APIs into a single React-based platform provides users with a unified and efficient solution for managing their social media presence. The key results of the proposed system highlight its potential to enhance user engagement, streamline content management, and support career development, particularly for job seekers and professionals. By enabling users to post updates, track activities, and maintain a consistent online identity across multiple platforms, the system eliminates the need to juggle between different applications, saving time and effort. This seamless experience ensures that users can focus on creating high-quality content and interacting meaningfully with their audience. One of the standout features of the system is the ability to upload various media types, such as images, audio, and video, allowing users to share diverse content effortlessly. This feature not only enhances the richness of interactions but also contributes to increased user engagement by accommodating different forms of expression.

Additionally, the BERT-powered content classification module proves to be a valuable asset for managing interactions. By processing comments and categorizing them as positive, neutral, or negative, BERT provides users with deeper insights into the sentiment of their audience, helping them focus on the most relevant and meaningful interactions. This sentiment analysis aids in improving content strategies, fostering more productive engagement, and ensuring that users' social media activities align with their professional goals. The system's functionality is particularly advantageous for job seekers who need to maintain an updated and professional online presence. By simplifying the management of social media interactions, users can efficiently showcase their achievements, highlight their skills, and expand their professional network. The ability to engage with potential employers or collaborators directly through a unified platform can significantly improve job prospects and career growth. Furthermore, by offering insights into user engagement and interaction sentiment, the system enhances content strategy, ensuring that users maximize their impact in a

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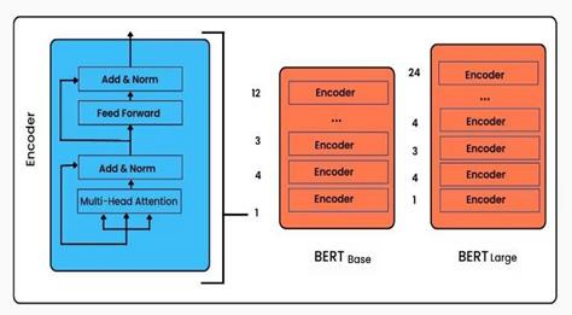
competitive digital landscape.

V. ARCHITECTURE OF BERT MODEL



The architecture of the BERT (Bidirectional Encoder Representations from Transformers) model is built upon the transformer architecture, which relies on self-attention mechanisms to process and understand language. Unlike traditional models that read text sequentially, BERT reads the entire sequence of words simultaneously, allowing it to capture contextual information from both directions left to right and right to left. This bidirectional approach enables BERT to understand the context of a word based on the surrounding words, significantly enhancing its ability to grasp nuanced meanings. The model consists of multiple layers of transformers, each comprising attention heads that enable it to focus on different parts of the input text while learning various linguistic patterns and relationships.

BERT employs a technique called masked language modeling, where random words in the input are masked, and the model is trained to predict these masked words based on the context provided by the other words. This training process equips BERT with a rich understanding of syntax and semantics, making it highly effective for a variety of natural language processing tasks, including text summarization, sentiment analysis, and question answering. The flexibility and contextual awareness of BERT's architecture allow it to achieve state of the art performance across numerous benchmarks in the field of natural language understanding.

VI. RESULT AND DISCUSSION:

A. Precision:

Precision, in the context of social media interaction analysis, measures the relevance and accuracy of the content selected for sentiment classification. Specifically, it focuses on how many of the comments or interactions classified as relevant or significant (true positives) are truly meaningful, compared to all the interactions the system identifies as important (true positives + false positives). For instance, when processing comments on a user's post to categorize them as positive, neutral, or negative, precision ensures that the comments flagged as relevant are actually meaningful and align with the context of the post. A high precision score means that the system accurately identifies valuable interactions, avoiding irrelevant or off-topic content from being categorized as important.

$$\text{Precision} = \frac{TP}{TP + FP}$$

- True Positives (TP): The number of instances correctly predicted as positive.
- False Positives (FP): The number of instances incorrectly predicted as positive.

High precision is essential for ensuring that only relevant content is selected for analysis, helping users focus on meaningful interactions. It filters out noise, ensuring that insights drawn from the interactions are useful, and provides a more efficient and effective way to engage with an audience or manage content. By optimizing precision, content management systems can streamline decision-making and improve overall user experience.

B. Recall:

BERT (Bidirectional Encoder Representations from Transformers) to perform extractive summarization by selecting the most relevant sentences or phrases from a given text. The system focuses on optimizing recall, ensuring that the summary captures a comprehensive set of important information from the source text. Recall, in this context, is crucial for maintaining the integrity of the summary, as it measures how effectively the model identifies all critical content.

$$\text{Recall} = \frac{TP}{TP + FN}$$

- False Negatives (FN): The number of instances that are actually positive but were incorrectly predicted as negative.

While high recall ensures that most of the important points are included, the system also considers precision to balance the relevance of the selected content. This approach aims to produce high-quality, relevant, and

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comprehensive summaries, making the system efficient in content extraction for various use cases like social media sentiment analysis, content management, and knowledge extraction.

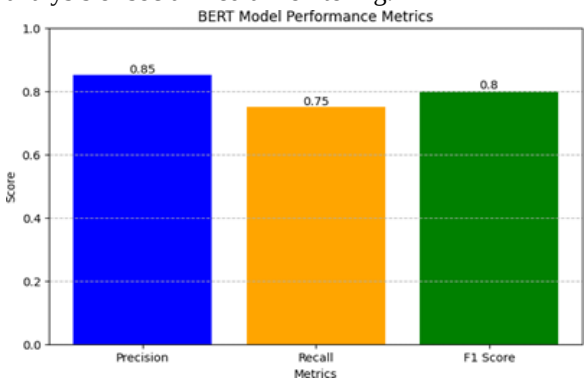
C. F1-score:

The F1 score is a metric used to evaluate the performance of a model, particularly in classification tasks where both precision and recall are important. It is the harmonic mean of precision and recall, providing a balance between the two. The F1 score is especially useful when the class distribution is imbalanced, meaning that one class (such as relevant comments or positive interactions) might be more frequent than the other.

The F1 score is the harmonic mean of precision and recall, calculated as:

$$\text{F1 score} = 2 \times \frac{\text{Precision} \times \text{Recall}}{\text{Precision} + \text{Recall}}$$

The F1 score takes both false positives and false negatives into account, which is why it's a good metric when you need a balance between precision and recall. A high F1 score means the model has both high precision (low false positives) and high recall (low false negatives), ensuring it is accurately identifying relevant content while minimizing irrelevant results. An F1 score close to 1 indicates an excellent model, while a score close to 0 suggests poor performance. The F1 score is particularly important in situations where the consequences of false positives and false negatives are both significant, such as in sentiment analysis or social media monitoring.



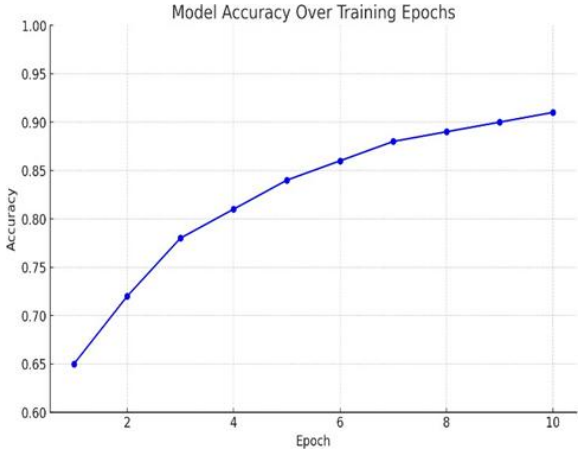
D. Accuracy:

In the context of summarization using a BERT model, accuracy is a metric that measures the proportion of correctly identified sentences or phrases (both relevant and irrelevant) in relation to the total sentences considered by the model. In other words, accuracy reflects how often the model makes correct predictions, whether positive (important sentences selected) or negative (non-important sentences discarded).

$$\text{Accuracy} = \frac{\text{True Positives (TP)} + \text{True Negatives (TN)}}{\text{Total Predictions (TP + TN + FP + FN)}}$$

where:

- True Positives (TP) are sentences correctly identified as important.
- True Negatives (TN) are sentences correctly identified as unimportant.
- False Positives (FP) are sentences incorrectly identified as important.
- False Negatives (FN) are important sentences that were missed by the model.



BERT (Bidirectional Encoder Representations from Transformers) to enhance user engagement and content management across social media platforms such as Instagram, Facebook, and LinkedIn. By using BERT's advanced natural language processing capabilities, the system analyzes comments and interactions, providing sentiment analysis that classifies comments into positive, neutral, or negative categories. This enables users to better understand how their audience perceives their content and interactions. The system leverages the Hugging Face Transformers library, which includes the Bert Tokenizer and Bert for Sequence Classification. First, the input text, in the form of user comments, is tokenized. This process converts the text into token IDs that the BERT model can process. The attention mask is also created to distinguish real tokens from padding tokens, ensuring that the model accurately interprets the input. The tokenized text is then passed through the BERT model, which generates embeddings a high-level representation of the text that captures its context

and meaning. These embeddings are used to classify the sentiment of the comment. Afterward, the tokens are decoded back into human-readable text, providing a summary or insight into the sentiment of the comment. By integrating this sentiment analysis into the social media platform, the system enables users to filter relevant interactions, focus on valuable conversations, and improve their content strategies. This is particularly beneficial for job seekers and professionals who want to enhance their online presence, track their digital reputation, and engage effectively with their network. The use of BERT ensures a deeper understanding of user interactions, making the system a powerful tool for content moderation and engagement insights.

VII. CONCLUSION

In conclusion, the proposed system offers a comprehensive solution for managing multiple social media platforms in one seamless interface. By integrating Instagram, Facebook, and LinkedIn, users can efficiently handle their social media activities, ensuring a unified and professional online presence. The ability to upload various media types, such as images, audio, and video, along with the BERT-based content classification for sentiment analysis, further enhances user engagement and content management. The system is particularly advantageous for job seekers and professionals, helping them maintain an up-to-date personal brand and optimize networking opportunities. Through its integration of social media platforms and advanced content analysis features, the system empowers users to navigate the digital landscape more effectively, fostering career growth, improving engagement, and streamlining social media interactions. Ultimately, this solution improves efficiency, engagement, and online reputation management, positioning users for success in an increasingly competitive digital environment. Future work could focus on expanding the platform's capabilities by integrating additional social media platforms, such as TikTok, to offer a more comprehensive solution. Enhancing the AI-driven content recommendation and scheduling features could also improve user engagement and content strategy. Additionally, incorporating advanced analytics and performance tracking tools would provide users with deeper insights into the effectiveness of their social media activities, further optimizing their digital presence.

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