



360-DEGREE FEEDBACK SOFTWARE FOR THE GOVERNMENT PRESS INFORMATION BUREAU (PIB) USING ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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Abstract: In response to the contemporary demands of a rapidly evolving media landscape, our innovative AI-driven feedback system emerges as a solution adept at assessing diverse media content across multiple regional languages. This cutting-edge approach addresses the critical need for real-time evaluation of government-related news, serving as a pivotal tool for monitoring public opinion and refining communication strategies. The absence of an AI-driven feedback system for evaluating government-related news in regional languages presents a substantial challenge. Our solution becomes indispensable in proactively managing public opinion, facilitating crisis response, and fostering effective communication. It accomplishes this by tracking sentiment in regional media and categorizing news by department, offering a lightweight prototype that seamlessly integrates sentiment analysis, issue tracking, and public interaction. What sets our solution apart are its unique features, tailored specifically for the Indian Government. The integration of sentiment analysis, issue tracking, and departmental categorization is complemented by an intuitive interface, a minimal tech stack, and real-time insights, empowering swift crisis response and evidence-based decision-making.

Keywords: AI-driven feedback system, Web scraping, Sentiment analysis, Real-time media monitoring, Crisis management, Government communication, Machine learning, Departmental feedback.

I. INTRODUCTION

Introducing a cutting-edge 360-degree feedback program designed especially for the Indian government, which attracted notice in local media for combining machine learning and artificial intelligence. This innovative idea has generated a lot of interest and coverage in local news channels with the goal of revolutionizing performance assessments within government organizations. The Press Information Bureau (PIB) is the nodal agency of the Government of India to disseminate information on government policies, programs, initiatives, and achievements to the print and electronic media. It functions as an interface between the Government and the media and provides feedback to the Government on people reactions as reflected in the media. Information is disseminated from Headquarters through Press Releases in English and subsequently taken from PIB Regional offices in English to reach out to newspapers and media organizations across the country.

To provide effective and timely feedback to the Government, an automated feedback system using Artificial Intelligence and Machine Learning is required. The absence of an AI-driven feedback system for evaluating government-related news in regional languages presents a substantial challenge. The software should categorize the stories into the concerned departments as per the tags provided. The stories should be categorized as favorable (positive), neutral, or not favorable (negative) to the Government of India. Negative stories pertaining to a department should be notified to the concerned PIB officer on a real-time basis by E-mail, SMS or Android notification or by other means. The clippings should be classified into Departments and tonality (positive, negative, and neutral). If the story is negative, the concerned PIB officer should get the notification immediately. The software adapts the feedback process to the dynamics of the Indian governmental context by utilizing AI and ML capabilities. It makes a thorough review system possible by combining the perspectives of various stakeholders and using cutting-edge algorithms to extract intelligence that can be use. An AI-driven feedback system that can evaluate media material and provide real-time insights on news pertaining to government is required to address the problem as it is presented. Such a system is essential for effective monitoring in today's markets and sectors, enabling governments to proactively manage public opinion, address problems, and improve communication methods.

II. LITERATURE REVIEW

Scarnò, M. (2018). "AI and Web Scraping for Information Retrieval from the World Wide Web." Explores the web as a viable alternative for information acquisition, acknowledging challenges of expansive, sparse, and unstructured data. Investigates structuring data through web scraping, utilizing web search engines to create queries. The strategy, mimicking human behavior, extracts timely price statistics for the FAO's Agricultural Market Information System. Agun, H. (2023). "WebCollectives: A Java-Based Web Content Extractor." Published in SoftwareX, this work introduces a light regular expression-based tool for web content extraction. Enhances information retrieval from web sources, contributing to improved data acquisition processes [1].

Bhujbal, M., Bibawanekar, Ms, & Deshmukh, P. (2023) advocate for news aggregators in the International Journal of Advanced Research in Science, Communication, and Technology. Their paper emphasizes web scraping's role in structuring data for effective news aggregation. Citation: Bhujbal, M., et al. (2023). "News Aggregation using Web Scraping News Portals." doi: 10.48175/IJARSCT-12138. Mohamed, A., et al. (2020) explores a News Aggregator and Efficient Summarization System, addressing challenges of information overload and emphasizing efficient content curation. Citation: Mohamed, A., et al. (2020). "News Aggregator and Efficient Summarization System." 636-641. doi: 10.14569/IJACSA.2020.0110677 [2].

Bale, Ajay et al. (2022) investigates web scraping approaches and performance on modern websites, emphasizing its significance for information acquisition. Their study evaluates techniques, including the requests library and selenium, presenting findings through visualized graphs. Results underscore the need for enhanced measures against web scraping bots. Citation: Bale, Ajay et al. (2022). "Web Scraping Approaches and their Performance on Modern Websites." doi: 10.1109/ICESC54411.2022.9885689. Hossen, Arafat et al. (2021) contribute to text mining and sentiment analysis of newspaper headlines in Information (Switzerland). Citation: Hossen, Arafat et al. (2021). "Text Mining and Sentiment Analysis of Newspaper Headlines." 12, 414. doi: 10.3390/info12100414 [3].

Garvey, S. & Maskal, C. (2019) challenge claims of AI negative bias, the "Terminator Syndrome," via news media sentiment analysis spanning six decades. Utilizing Google Cloud Natural Language API, the study finds no significant negative sentiment, discussing implications for AI risk perceptions and advocating for responsible AI innovation. Citation: Garvey, S. & Maskal, C. (2019). "Sentiment Analysis of the News Media on Artificial Intelligence Does Not Support Claims of Negative Bias Against Artificial Intelligence." OMICS: A Journal of Integrative Biology, 24. doi: 10.1089/omi.2019.0078. Kawade, D. & Oza, K. (2017) focus on sentiment analysis of 5000 tweets related to the Uri attack, revealing 94.3% expressing disgust. Citation: Kawade, D. & Oza, K. (2017). "Sentiment Analysis: Machine Learning Approach." International Journal of Engineering 9, 2183-2186. doi: 10.21817/ijet/2017/v9i3/1709030151 [4].

Hossen, Arafat et al. (2021) conduct text mining and sentiment analysis on The Daily Star's headlines in Bangladesh (2018-2019). Employing word clouds, sentiment, and cluster analysis, they uncover patterns. In 2018, terms like election, kill, cricket, and Rohingya exceeded 60 mentions, while 2019 saw BNP, poll, kill, AL, and Khaleda surpassing 80 mentions. Sentiment analysis reveals frequent fear and negative emotions, with anger, anticipation, sadness, trust, and positive emotions appearing over 400 times. Clustering highlights word groups reflecting political situations and public sentiments, showcasing the efficiency of text mining in capturing a country's dynamics during specific periods. Citation: Hossen, Arafat et al. (2021). "Text Mining and Sentiment Analysis of Newspaper Headlines." Information (Switzerland), 12, 414. doi: 10.3390/info12100414 [5].

Shivam Mca (2020) emphasizes the significance of AI and ML techniques in securing communication emails from attacks. The research highlights AI's global impact and its transformative role in security. Focusing on machine learning's ability to analyze email patterns, the study illustrates its prowess in identifying crucial emails, malware, and scams. Machine learning algorithms serve as effective filters, improving email judgment. The research also assesses existing literature on the subject, showcasing enhancements made in this study. Citation: Shivam Mca (2020). "AI and ML techniques to Analyze Communication Emails and Text patterns To Secure from Attacks." SSRN Electronic Journal, 8, 2084-2087 [6].

Sundaramoorthy, K. & R, Durga & Nagadarshini, S. (2017). NewsOne — An Aggregation System for News Using Web Scraping Method. 136-140. 10.1109/ICTACC.2017.43. In the contemporary fast-paced landscape, obtaining reliable news is challenging amidst numerous online sources. News aggregators streamline this process by consolidating preferred outlets, employing web scraping for data extraction. These platforms enhance user experience through refined algorithms, improved interfaces, and innovative features such as sentiment analysis and topic clustering. This continuous iteration ensures efficient and timely delivery of trustworthy news tailored to individual preferences, addressing the ongoing need for accessible and information in today's digital age [7].

Agun, Hayri. (2023). WebCollectives: A light regular expression-based web content extractor in Java. *SoftwareX*. 24. 10.1016/j.softx.2023.101569. Traditional web crawling methods involve distinct steps for downloading and extracting web content. However, a notable drawback is the absence of a focus-based crawling strategy. This paper introduces WebCollectives, a crawler that integrates content extraction into a hierarchical regular expression model, streamlining the process through a pipeline-oriented framework. Using either Selenium or direct HTTP GET, it employs hierarchical regular expressions for extraction. Compared to the standard DOM, WebCollectives exhibits enhanced extraction efficiency and reduced code complexity, particularly outperforming non-recursive DOM hierarchy definitions [8].

Kawade, Dipak & Oza, Kavita. (2017). Sentiment Analysis: Machine Learning Approach. *International Journal of Engineering and Technology*. 9. 2183-2186. 10.21817/ijet/2017/v9i3/1709030151. Abstract—Twitter is one of most popular social networking site where people are expressing their views, opinion and emotions liberally. These tweets are recorded and analysed to mine emotions of people related to a terrorist attack (Uri attack). Present study retrieve tweets about Uri attack and find emotions and polarity of tweets. To mine emotions and polarity in tweets, text mining techniques are used. Approximately 5000 tweets are recoded and pre-processed to create a dataset of frequently appearing words. R is used for mining emotions and polarity. Experimental result showed that 94.3% people were disgusted by Uri attack. It is also useful to identify opinions of people about any event or persons and also finds polarity of text whether positive, negative or neutral. Sentiment analysis is a type of text classification which can classify text into different sentiments [9].

Mohamed, Alaa & Ibrahim, Marwan & Yasser, Mayar & Ayman, Mohamed & Gamil, Menna & El-Ashmawi, Walaa. (2020). News Aggregator and Efficient Summarization System. 11. 636-641. 10.14569/IJACSA.2020.0110677. News Aggregator is simply an online software which collects new stories and events around the world from various sources all in one place. News aggregator plays a very important role in reducing time consumption, as all of the news that would be explored through more than one website will be placed only in a single location. Also, summarizing this aggregated content absolutely will save reader's time. A proposed technique used called the TextRank algorithm that showed promising results for summarization. This paper presents the main goal of this project which is developing a news aggregator able to aggregate relevant articles of a certain input keyword or key-phrase. Summarizing the relevant articles after enhancing the text to give the reader understandable & efficient [10].

Kuzulu, Ece & Iyem, Cemal. (2016). Is 360 Degree Feedback Appraisal an Effective Way of Performance Evaluation?. *International Journal of Academic Research in Business and Social Sciences*. 6. 10.6007/IJARBS/v6-i5/2124. The 360 degree feedback approach has been implemented by many organisations for development or performance evaluation objectives. This paper questions the effectiveness of 360 degree feedback implementations in rating employee performance. This literature review was conducted on 360 degree feedback practice with performance evaluation purposes. The aim of this review was to define and discuss the 360 degree feedback; contrasting the process with the other methods and identifying whether this is a good way of performing appraising or not [11].

Görün, Mustafa & KAYAR, İsmail & Varol, Burak. (2018). 360-Degree Performance Appraisal and Feedback System: A Study with Heads of Departments in Çanakkale Onsekiz Mart University. *Gaziantep University Journal of Social Sciences*. 17. 1407-1419. 10.21547/jss.449154. The study investigates the significance of the 360-degree performance appraisal system in human resources management. It emphasizes the necessity for accurate employee evaluation and improvement based on organizational goals. Traditional methods have been replaced by the 360-degree system, which gathers feedback from multiple sources, enhancing objectivity. The study includes an empirical survey with department heads at Çanakkale Onsekiz Mart University to identify strengths and weaknesses [12].

III. REQUIREMENT SPECIFICATION

FUNCTIONAL REQUIREMENTS

In response to the dynamic media landscape and the need for effective government communication, the proposed system encompasses essential functional requirements. The project's success relies on the seamless integration of these key functionalities.

Real-time Media Monitoring:

- The system must enable continuous and real-time monitoring of diverse media sources, including regional language websites and YouTube channels, to stay abreast of public reactions and media sentiments.
- Web Scraping Tools: Develop robust web scraping tools that systematically gather news articles and closed captions from a comprehensive list of regional media sites and e-papers.
- Dynamic Data Collection: Ensure dynamic and up-to-date data collection to provide accurate and timely information for analysis.

Sentiment Analysis and Tonality Classification:

- The system should incorporate advanced Natural Language Processing (NLP) techniques for sentiment analysis on textual data extracted from news articles, providing a nuanced understanding of tonality.
- Machine Learning Models: Utilize state-of-the-art machine learning models such as NLTK/Text Blob to categorize sentiment as positive, negative, or neutral.
- Tonality Classification: Implement a sophisticated system for tonality classification, offering a detailed insight into public perceptions.

Notification Alerts for Crisis Management:

- The system must include an automated notification system to alert Press Information Bureau (PIB) officers promptly about news articles with negative sentiment, facilitating proactive crisis management.
- Immediate Notifications: Implement immediate notifications via SMS, email, or Android notifications to ensure PIB officers are promptly informed of negative media coverage.
- Configurable Preferences: Allow PIB officers to configure notification preferences, ensuring alerts are received through their preferred communication channels.

HARDWARE REQUIREMENTS

- Processor: Intel(R) Core i3 & above Versions.
- System: 64-bit operating system, x64-based processor.
- Installed Ram: 8 GB.
- Network Infrastructure: High-speed and reliable network connections to ensure seamless communication between server components and responsiveness for end-users.

SOFTWARE REQUIREMENTS

- Platform and Hosting: Hosting for scalability, reliability, & security. Compatibility across platforms (web, mobile).
- Programming Languages and Frameworks: Python for AI/ML algorithms and backend development. TensorFlow or PyTorch for machine learning models.
- User Interface (UI) and User Experience (UX): Intuitive and user-friendly interface for government officials. Real-time insights dashboard displaying sentiment analysis and issue tracking.
- APIs for Integration: Design APIs for seamless integration with other government systems and services.
- Operating System: Choose a stable and secure operating system that aligns with government IT policies. Common choices include Linux distributions (e.g., CentOS, Ubuntu) or Windows Server.
- Front-End Technologies: Implement front-end technologies (HTML, CSS, JavaScript) to create an intuitive and user-friendly interface. Consider using a front-end framework.

IV. PROBLEM STATEMENT

The Press Information Bureau (PIB) is the nodal agency of the Government of India to disseminate information on government policies, programs, initiatives, and achievements to the print and electronic media. It functions as an interface between the Government and the media and provides feedback to the Government on people reactions as reflected in the media. Information is disseminated from Headquarters through Press Releases in English subsequently translated from PIB Regional offices in English to reach out to newspapers and media organizations across the country.

To provide effective and timely feedback to the Government, an automated feedback system using Artificial Intelligence and Machine Learning is required. The software should categorize the stories into the concerned departments as per the tags provided. The stories should be categorized as favorable (positive), neutral, or not favorable (negative) to the Government of India. Negative stories pertaining to a department should be notified to the concerned PIB officer on a real-time basis by SMS, E-mail, or Android notification or by other means. The clippings should be classified into Departments and tonality (positive, negative, and neutral). If the story is negative, the concerned PIB officer should get the notification immediately. The software adapts the feedback process to the dynamics of the Indian governmental context by utilizing AI and ML capabilities.

OBJECTIVES

- Enhanced Governance: Implementing a 360-degree feedback software powered by AI/ML aims to improve governance within the Government of India. The objective is to foster a culture of transparency and accountability in decision-making processes.

- **Optimized Workforce Performance:** The software aims to optimize the performance of government officials by providing a comprehensive evaluation mechanism. AI/ML algorithms identify strengths and areas for improvement, enabling targeted training and development programs.
- **Data-Driven Decision Making:** Utilize AI/ML algorithms to analyze feedback data, extract meaningful patterns, and provide actionable insights. This objective aims to empower decision-makers with data-driven information for strategic human resource planning.
- **Promote Continuous Improvement:** Establish a mechanism for continuous improvement by encouraging ongoing feedback loops. The software aims to facilitate a culture of learning and development within the government workforce. This objective seeks to build public confidence in the government's commitment to efficiency and performance excellence.

EXPECTED OUTCOMES

- **Enhanced Governance Efficiency:** Implementation of the AI-driven feedback system is expected to significantly enhance the efficiency of governance by providing real-time insights into public sentiment across various regional languages.
- **Improved Communication Strategies:** The software's ability to categorize news by departments and tonality allows for a targeted and strategic approach to communication.
- **Proactive Crisis Management:** The real-time notification system for negative stories ensures that concerned PIB officers are immediately informed of potentially critical issues. This proactive approach enables government authorities to address crises promptly, minimizing potential damage to public perception.
- **Transparent and Data-Driven Decision Making:** The integration of sentiment analysis and issue tracking provides government officials with a transparent view of public opinion.

V. SYSTEM DESIGN

This comprehensive methodology employs AI and ML to create a robust 360-degree feedback system for PIB. By integrating sentiment analysis, an interactive dashboard, and continuous feedback mechanisms, the software ensures real-time insights, proactive crisis management, and informed decision-making in the realm of media monitoring and communication strategy for the government.

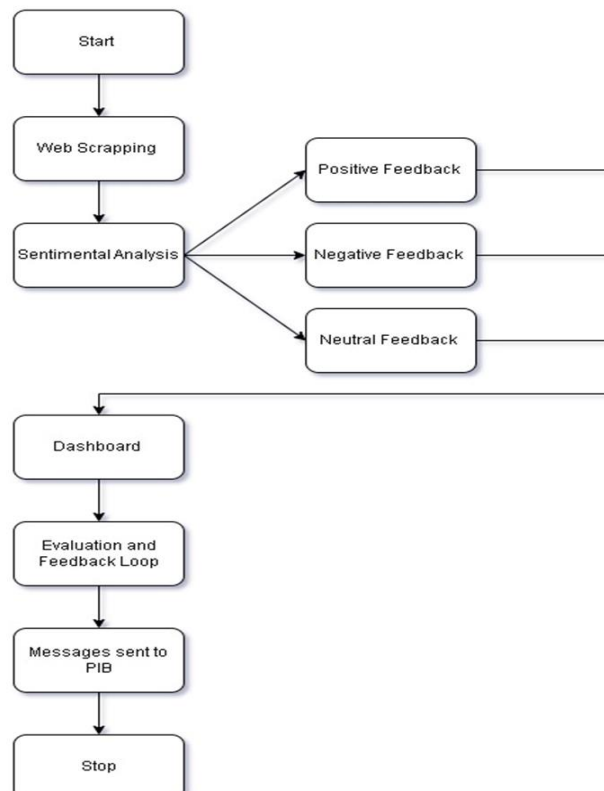


Figure 1: Methodology for 360-Degree Feedback Software for Government PIB

VI. METHODOLOGY

- **Start:** Collaborate with government stakeholders to define project objectives, scope, and success metrics. Assemble a cross-functional team comprising AI/ML experts, developers, and subject matter specialists.
- **Web Scraping:** Identify a comprehensive list of regional media sites, e-papers, and select YouTube channels for data collection. Develop web scraping tools to systematically gather news articles, video transcripts, and closed captions.
- **Sentiment Analysis:** Utilize Natural Language Processing (NLP) techniques to conduct sentiment analysis on textual data extracted from news articles. Train machine learning models, such as NLTK/Text Blob, to categorize sentiment as positive, negative, or neutral.
- **Dashboard:** Design and implement an intuitive dashboard using HTML, CSS, and JavaScript for real-time data visualization. Integrate features allowing sorting and filtering of news content based on sentiment, department, and other relevant criteria.
- **Evaluation and Feedback Loop:** Establish a continuous evaluation process to assess the accuracy and performance of the sentiment analysis models. Implement a feedback loop allowing government users to provide manual input, contributing to model refinement and continuous learning.
- **Messages Sent to PIB:** Develop an automated notification system to alert PIB officers in real-time about news articles with negative sentiment. Configure notification delivery through SMS, Android notifications, or other preferred communication channels.
- **Stop:** Conduct regular reviews with government stakeholders to evaluate the system's performance and gather feedback. Ensure ongoing compliance with data security, privacy regulations, and ethical AI practices.

WEB SCRAPING FLOW PROCESS:

News scraping involves extracting news articles and data from a news website and displaying it on a client's website. The process includes identifying the target website, accessing its HTML structure using tools like Requests and BeautifulSoup, parsing the HTML to extract relevant information, cleaning and formatting the data, storing it in a structured format, and integrating it into the client's website.

Python Model classifies the news using some of the popular. This model finds these keywords in those headlines or bulletins and shows the types of news on the web application. The user chooses the topics according to their preferences on the web application and the model shows the news according to their preferences. Automation enables clients to keep their sites updated with the latest news, improving user engagement. However, it's crucial to respect website terms, adhere to ethical guidelines, and respect copyright laws when scraping news websites.

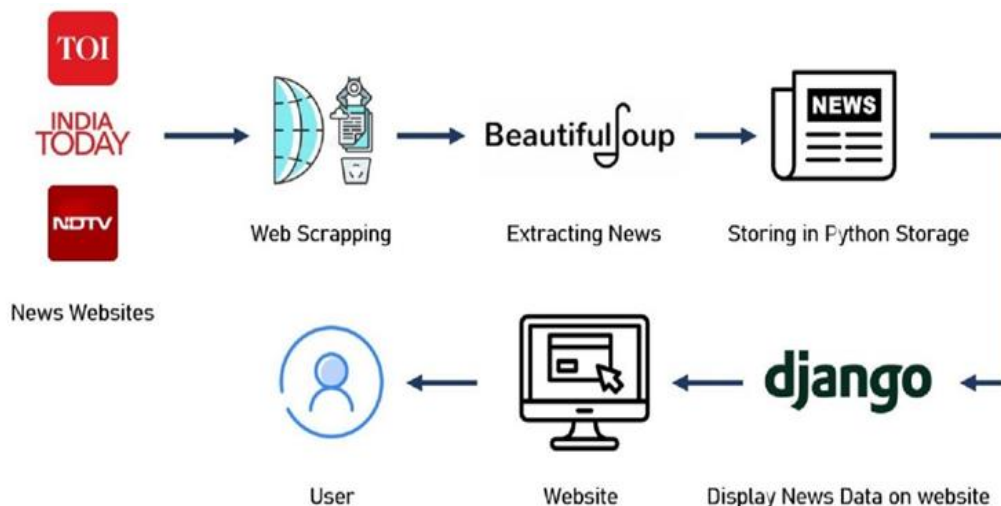


Figure 2: Web Scrapping Detailed Process

VII. APPLICATIONS

- **Real-time Media Monitoring:** The 360-degree feedback software can provide real-time monitoring of media coverage related to government policies and initiatives. It enables the PIB to stay updated on public reactions and media sentiments.



- **Departmental Feedback System:** The software categorizes stories based on departments, offering targeted feedback to respective PIB officers. This ensures that relevant stakeholders receive prompt notifications regarding media coverage related to their areas of responsibility.
- **Sentiment Analysis and Tonality Classification:** AI-driven sentiment analysis helps classify media stories as positive, negative, or neutral. This classification provides a nuanced understanding of public perceptions, allowing the government to tailor responses accordingly.
- **Notification Alerts:** Immediate notifications via SMS, email, or Android notifications ensure that PIB officers are promptly informed about negative media coverage. This allows for swift response mechanisms to address concerns or misinformation.
- **Adaptive Feedback Process:** The software adapts to the dynamic nature of government operations by incorporating AI and ML capabilities. It provides a comprehensive and adaptive feedback mechanism that aligns with the unique context of the Indian government.
- **Issue Tracking and Resolution:** The 360-degree feedback software goes beyond monitoring media coverage and incorporates a robust issue tracking and resolution system. It allows PIB officers to log and track issues arising from media narratives, public concerns, or misinformation. By categorizing and prioritizing these issues based on their potential impact, the system facilitates a streamlined approach to resolution.
- **Performance Analytics and Reporting:** The software includes a sophisticated performance analytics module that provides PIB with in-depth insights into the effectiveness of communication strategies and policy implementations.

VIII. ADVANTAGES AND DISADVANTAGES

ADVANTAGES

- **Proactive Crisis Management:** The real-time feedback system enables proactive crisis management by identifying negative media coverage promptly. This allows the government to address issues before they escalate.
- **Enhanced Communication Strategies:** AI-driven insights empower the government to refine communication strategies based on public sentiment. Positive stories can be amplified, while corrective actions can be taken in response to negative narratives.
- **Efficient Resource Allocation:** Targeted feedback on departmental performance facilitates efficient resource allocation. The government can prioritize areas that require attention, leading to optimized workforce performance and resource utilization.
- **Transparent Governance:** The project promotes a transparency in governance by providing real-time information on public reactions. This transparency builds public trust and confidence in the government's ability to address concerns.

DISADVANTAGES

- **Technological Dependencies:** The success of the project relies on the availability and reliability of technology infrastructure. Technical glitches or interruptions could impact the real-time monitoring and notification process.
- **Privacy Concerns:** The automated feedback system involves processing media content, which may raise privacy concerns. Ensuring compliance with data protection regulations is crucial to address potential privacy issues.
- **Initial Implementation Challenges:** Implementing a new AI/ML-driven system within a government organization may face resistance and require significant training for users. Initial challenges in adapting to the new system may arise.

IX. CONCLUSION

In concluding the proposed AI-driven feedback system, it becomes evident that the amalgamation of real-time media monitoring, advanced sentiment analysis, and crisis management notification alerts is a transformative leap for effective governance in the Indian context. This holistic system is poised to redefine the government's approach to communication, decision-making, and crisis response. Real-time media monitoring serves as the eyes and ears of the government in the ever-expanding digital landscape. The web scraping tools deployed ensure not only a broad coverage of media sources but also a continuous, dynamic collection of data. The inclusion of websites and e-magazines reflects a commitment to inclusivity, enabling the government to gain insights into sentiments at a granular level. This functionality addresses the necessity for timely and accurate information, providing a foundation for proactive decision-making. The incorporation of advanced sentiment analysis stands as a technological milestone. By harnessing the capabilities of Natural Language Processing and machine learning models, the system goes beyond mere sentiment categorization. It delves into tonality nuances, offering a comprehensive understanding of public perceptions. This depth of analysis empowers government officials to tailor communication strategies, respond strategically to negative sentiments, and amplify positive narratives.



Crisis management, a critical aspect of effective governance, is significantly enhanced through the notification alerts feature. The automated system ensures that PIB officers are promptly informed of negative sentiment articles, enabling swift and targeted responses. The configurability of notification preferences acknowledges the diverse communication channels preferred by different officers, adding a layer of flexibility to crisis response. In essence, this AI-driven feedback system is not just a technological upgrade; it represents a paradigm shift in how the government engages with citizens and manages its public image. It signifies a commitment to transparency, responsiveness, and efficient governance. As the government embarks on the implementation of this transformative tool, it paves the way for a future where data-driven insights, adaptive communication, and proactive crisis management redefine the standards of governance in the digital age. The proposed system stands as a testament to the government's embrace of innovation to better serve its citizens and strengthen the democratic fabric of the nation.

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