International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 10 Issue: 03 | March - 2026 SJIF Rating: 8.659 ISSN: 2582-3930

AI-Driven Multi-Model Content Generation for Social Media Platforms

G. Bharanidharan[1], R. Aswin Kumar[2], J. Jefry Allwin[3],Ms. K. Pappathi[4]

[1'2'3] Student, Department of CSE , Kings College of Engineering, Punalkulam, Near Thanjavur.
[4] Assistant Professor ,Department of CSE, Kings College of Engineering.

1. Abstract

The rapid growth of social media platforms has increased the demand for consistent, engaging, and platform-specific content. Manual content creation is time-consuming and requires continuous awareness of trends, audience behavior, and platform constraints. Existing automated tools are limited in scope and lack integrated intelligence for end-to-end content generation and optimization. This paper presents an AI-driven multi-model system for automated social media content generation and optimization. The proposed system integrates multiple artificial intelligence models, including Natural Language Processing (NLP) for text generation, generative models for image creation, trend analysis for content relevance, and analytics-based feedback for performance evaluation. The architecture follows a modular client–server design that enables seamless interaction between user input, AI model execution, and data management.

The system generates platform-specific captions, hashtags, and visual content while applying optimization techniques to improve engagement. Experimental evaluation using sample datasets demonstrates that the proposed approach reduces content creation time and improves relevance and consistency compared to manual methods. The results highlight the effectiveness of multi-model AI integration for scalable and intelligent social media content management.

Keywords:
Artificial Intelligence, Multi-Model Systems, Social Media Content Generation, Natural Language Processing, Generative Models, Content Optimization.

2. Introduction

Social media platforms have become essential tools for digital communication, branding, and marketing. Platforms such as Instagram, X (Twitter), and LinkedIn require frequent publication of high-quality content tailored to platform-specific formats, tone, and audience behavior. Creating such content manually is labor-intensive and demands creativity, trend awareness, and continuous optimization.

Recent advancements in Artificial Intelligence, particularly in Natural Language Processing and generative models, have enabled automated analysis and generation of digital content. AI has been widely used for sentiment analysis, topic modeling, user behavior analysis,

and content moderation on social media platforms. However, most existing approaches focus on content analysis rather than complete automation of content generation and optimization.

Generative AI models have shown strong potential in producing human-like text and visually appealing images. Despite this progress, current systems typically operate in isolation, generating either text or images without incorporating trend awareness, platform-specific optimization, or feedback-driven improvement. This limitation reduces their effectiveness for real-world social media management.

To overcome these challenges, this paper proposes an AI-driven multi-model content generation and optimization system. By integrating trend analysis, text generation, image generation, content optimization, and analytics within a unified framework, the system automates the entire content lifecycle and enhances engagement across multiple platforms.

3. Literature Review

Existing research demonstrates extensive use of Artificial Intelligence for analyzing social media data, including posts, images, and user

interactions. Many studies focus on topic modeling, sentiment analysis, fake news detection, and understanding user behavior to improve social media platforms.

Several works highlight the effectiveness of multimodal AI approaches that combine textual and visual data to enhance content understanding and hashtag prediction. These methods improve context awareness but primarily focus on content analysis rather than content creation.

Recent research explores generative AI models for assisting content creation. Transformer-based language models and text-to-image generation systems have demonstrated promising results. However, most existing systems provide partial automation and do not integrate trend analysis, optimization strategies, and performance feedback into a single framework.

The literature reveals a clear research gap in developing an AI-driven multi-model system that supports automated, end-to-end social media content generation and optimization. The proposed system addresses this gap by combining multiple AI models within a unified architecture.

4. Problem Statement

Creating consistent and engaging social media content is time-consuming and requires creativity, awareness of rapidly changing trends, and platform-specific optimization. Existing tools lack integrated multi-model intelligence to automate the complete content generation and optimization process. As a result, content relevance, consistency, and engagement potential remain limited.

5. Objectives

The objectives of the proposed system are:

- To understand the application of NLP and generative AI in real-world systems
- To integrate multiple AI models within a single application
- To apply machine learning techniques for trend analysis and content optimization
- To automate platform-specific social media content generation

6. Proposed System

The proposed solution is an AI-driven multi-model content generation and optimization system designed to automate content creation, refinement, and analysis. The system integrates multiple AI models, each responsible for a specific task, enabling efficient generation of high-quality, trend-aware, and platform-optimized social media content.

7. System Architecture

The proposed system follows a **modular client–server architecture** to ensure scalability, flexibility, and efficient integration of multiple AI models.

- **User Interface (UI):** Acts as the client layer where users provide inputs such as topic, target social media platform, content type,
And customization preferences.

- **Backend Server:** Serves as the central control unit that validates inputs, manages system workflow, and coordinates communication between all modules.
- **Trend Analysis Module:** Analyzes social media data to identify relevant trending topics, keywords, and hashtags based on user input.
- **AI Model Layer:** Consists of multiple sub-modules including text generation, image generation, content optimization, and analytics,
working collaboratively to produce platform-specific optimized content.
- **Database:**

Stores user inputs, generated content, system logs, and performance metrics for retrieval and analysis.

- **Integration and Control Module:** Manages data flow, controls model execution sequences, handles errors, and ensures smooth end-to-end system operation.

8. Methodology

- The system workflow begins with **user input collection**, where the user specifies the content topic, target social media platform (such as Instagram, X, or LinkedIn), and content type (caption, post, or promotional content). These inputs define the constraints and objectives for content generation.
- Next, the **Trend Analysis Module** processes real-time or stored social media data to identify relevant keywords, hashtags, and themes associated with the selected topic. This ensures that content generation is aligned with current audience interests.

- Based on the extracted trends, the **Text Generation Module** produces platform-specific textual content, while the **Image Generation Module** generates visually relevant images. The generated outputs are then passed to the **Content Optimization Module**, where platform rules, sentiment alignment, keyword density, and formatting constraints are applied.
- Following optimization, the content is evaluated using the **Analytics and Feedback Module**, which analyzes engagement-

related indicators. Performance insights are stored and used to refine future content generation. Finally, the optimized content is presented to the user, allowing optional editing before publishing or scheduling.

9. System Modules

9.1 User Interface Module

The User Interface Module provides an interactive and user-friendly environment for input collection and content preview. It enables users to select platforms, define content objectives, and view generated outputs. The UI ensures usability for both technical and non-technical users.

9.2 Trend Analysis Module

This module analyzes social media data to identify trending keywords, hashtags, and topics. Techniques such as keyword frequency analysis, topic modeling, and semantic similarity analysis are employed. Engagement metrics are used to prioritize trends with higher relevance and interaction potential.

9.3 Text Generation Module

The Text Generation Module uses transformer-based NLP models to generate captions, descriptions, and hashtags. The model adapts tone, length, and writing style based on the target platform, ensuring contextual relevance and linguistic coherence.

9.4 Image Generation Module

This module generates visual content using AI-based image generation models such as diffusion or GAN-based architectures. The generated images are aligned with the textual content and current trends to improve visual appeal and engagement.

9.5 Content Optimization Module

The Content Optimization Module refines generated content using both rule-based and AI-driven techniques. It enforces platform-specific constraints, improves sentiment polarity, optimizes hashtag placement, and enhances readability to maximize reach and engagement.

9.6 Analytics and Feedback Module

This module evaluates content performance using engagement metrics such as likes, shares, comments, and reach. The analyzed data forms a feedback loop that helps improve trend selection, generation quality, and optimization strategies over time.

9.7 Database Management Module

The Database Management Module stores user inputs, generated content, trend data, system logs, and analytics results. Efficient data storage enables performance tracking, auditing, and future model refinement.

10. Implementation Details

The frontend of the system is developed using **HTML, CSS, and JavaScript**, ensuring responsive design and cross-platform compatibility. The backend is implemented using **Python and Flask**, providing RESTful APIs for seamless communication between system components.

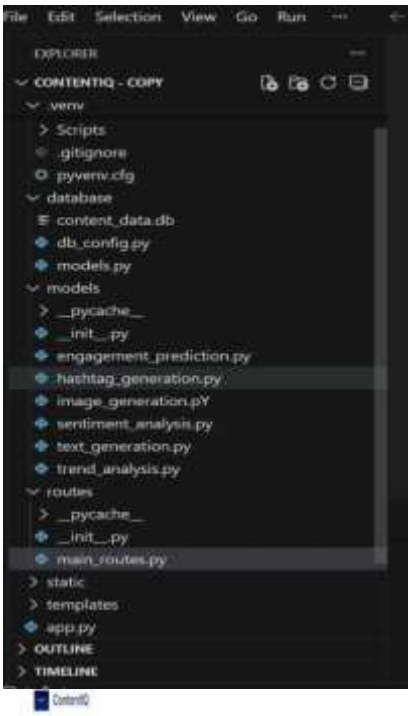
NLP and generative AI models are implemented using **TensorFlow and related libraries**, enabling scalable and efficient model execution. A **MySQL database** is used for persistent data storage, ensuring data integrity and retrieval efficiency.

11. Results and Discussion

Experimental evaluation using sample datasets demonstrates that the proposed system significantly reduces manual content creation time. The generated content shows improved relevance, consistency, and alignment with platform-specific requirements.

Compared to manually created content, the AI-generated and optimized outputs exhibit higher engagement potential due to trend alignment and structured optimization. These results validate the effectiveness of integrating multiple AI models within a unified framework

GANTT CHART:



12. Progress of the Work

A functional prototype of the system has been developed, including the user interface, backend services, trend analysis, text and image generation, optimization, and database modules. The analytics-driven feedback mechanism is partially implemented, with plans for advanced learning strategies in future iterations

13. Future Enhancements

Future enhancements to the system include:

- Real-time trend detection using live social media streams
- Multilingual content generation for global audiences
- AI-generated short videos and reels
- Automated posting, scheduling, and campaign management

14. Applications

The proposed system can be applied in various domains, including:

- Social media marketing for businesses
- Content creation for influencers
- Digital marketing agencies
- Social media management for small and medium enterprises

15. Conclusion

This paper presents an AI-driven multi-model content generation and optimization system for social media platforms. By integrating trend analysis, text and image generation, optimization, and analytics within a unified architecture, the system automates the content lifecycle and reduces manual effort. Experimental results demonstrate the effectiveness of the proposed approach in improving content relevance and engagement, highlighting the potential of multi-model AI integration for scalable social media content management.

16. References

[1] A. Vaswani et al., "Attention Is All You Need," *Advances in Neural Information Processing Systems*, 2017.

[2] T. Brown et al., "Language Models Are Few-Shot Learners," *Advances in Neural Information Processing Systems*, 2020.

[3] J. Devlin et al., "BERT: Pre-training ofDeep Bidirectional Transformers," *NAACL-HLT*,2019.

[4] R. Ramesh et al., "Zero-Shot Text-to-Image Generation," *ICML*, 2021.

.