© MAY 2026 | IRE Journals | Volume 9 Issue 11 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I11-1717762

Socialcontentforge: Multi-Agent AI System for Automated Influencer and Brand Content Creation

MIRAL GOPANI[1], NAMAN RATHOD[2], ROHIT PARMAR[3], SAKSHI PATEL[4], PROF. SUDHIR DHEKANE[5]

[1,2,3,4,5]*Department of Artificial Intelligence (AI) and Data Science, SVKM's Dwarkadas J. Sanghvi College of Engineering, Mumbai, India*

Abstract- ***SocialContentForge is a multiagent AI framework that enables influencers and brands to create and publish content more effectively and efficiently across all social media platforms. It solves many of the problems related to creating consistent, high-quality content for multiple channels, while significantly reducing the amount of time it takes to produce that content. SocialContentForge uses sophisticated Generative Artificial In-telligence technologies like Google's Gemini and a locally run Stable Diffusion V1-5 model for Image Generation in conjunction with OAuth-based connections to popular social media sites such as Instagram, Facebook, LinkedIn, and Twitter/X. Agents within SocialContentForge work together to deliver the content to a given platform and monitor engagement data for that post. It was reported by users that this multi-agent system has reduced the amount of time it takes to generate content by 70-75%. The framework also contains several user assistance features including Global AI chatbot, Customizable brand voice, Platform-specific tone controls, Image Editing Modules and Content moderation which automatically removes content that is potentially inappropriate. Real-time analytics capture engage-ment metrics such as likes, comments, shares, and reach via interactive dashboards to provide users with quick access to their data. The MERN Stack was used to develop SocialContentForge, while images were generated in a hybrid execution model using PyTorch and CUDA, and were integrated through FastAPI and Cloudflare Workers to provide optimal performance, multi-user control, and adherence to ethical content generation practices.***

Index Terms- ***Content Generation, Generative AI, Multi-Agent AI Systems, Performance Analytics, Social Media Automation.***

I. INTRODUCTION

A. Background and Context

Digital marketing has undergone significant change. The non-homogenous character of these platforms, which is re-flected in different content formatting, ways of engagement, algorithm operation, and audience demand, requires content producers to make their content tailored to the nature of the particular platform. It is necessary to adapt continuously, optimize platforms, and engage with the audience.

Content creators spend three to five hours per day on social media management activities. Tasks like media opti-mization to different demographic groups, tonal alterations, and character restrictions, and other tedious cross-platform posting operations, which together add an operational load that often leads to irregular posting schedules, compromised creative capabilities, and subpar engagement results.

Generative Artificial Intelligence, specifically Large Lan-guage Models (LLM) and text-to-image synthesis systems allow transforming limited input data into captions, blog posts, hashtags, and images. The currently available tools are still disjointed: scheduling systems do not support the creation of intelligent generations, and generative models do not offer cross-platform deployment and analytics assistance. Existing AI solutions do not fulfill the requirements of the multi-platform strategy. This has led to an obvious need to have a unified smart system to match the generative AI with the real-world requirements in multi-platform content management.

B. Problem Statement

Available solutions are inadequate, to provide a more ap-proachable framework of orchestrating social media content, at an enterprise level, across a multi-platform. Academic research and business products is often focused on individual subsys-tems, and does not attempt to coordinate across platforms or provide measurable performance results.

Key challenges include:
Time and Resource Constraints: Multi-platform content requires repetitive steps, such as ideation, writing, editing, hashtag choice, formatting, and scheduling, which reduces the frequency of production and lowers creativity.Platform-Specific Optimization: Every online platform place distinct restriction in the form of tone, formatting, character restric-tions, interaction rules and algorithms. Manual adjustment increases the workload.Fragmented Distribution Workflows: Independent authentication, formatting and scheduling pro-cesses across platforms creates redundancies and inconsisten-cies in operations. Limited Performance Insights: Platform-specific analytics dashboards provide non-standardized and isolated metrics, unified comparative analysis and evidence-based strategy optimization. Inconsistent Brand Voice: It is challenging to maintain a consistent tone and message between various media, products, and audiences. Scalability Limita-tions: Manual processes are not scalable to large enterprise-level content generation.

These limitations, highlight the need to have a platform that integrates generative AI, automated cross-platform de-ployment, brand modelling, and centralised analytics in an infrastructure that is scalable.

C. Research Objectives
This paper seeks to create an integrated artificial intelligence system herein referred to as SocialContentForge which is intended to automate the process of content generation, distri-bution and performance analysis. The primary objectives are as follows: Intelligent Content Generation: The framework use the language and image generation models to generate high-quality platform-optimized content. Reducing content creation time by 70-75% through addition of trend analysis to detect new topics and algorithmic opportunities, facilitate automated and manual workflows. Automated Multi-Platform Distri-bution: The platform integration with Instagram, Facebook, LinkedIn, and Twitter/X using OAuth to support single-click publishing. It will automatically adjust captions, ratio of images, hashtags, and metadata and add smart scheduling based on the engagement patterns and past performance. Performance Analytics and Optimization: The structure will create a centralised analytics engine that consolidates and unify engagement measures in the platforms. Adaptive learn-ing models will process the past to create predictive insights. Brand Voice Modeling: The model will create learning of brand-voice based on AI by examining past posts to obtain tone, vocabulary, and patterns in viewpoints, and thus maintain uniform messages across platforms. Scalable Multi-Agent Architecture: Design a distributed multi-agent system that will undertake the responsibilities of generation, adaptation, distribution, analytics, trend tracking and brand modelling. User Experience and Customization: The framework will offer a user-friendly MERN-based web interface that can allow real-time previews, inline editing, OAuth, responsive design, custom generation instructions, AI chatbot support, edit images, and content moderation features.

D. Scope of the Project
The deliverables will involve a prototype integrated multi-agent AI system to handle automated multi-platform social media management. The prototype encompasses content gen-eration, adaptation, distribution, and analytics aggregation, OAuth-based API integration with social media platforms, real-time analytics engine for cross-platform metrics normal-ization and visualization, and content creation, publication, and performance monitoring of the MERN-stack web applications within a single environment.

E. Significance and Impact
This study fills generative AI theory and multi-platform content management requirements. The proposed system will improve the productivity, consistency, scalability and data-driven decision-making by combining generation, distribution, analytics, and optimization. Allow to scale and lower the operating overheads. The framework shows that AI-based content orchestration can be fully implemented in the context of contemporary digital marketing.

II. RELATED WORK

This section is a literature review of research on artificial intelligence-based social media content

generation, whose predominant themes and gaps in the research motivate the proposed framework.

A. Convergence of Artificial Intelligence with Social Media

Saheb et al. have examined 1540 articles discussing the intersection of artificial intelligence and social media [6]. Themes of conversational agents and user experience became prevalent, and the need to focus more on sentiment analysis and brand engagement recommendation increased. Although the study is very good in the theoretical mapping of this evolution, it fails to give a guideline on how to implement it in real-time adaptive content across platforms.

B. LLM Based Social Media Engagement Simulation

Qiu et al. suggested an action-directed model that decou-ples engagement prediction and response generation in large language models [5]. Zero-shot performances were less than BERT models, and few-shot settings enhanced contextual compatibility. In spite of the fact that the framework can increase the intent-driven response generation, cross-platform strategies, and brand consistency across end-to-end systems are not touched.

C. Automated Content Creation with Generative Artificial Intelligence

The VEDA AI system presented by Ganesh et al. is a text, image, and thumbnail generator that works based on transformer-based models [2]. According to their findings, the use of artificial-intelligence tools was prevalent, but used in a collaborative manner, thus not automating but mostly used to analyse trends. Although the system is multimodal, there are no coordinated strategies for multi-agent cooperation and continuous performance optimization, and thus it is restricted to large scale applicability.

D. Artificial Intelligence Driven Promotional Content Gener-ation

Pardeshi et al. examined generative models of automated promotional video generation using the generative adversarial networks and variational autoencoders [4]. Scalability, de-creased manual effort and visual consistency are some of its benefits. Nevertheless, there are still difficulties in quick adaptation of the themes and ethical issues.

E. Human Artificial Intelligence Collaboration in Marketing Campaigns

A human-AI cooperation system was proposed by Yi and Xian between marketers, creators and generative systems [7]. The research illustrates various assisted content creation and regulatory compliance options. However, it provides little in-formation on scalability, automated multi-creator coordination, performance measurement or aggregation on the enterprise level.

F. Artificial Intelligence Powered Viral Content Creation

Case studies by Ahdus Technology indicate automated short-form video generation that is trend-focused and engagement-driven [8]. Although the strategy justifies scal-able artificial-intelligence pipelines, it is limited to particular formats and platforms.

G. Impact of Artificial Intelligence on Brand Authenticity

Bruns and Meissner examined how artificial intelligence generated by generative methods influences brand authenticity [1]. The publication of AI-generated content was determined to decrease perceived authenticity and interactivity, and col-laborative human-assisted practices did not harm trust. The research is based on the results of perception and does not present quantitative performance levels and strategies of balancing automation and authenticity.

H. General Artificial Intelligence Impact on Social Media Content

The study by Mohamed et al. examined artificial-intelligence-based automation, personalization, and engage-ment analytics in the social media [3]. The results of the surveys show that users have mixed feelings, especially with regards to bias and transparency. Although the study provides information about the user attitudes, there are no implemen-tation structures.

© MAY 2026 | IRE Journals | Volume 9 Issue 11 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I11-1717762

I.Enterprise Generative Artificial Intelligence Implementation Honda used an implementation of generative artificial in-telligence in various channels of communication with human involvement to ensure brand intent [9]. Even though the initiative enhances efficiency and customization, there is a limited architectural description that limits the reproducibility.

J. Synthesis of Research Gaps

The literature reveals four primary gap categories addressed by SocialContentForge: Methodological Gaps: The absence of multi-agent, real-time, cross-platform frameworks and systematically-brand-consistent, approaches to adaptation.

Evidence and Empirical Gaps: Scarcity of validated per-formance measures, measurable performance and production-capable implementations.

Theoretical Gaps: Weak ethical integration models, little application of the best models of human-artificial-intelligence cooperation, and no systematic brand voice models.

Implementation Gaps: There are a few strategies available to implement practical multi-platform OAuth integration, but no cross-platform analytics, and the lack of focus on user-experience between automation and creative control.

SocialContentForge provides solutions to these gaps by means of a common multi-agent system, real-world platform integration, extensive analytics and user-focused design.

III. SYSTEM DESIGN AND METHODOLOGY

A. Architectural Overview

The paper proposes an engineered system called SocialCon-tentForge, which will allow users to create content, schedule it, and distribute it across various platforms using a modular multi-agent framework. This design takes a scalable and extensible paradigm with discrete subsystems, which operate independently but have standardized communication and data-representation protocols. This type of modularity enhances isolation of faults, ease of maintenance and the availability of integrative capacity of innovative agents or social media systems without affecting the overall stability of the system. There are five layers that are interdependent and they all manage the whole workflow of the platform.

The Presentation Layer is represented in form of a re-sponsive web application that will enable users to create content, manage the preferences of the platform, create post schedules, track analytics, and trend analysis. It provides real time feedback and provides an interface back to the underlying multi agent system.

The Application Layer provides the main logic and coor-dinates the workflow. It distributes the tasks between agents, enforces rules of operation, manages sequencing and depen-dencies and resolves errors. This layer ensures continuity throughout the content lifecycle that includes generation, re-fining, scheduling and publishing.

The Agent Layer contains specific AI agents that have a discrete set of functions in the content-management pipeline. The agents interact with each other, exchange medium data

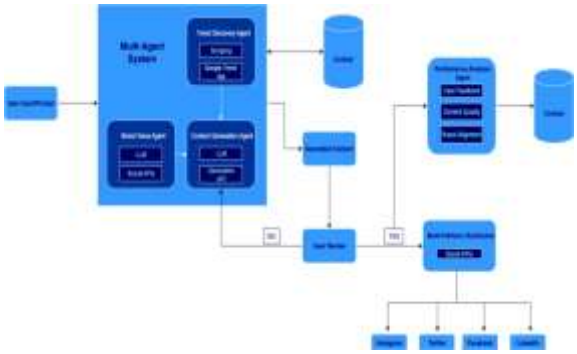

Fig. 1. Architecture of the SocialContentForge multi-agent system

and yet they retain functional autonomy, which helps in horizontal scaling as additional capabilities are added.

The Integration Layer supports secure integration with other social media though authentication is also supported by OAuth as well as standardized API interfaces. It facili-tates the content publishing, time-scaling synchronization and the retrieval of

performance metrics as well as abstracting platform-specific API differences to ensure interoperability and consistency.

The Data Layer provides long-lasting storage of user profiles, content drafts, records of publications, credentials of social accounts, and engagement metrics. It also makes it easy to query and access data in a short time span and to maintain data integrity and encryption of delicate information.

B. Multi-Agent System Design

The multi-agent architecture of SocialContentForge pro-vides intelligence distribution among special agents to coordi-nate the creation, optimization, distribution, and analytics of contents. Its design is more modular, tolerant to faults, and ex-tensions, the agent works independently but can interact using standardized protocols to facilitate the coordinated execution of a workflow. This distributed AI paradigm makes it possible to scale up the orchestration of heterogeneous social media environments.

The Content Generation Agent and Image Genera-tion Agent converts user high-level prompts into platform-optimized textual responses based on Google Gemini 2.5 Flash. It takes on different tones, lengths, semantic density, formatting guidelines, and uses hashtags based on platform-specific limitations. Platform strategies are storytelling and structured captions on Instagram, conversation prompts on Facebook, professional insight-driven posts on LinkedIn, and high-impact posts on X. Generation parameters such as tem-perature, top-p control creativity, and post-processing consis-tency and compliance. Fallback mechanisms ensure continuity of operations when there are temporary interruptions in the AI services.

The Trend Discovery Agent uses Google Gemini to semantically search user prompts and determine emerging discussions, trending topics, and other relevant hashtags in real-time without depending on third-party APIs. It is able to dynamically match generated content with changing audience interests using the language understanding of context. The next steps involve quantitative validation of the results with the use of Google Trends and predictive time modeling.

The Multi-Platform Distribution Agent is an automated cross-platform publishing tool, which uses OAuth 2.0 authen-tication and platform-sensitive API treatment. It customizes captions, media formats, and metadata to the needs of the platform and does parallel posting with parallel error recovery to remain partially successful even in the face of failure. In platforms, there are Instagram Graph API (two stage media publishing), Facebook Page API, Linked In OAuth PKCE and User Generated Content API, Twitter/X API v2 with character limit enforcement.

The Performance Analyzer Agent has engagement metrics aggregations, including likes, comments, shares, impressions, and reach from connected platforms, normalizes terminology, and places past records to compare across platforms. It helps in planned and on-demand synchronization, which facilitates lon-gitudinal performance assessment and strategic realignment.

The Global AI Chatbot Agent offers conversational sup-port to navigation, content suggestions and workflow opti-mization based on Gemini-based contextual understanding. It integrates user session awareness, linked accounts, and recents to provide personal guidance.

The Custom Instructions System allows users to define brand-specific tone, vocabulary, content limits and stylistic rules which are automatically programmed into generation prompts. These consistent preferences ensure brand stability whilst still having the ability to update dynamically without necessarily changing previous outputs.

Platform-Specific Tone Controls allow a finer level of stylistic adjustment on a platform-by-platform basis, with dif-ferentiated communication strategies but maintaining overall brand identity. The tone parameters are overlaid with instruc-tions that are custom during the generation of the content in order to achieve consistency and contextual adaptation.

The Image Editing Module enables the post-generation refinement of an image with the aid of

crop, rotation, bright-ness and filtering in the platform interface. Images that have been edited exist in Cloudinary separately to their originals, maintaining a version history and maintaining a professional quality control in a workflow.

Finally, the Content Moderation System uses proactive generation-figurehead filtering with the aid of keywords to avert indecent or policy-defying outputs. The prompts are checked against a maintained database of key words and flagged entries stop processing with user report. This pre-processing algorithm saves the computing power and imposes a responsible use of AI.

C. Technology Stack

SocialContentForge is built on top of a modular stack of backend technologies, frontend frameworks, and cloud-based infrastructure services that are built to facilitate scalable coor-dination of content across a variety of platforms.

The backend architecture uses the asynchronous and non-blocking Node.js with Express.js framework which supports both agent orchestration and non-blocking RESTful operations of the API. MongoDB is the NoSQL document database hence allowing flexible schema development to support het-erogeneous contents, user settings and analytics documents. Mongoose ODM applies schema validation and querying. Authentication is done using stateless session based on JSON Web Token (JWT) and OAuth 2.0 with the use of PKCE where required. The encryption of OAuth tokens is done using AES-256-CBC and the use of Helmet.js is made to enhance the security of the HTTP header.

The artificial intelligence services integrated into the system include Google Gemini as a text generation tool and chatbot support, and a locally hosted version of Stable Diffusion v1-5 as an image generator. The model runs at FP16 accuracy on CUDA-compatible GPUs, which switches to CPU mode when needed, and generates 768×768 in images after 25 denoising steps. Base64 encode is applied to the resulting images before uploading to the Cloudinary CDN and storing and storing them with metadata to enable delivery optimization across the globe. Content moderation systems offer immediate validation before the synthesis. The Instagram Graph API version 18.0, Facebook Graph API, LinkedIn User-Generated Content (UGC) API, Twitter/X API version 2 are platform integrations, and each is managed by a specific workflow handler.

The frontend uses React 18 with Vite that supports opti-mized building pipelines and production. The uniformity of visual styling is ensured using Tailwind CSS, and Framer Motion adds interaction to users by giving it declarative animation options. The React Context API is used to manage application state and React Hot Toast is used to provide real-time notifications. React Router v6 supports routing function-ality including access-controlled navigation. Image editing is done on the client side through browser-based editing tools. There are continued storage systems that store user-specific instructions and tone preferences.

The infrastructure is scalable and performance-based. The environment variables are used to help manage the configura-tion and draw the difference between development and produc-tion settings and cross-origin resource sharing (CORS) policies are used to impose strict domain restrictions. The efficiency of queries is improved through indexing in MongoDB, and media content is delivered by Cloudinary infrastructure. The stateless Node.js server delegates computationally intensive functions to a stable diffusion model. The stateless nature of the API, token-based authentication, and asynchronous task queue is also used to support horizontal scalability.

D. System Workflow

This system comprises three interlocking workflows, namely, content creation, multi-platform distribution, and an-alytics synchronization.

The beginning of content creation is user input whether in AI-assisted mode or manual mode. Captions and images are created in parallel in AI mode which are reviewed, refined and saved as drafts.

The distribution workflow uses OAuth authentication to simultaneously publish content to platforms, and logs post IDs, error logs and posts real-time status with status notification.

The analytics workflow gathers the engagement metrics (likes, comments, shares, reach, impressions)

using APIs and can be sync through manual, scheduled, or event. Data is normalized, missing values are normalized so that they can be compared by time, and data is stored and displayed on a centralized dashboard.

E. Database Schema Design

The schema of MongoDB contains three main collections which are Users, Social Accounts and Posts. Users' collection stores identifiers, i.e. passwords hashed using bcrypt, unique and indexed email addresses, timestamp fields, and links to related Social Accounts and Posts. The Social Accounts collection contains encrypted OAuth tokens, tokens refresh operation time stamps, platform identifiers, user- related meta-data, status notification of synchronizations, and credentials which are further encrypted using AES-256-CBC encryption to secure integration. The Posts collection contains captions, media URL references, creation timestamps, lifecycle status with the values draft, posting, completed, or failed and forms arrays of platform-specific distribution results and engagement metrics. Synchronization of metrics on a time basis provides both incremental updates and longitudinal analysis processes.

F. Security Architecture

The system provides a defense method comprising of au-thentication, encryption, network controls and input validation. A 24-hour expiry to guarantee scalability is available in stateless authentication with JSON Web Tokens, whereas OAuth 2.0 with PKCE is available to provide third party access
with automatic token refresh.

Environment variables contain sensitive data, which is not controlled by version control, and all OAuth tokens are en-crypted at rest. Network security: it consists of strict CORS, rate limited to 200 requests per 15 minutes per IP, request timeouts, and secure HTTP headers with the help of Helmet.js. Characters, format and type checking as well as sanitization helps in input validation to prevent injection and malformed data whereas parameterized query and schema validation helps in data integrity and prevents NoSQL injection.

IV. IMPLEMENTATION

SocialContentForge was developed based on a multi-staged development process that combined the backend services, the frontend interface, the artificial intelligence modules, the authentication system, the content distribution pipelines, and the analytics collection into one architectural solution. All components of the system were well introduced and properly tested at the various stages to ensure scalability, reliability, and security. As a result, the end product will be a multi-agent system that will be able to independently produce, control, and share the social media content and simultaneously combine performance metrics.

A. Development Methodology

The development was done in a staged approach which verified the main components and then introduced the depen-dent modules with the system having stability, scalability and maintainability.

Phase one developed the fundamental infrastructure of the platform including Node.js, Express and MongoDB as the data repository and authentication was performed by means of JSON Web Token (JWT) and secure sessions. Access to analytics, content management and OAuth token management were incorporated. The frontend was developed with react and Vite to optimize the builds and speed the development, and Tailwind CSS allowed styling of the components with specified routing and layout, which gave rise to a system that can support user accounts. The second stage added an AI-powered content generation module in which captions platform-specific were created based on formatting and toning needs in Instagram, Facebook, LinkedIn, and Twitter with API error correction. The generated images were created with a Stable Diffusion v1-5 model that was run locally in a Python pipeline on PyTorch and Diffusers with CUDA acceleration and Base64-encoded and delivered via Cloudinary to the Node.js server. There were also other features such as custom instructions, tone modulation, prompt moderation and a global AI chatbot to guide workflow.

The third stage introduced secure platform connections with OAuth 2.0 authorization, which

© MAY 2026 | IRE Journals | Volume 9 Issue 11 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I11-1717762

allowed automated publishing and analytics retrieval of Instagram, Facebook, LinkedIn, and Twitter, long-life Instagram tokens, Facebook Page tokens, LinkedIn media upload workflows, and twitter OAuth 2.0 through PKCE, the tokens were encrypted with AES before being stored in the database. The fourth phase created an automated publication pipeline delivering the content on the platforms, having modified it to fit platform-specific for-mats, such as the creation of Instagram media containers and tracking, Facebook structured post requests, LinkedIn asset workflows, and Twitter character optimization, and its asynchronous execution allowed simultaneous publication and real-time tracking. The fifth phase added an analytics sub-system which gathered engagement data including likes, com-ments, impressions, reach and profile interactions via platform specific APIs and standardized into a central schema and visualized via dashboard summaries with manual or batch synchronization. The last step was testing and optimization, such as device responsiveness, token expiry, API failure, Insta-gram media processing pipeline simplification, and frontend-backend communication, and was the foundation of the system being deployed.

TABLE I
IMAGE GENERATION STATISTICS

Metric	Value
Total Tests	5
Image Generation Time (Avg)	43.61 s
Minimum Time	41.67 s
Maximum Time	46.08 s
Success Rate	100.0%
Device	CUDA
Resolution	768 × 768
Inference Steps	25

TABLE II
CAPTION GENERATION STATISTICS

Metric	Value
Total Tests	5
Average Generation Time	3.50 s
Minimum Time	3.00s
Maximum Time	4.07 s
Success Rate	100.0%
Model	Gemini 2.5 Flash
API Endpoint	Google Generative Language API

B. Key Implementation Features

SocialContentForge is an automated, content creation sys-tem that focuses on safe multi-platform connectivity, content publishing, and centralized analytics into a single environment.

1) Dual-Mode Content Creation: The system allows AI-aided and manual content development in one interface. The AI mode transforms prompt into platform-specific captions and pictures. Storing of content is done in an infrastructure based on CDN and editing can be done before publishing. Manual mode the mode lets you type captions directly and upload media directly either by file or URL. An asset storage is supported by Cloudinary integration. Hybrid workflow allows manual mode and AI mode switching.

2) Platform-Specific Optimization: Captions, media and API interactions are modified as per platform needs. Optimiza-tion of the caption contains the limits of characters, formatting and tone adjustment (Twitter concise, LinkedIn professional, Instagram/Facebook conversational). Resolution and compat-ibility with format is taken care of by image optimization. Cloudinary allows delivery of CDN and validation controls are in place before published.

3) Comprehensive OAuth Management: Facebook, LinkedIn, and Twitter use the OAuth 2.0 (with PKCE), whereas Instagram uses long-lived tokens. Token lifecycle management consists of encrypted storage and expiration and refreshing. No passwords are saved and connection status is shown with permission management support.

4) Resilient Multi-Platform Posting: The system provides multi-platform simultaneous posting. A failure of one platform will not influence other platforms. Transient errors are dealt with by retry mechanisms using incremental backoff, and authentication errors are dealt with by refurbishing a

token. Instagram has media-status polling to consider the delays in processing. Successful posts are not affected by failures.

5) Centralized Analytics Dashboard: The dashboard con-tains metrics of engagement, including reach, interactions and follower activity combined with platforms. The postings are presented in chronological order and have platform tags to compare. These metrics are updated manually or in a batch mode. The data is then normalized in one schema with any missing metrics being realized.

6) Advanced User Assistance Features: It has a Global A.I. Chatbot to give conversational and workflow guidance. The custom instructions enable users to set the tone, use of vocab-ulary and preferences related to audiences. Communication styles on a platform are preserved by tone-control parameters. Image editing allows versioned asset editing. To make sure that content is safely used, content moderation filters search by key words.

C. User Interface Design

The user interface is structured to ensure easy and efficient interaction and has a consistent visual behaviour with all the modules within the system. It has a usability-focused strategy and structured information presentation and simplified work flows, particularly in content creation and publishing.

1) Design Principles: The interface is clear based on hier-archical layouts that promote valuable tasks and information. The efficiency is obtained through reducing the number of in-teractions in the routine operations such as content generation and publishing. Real-time validation, visual indicators, and toast messages are used as the means of continuous feedback. Standardized typography, spacing and color themes maintain consistency. It is accessible with the help of semantic markup, compatibility with keyboards, adequate color contrast, and assistive technologies.

2) Key Interface Components: The major component of the interface is the Navigation Menu that gives access to important modules in the form of dashboard, analytics, content creation, post history and account management. The Dashboard shows the overview with the metrics of engagement, reach, recent posts and account status. The Create Content page can also be used to create content manually and through AI assistance with platform indicators, media upload, real-time preview, and clear status updates. A Global AI Chatbot is contextually helpful, has tonal options, custom instructions, and an in-built picture editing tool. The Post History page is presented with filters, detailed views, analytics and batch operations of the published material. The Accounts Management page depicts related platforms having status indicators and connection controls.

3) Responsive Design: This is a mobile-first design ap-proach that makes devices usable. Single column layouts and touch controls are provided by mobile, multi column layouts by tablets and extended navigation and hover effects by desk-tops. Larger touchpoints, responsive images, fewer animations and rapid access to essential features are all optimizations.

D. Performance Optimization

Performance optimization is implemented on both back- and front-end parts in order to guarantee responsiveness, scalability and stability.

1) Backend Performance: Backend efficiency is enhanced by optimized database operations including indexing, selective field retrieval and pagination to reduce latency and handle large data sets. Request timeouts and parallel processing are used to improve API performance. Data that is frequently accessed is cached. The database connection pooling and image processing memory usage are used to optimize resource usage. Graceful degradation will guarantee the availability of the system when there is high workload because the priority will be given to the most crucial services.

2) Frontend Performance: Vite-based build tools such as tree-shaking, code-splitting, and minification are used to en-hance frontend performance and decrease load time. Lazy loading means that only the needed components will be loaded at the beginning. Part of the runtime efficiency is provided by component memoization, input debouncing, and fewer re-renders. The Axios interceptors are used to optimize network

performance by handling requests, preventing redundancy, and optimistically updating with rollback.

E. Development Tools and Practices

Development practices are based on standards to provide maintainability, collaboration and reliability during the project lifecycle.

1)Version Control: It is being used with Git having a feature-based workflow with isolated branches to avoid con-flicts. Code reviews help to improve collaboration and code quality, whereas the descriptive commit messages enhance traceability.

2) Environment Management: Different environments are developed and production environments are kept. The end-points of APIs are specific to the environment to guarantee a correct deployment and credentials are not in the version control to guarantee security.

3)Testing Approach: Automated testing will be done to encompass fundamental workflows, error handling, cross plat-form compatibility with actual social media accounts. Testing on Chrome, Firefox, Safari, and Edge are done. Unit testing, backend integration testing, and end-to-end testing are also to be improved in the future.

V. RESULTS AND DISCUSSION

SocialContentForge's research indicates a successful multi-agent approach for integrating AI services for use in multi-platform publishing systems. The results obtained during the experiment indicated that the platform was stable and the mechanisms for content generation were economically pro-cessed and the mechanisms for collecting analytics data were completed in an independent and continuous manner.

A.System Functionality Validation

The effectiveness of the generated content was validated by the use of AI-generated content, manually entering content, distributing content across multiple platforms, authenticating using OAUTH and returning analytics to provide evidence of successful operation and functionality of the subsystems associated with this project under normal operational environ-ments.

1)Content Generation Capabilities: Using Cloudinary's CDN, the image outputs matched the user prompts and were delivered quickly. The time it took for complete posts to be generated was reduced to 10 to 15 seconds.

Stable Diffusion v1-5 when deployed locally produced 768 × 768 high quality images. GPU systems were able to generate the images in 3 to 10 seconds, whereas the CPU execution of the same images took 30 to 60 seconds.

The Custom Instructions for each brand allowed for brand voice and content preference to be retained. The Platform-Specific Tone Control provided the ability to communicate differently, based on how the content would be displayed on a specific platform.

2)Multi-Platform Distribution: Automated publishing worked as intended on every supported platform. Instagram utilized a two-part workflow that included media polling and achieved over a 90% success rate. Facebook posting main-tained steady success rates with automatic token refreshes.

LinkedIn completed the multi-step media upload process and provided text-only fallbacks for failed uploads, while Twitter's publishing process was able to validate character length and use PKCE to authenticate users quickly.

3)OAuth Authentication: Through the utilization of native authorization redirection, AES-256 token encryption, and to-ken expiration, OAuth authentication proved to have a high degree of reliability. The automatic refresh of tokens ensured consistent connections with Facebook, LinkedIn, and Twitter, while Instagram utilized long-lived access tokens. Users were able to reconnect their accounts without the disruption of their current workflow.

4)Performance Analytics: The analytics subsystem col-lected data related to engagement metrics from Multiple platforms through an analytics dashboard. While there is an update of aggregated summary, post-level metric statistics and trend visualisation metrics thoughtout the manual and batch synchronisation process both manual and batch

synchronisa-tion processes appeared to capture metrics correctly.

B.User Experience Observations

1)Interface Usability: User evaluation revealed that the platform offers an intuitive and visually consistent experience for users from various levels of technical proficiency. First-time users were able to complete tasks related to content creation without assistance. The platform's use of a dark mode provides an enhanced level of accessibility and responsiveness to ensure the user experience remains consistent across mobile devices, tablets, and desktop computers.

2)Workflow Efficiency: Exceptional reductions in produc-tion time for content were noted in the study. Traditional multi-platform workflows could take an average of 80–120 minutes per cycle, compared to only 4-5 minutes for equivalent tasks when performed by SocialContentForge; thus, creating esti-mated time savings of 75-90 minutes and improving efficiency by approximately 93%-96%.

Content output capacity increased greatly from an average of 15–20 multi-platform posts (per day) to only 3–4 posts (per day) using traditional production methods.

3)User Control and Flexibility: Users continued to retain complete control over the creation of content through automa-tion. Users were able to modify, generate or replace captions and images in addition to being able to switch from using AI-assisted methods to manual methods of creating content. Additionally, before any post could be published, the user must approve the post.

4)Advanced Feature Adoption: Following user testing, the high rate of user acceptance of advanced features, including the Global AI Chatbot and Custom Instructions, suggested that the Global AI Chatbot provided guidance through the platform, assistance with the refinement of captions, and help with workflow, with typical response times (2–3 seconds) allowing for the discovery of the feature without any third-party documentation.

Custom Instructions also helped to create a unified brand identity since the generated output was consistent with existing preference settings and eliminated some of the time required to edit existing output materials.

C.Technical Performance Metrics

1)Response Times: In terms of system performance eval-uation, evaluations of overall performance have indicated that all main components were performed at acceptable levels. It typically requires 10-15 seconds to generate content using AI; it is also standard for data storage activities to complete under 0.5 seconds (500 ms). Publishing content from one location to multiple locations has a performance range of 2–5 seconds for a single location and 15–30 seconds for posting products to multiple locations. Synchronizing analytics takes between 3 and 8 seconds, while dashboards load in less than 1 second. To ensure that all operations are completed, including slower Instagram media, a timeout of 120 seconds is also in place for all operations.

The performance of local image generation using Stable Diffusion V 1-5 is dependent on whether the image is gen-erated via GPU or CPU; images generated using a CUDA enabled system typically take 3–10 seconds per image and are considered interactive workflows. If an image is generated with a CPU, it generally takes 30–60 seconds for the image to be processed and therefore would be better done as a batch job. Sending the images from the backend system to the browser clients was done using Base64 encoding and took very little time to transmit data (on average, <500 ms for 768 × 768 pixels).

2)Error Handling Effectiveness: Through automated re-tries after a network failure, and the OAuth token being refreshed without user intervention, error handling improved the system's overall reliability and resilience. Detailed com-munication of platform-specific errors enabled the accurate recording of partial publish results to ensure analytics and publishing history were preserved.
Before generating prompts and returning policy violation feedback without displaying restricted keyword text, the Con-tent Moderation System

© MAY 2026 | IRE Journals | Volume 9 Issue 11 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I11-1717762

prevents unneeded resource utilization by blocking restricted prompts.

3)Scalability Observations: The concurrent usage tests of the system showed that all aspects, including all database queries, had stable system behaviours for up to 1-second completion times (even with hundreds of posts). In addition, because of Cloudinary's content delivery network (CDN), there was quick access to media, and the majority of latency was attributed to external AI services and Instagram-related processing of media by Instagram.

D.Platform-Specific Results

1)Instagram Integration: The success of posting to Insta-gram using the integration was at least 90% as measured by the posting success. The delivery pipeline via Cloudinary allowed for image quality to be preserved while polling for the status of media being published prevented incomplete publishing during processing.

2)Facebook Integration: The integration of Facebook showed consistent speed for publishing content, reliable mech-anisms for refreshing tokens, as well as complete retrieval of metrics for all engagement types.

3)LinkedIn Integration: The use of LinkedIn integration not only allowed for secure authenticated logins to the ap-plication but also allowed for the publishing of application content in accordance with LinkedIn's professional content guidelines. Despite a more complex multi-step image upload workflow than any other platforms, it was sufficiently tested and returned consistent results.

4)Twitter Integration: You could post rapidly via Twitter integration using secure OAuth2.0 PKCE authentication with the ability to constantly post within Twitter's 280-character re-striction, guaranteeing uniformity in the formatting behaviour of your post. Currently, the only functionality offered is text-based publishing

E.Comparative Analysis

TABLE III
COMPARISON ANALYTICS

Feature	Social Content	Buffer	Hoot suite	ChatGPT + Manual
AI Content Gen-eration	Yes (Integ.)	No	No	Yes (Sepa-rate tool)
AI Image Gener-ation	Yes	No	No	Yes (Sepa-rate tool)
Multi-Platform	Yes	Yes	Yes	No (Man-ual)
Platform Optimization	Auto	Manual	Manual	Manual
Performance An-alytics	Yes	Yes	Yes	No
Scheduling	Future	Yes	Yes	No
Content Calendar	Future Scope	Yes	Yes	No
Cost	Free (API)	INR 532	INR 8800	INR 1776
Learning Curve	Low	Low	Med.	Low

F. Advanced Feature Performance

1)Global AI Chatbot Effectiveness: The Global AI Chatbot effectively handled approximately 85-90% of user questions independent, or with very minimal help from other human sources, through common requests such as help with using the platform, optimizing captions, and explanation of features. The chatbot consistently responded to user questions (average re-sponse time was 2–3 seconds), allowing for ongoing dialogue and uninterrupted communication between multiple users.

2)Custom Instructions and Tone Control Impact: The use of Customized Instructions by users with established Brand Identities yielded an approximate 40–50% reduction in Post-Generated Editing efforts/production time. The use of Preferred Vocabulary, preferred Style Elements, and Content Constraints was incorporated into generated output; therefore, all generated output was always congruent with user's expec-tations.

3)Content Moderation Accuracy: The content moderation system based on keywords achieved a precision of over 98% for detecting inappropriate content and achieved less than 2% false positives. The system detected and blocked all types of prompts

that violate the established policies for explicit content, hate speech, violence and misinformation.

VI. CONCLUSION AND FUTURE SCOPE

The SocialContentForge project is the basis for testing if a generative AI system can effectively control multiple agents in the creation of content prior to publishing on social media. The prototype that was developed integrates AI-generated content creation, platform-specific optimizations, multi-platform auto-matic content distribution, and an aggregated collection of an-alytics into one system. The experimental results demonstrate over a 93% decrease in time spent creating the content, while maintaining user editing and preview control. When using Google Gemini to generate the caption, completion of creating a post is accomplished within 20–30 seconds, while using OAuth to distribute results obtains a success rate greater than 90% across Instagram, Facebook, LinkedIn, and Twitter/X. Content creation and publishing takes place within an average of less than 120 seconds.

The system further provides a unified analytics dashboard that aggregates cross-platform engagement metrics, enabling longitudinal performance tracking and data-driven strategy refinement. Secure token management, structured error han-dling, and a scalable multi-agent design ensure reliability and enterprise adaptability. By consolidating fragmented research and commercial tools into a holistic framework, SocialCon-tentForge offers empirical evidence supporting AI-assisted automation in digital marketing workflows.

Future work will focus on enhanced brand voice per-sonalization using advanced stylistic modeling and adaptive language transfer, integration of AI-driven video synthesis pipelines, predictive trend forecasting through real-time an-alytics, and intelligent scheduling optimization.

Overall, the project validates the role of carefully engineered AI systems in improving efficiency, scalability, and evidence-based decision-making in social media management, while establishing a foundation for future research in human–AI collaborative content creation.

REFERENCES

[1] Bru¨ns, J. D., and M. Meißner, “Do You Create Your Content Yourself? Using Generative Artificial Intelligence for Social Media Content Cre-ation Diminishes Perceived Brand Authenticity,” Journal of Retailing and Consumer Services, vol. 79, Article 103847, 2024.

[2] Ganesh, L., T. Rishabh, S. Kuber, and S. Aayush, “Revolutionizing Con-tent Creation with AI: A Study on Automated Writing, Text Processing and Media Generation,” International Journal of Engineering Research & Technology (IJERT), vol. 14, no. 3, pp. 1–8, 2025.

[3] Mohamed, E. A. S., M. E. Osman, and B. A. Mohamed, “The Impact of Artificial Intelligence on Social Media Content,” Journal of Social Sciences, vol. 20, pp. 245–261, 2023.

[4] Pardeshi, Y., S. Alai, P. Kumbhojkar, V. Chaudhari, and K. Moholkar, “A Survey on Smart Promo Creator: AI-Driven Dynamic Video Gen-eration for Banners and Social Media Marketing,” in 2024 Interna-tional Conference on IoT Based Control Networks and Intelligent Systems (ICICNIS), IEEE, 2024, pp. 1443–1449. doi: 10.1109/ICIC-NIS64247.2024.10823268.

[5] Qiu, Z., H. Lyu, W. Xiong, and J. Luo, “Can LLMs Simulate Social Media Engagement? A Study on Action-Guided Response Generation,” arXiv preprint arXiv:2502.12073, 2025.

[6] Saheb, T., M. Sidaoui, and B. Schmarzo, “Convergence of Artificial In-telligence with Social Media: A Bibliometric and Qualitative Analysis,” Telematics and Informatics Reports, vol. 14, Article 100124, 2024.

[7] Yi, H., and L. Xian, “Automating Content Creation with Gen-AI: The Interplay Between Labor of Content Creators and Gen-AI in Marketing Campaigns,” ACM/IMS Journal of Data Science, vol. 37, no. 4, Article 111, 2024.

[8] Ahdus Technology, “Case study: Multi-agent AI system to create viral reels for 2M+ users,” 2024. [Online]. Available: https://ahdustechnology.fi/case-study-using-ai-to-create-viral-reels/

[9] Honda Motor Co., “Research on multi-agent generative AI systems, inspired by Honda’s unique Waigaya culture,” Honda Global Newsroom, 2024. [Online]. Available: https://global.honda/en/stories/171-2507-honda-generative-ai.html