

# GenSnap: An AI-driven System for Automated Image Generation and Social Media Scheduling

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**Abstract** - In today's digital era, building and maintaining a strong presence on social media has become increasingly important, but consistently producing and managing engaging content remains a major difficulty for users, particularly those who have limited time and resource. This paper introduces GenSnap, an AI-based application designed to simplify and streamline the process of content creation and posting by integrating image generation and automated scheduling into a unified platform. The system utilizes advanced models accessed through Hugging Face to generate visually appealing images from user-provided text prompts, enabling users to produce creative content quickly without requiring manual design skills or external tools.

In addition to image generation, GenSnap allows users to add customized captions and schedule posts for platforms such as Instagram and LinkedIn. This scheduling feature helps users maintain a consistent online presence without the need for continuous manual intervention. A built-in confirmation step ensures that users retain full control over the final content before it is published, thereby maintaining quality and relevance. The application is developed using Flask for backend processing, while SQLite is used for efficient data storage and management. It also incorporates automated scheduling mechanisms that execute posting tasks at user-defined times.

By combining AI-driven creativity with intelligent automation, GenSnap enhances efficiency, reduces workload, and supports consistent content delivery. The system is particularly beneficial for students, professionals, and small-scale content creators who aim to stay active on social media while balancing other responsibilities. Overall, the proposed solution demonstrates how integrating AI technologies can improve

productivity and effectiveness in modern social media management.

**Keywords** – AI-based application, image generation, automated scheduling, social media management.

## I. INTRODUCTION

In recent years, social media has become an essential platform for communication, branding, and content sharing. Individuals and organizations are expected to maintain a consistent online presence to remain relevant and engage their audience effectively. However, creating visually appealing content and posting it regularly requires time, creativity, and continuous efforts, which can be difficult for users managing multiple responsibilities.

With recent advancement in artificial intelligence, especially in text to image generation techniques, several aspects of content creation can now be automated with greater ease. Modern models like Stable Diffusion, available through platforms such as Hugging Face, allow users to generate high quality and visually rich image directly from simple text prompts. In parallel, social media platforms like Instagram and LinkedIn remain key channels for digital communication, interaction, and content sharing.

Despite the availability of separate tools for content generation and post scheduling, users often need to switch between multiple applications, which reduces efficiency and convenience. There is a need for a unified system that can streamline the entire workflow—from content creation to publishing—within a single platform.

To address this gap, this paper presents GenSnap, an AI-based application that integrates image generation, caption addition, and automated scheduling into a cohesive system. The application allows users to generate images from text prompts, schedule posts for future publishing, and maintain control through a confirmation step before posting. By combining these functionalities, GenSnap aims to reduce manual effort, improve consistency, and provide a practical solution for efficient social media content management.

## II. LITERATURE SURVEY

A study by S. Ramzan *et al.* [1] discussed a deep learning-based approach for generating images from textual descriptions. Their method integrates recurrent neural networks to interpret text and convolutional networks to produce corresponding images. When tested on the Oxford – 102 flowers dataset, the model was able to generate visually meaningful images with good alignment to the input text, showing improved performance in standard evaluation metrics such as inception score and PSNR. Their work highlights the potential of integrating natural language processing with computer vision to generate visually meaningful outputs from textual input. However, the approach primarily focuses on model performance and image quality, without addressing real-world application aspects such as user interaction, content management, or automated deployment. This limitation indicates a gap between advanced image generation techniques and their practical integration into user-oriented systems, which motivates the development of applications like GenSnap.

A study by Muhammad Bilal *et al.* [2] investigated how AI-based content automation influences user interaction on social media as well as overall marketing performance. Their research highlights how artificial intelligence is increasingly used to automate tasks such as content creation, scheduling, and personalization, leading to improved efficiency and higher engagement metrics like likes, shares, and reach. The findings indicate that AI-generated content positively influences brand visibility and overall marketing outcomes, while also reducing manual effort for users. However, the study also emphasizes certain challenges, including the risk of reduced creativity, over-reliance on automation, and potential loss of authenticity in content. These insights suggest that while AI-based automation enhances productivity and engagement, maintaining a balance between automated processes and human control is essential. This perspective supports the need for systems like GenSnap, which combine automation with user confirmation to ensure both efficiency and content reliability.

A study by Punna Ajay Kumar *et al.* [3] evaluated the role of generative AI tools, particularly Adobe Firefly, in social media marketing. The research highlights how generative AI enables users to create visually appealing content from simple text descriptions, thereby reducing the time and effort needed for content production. The study found that such tools are effective in generating creative visuals and backgrounds suitable for marketing purposes, thereby enhancing productivity and engagement. However, certain limitations were observed, including issues with text clarity in generated images and the need for additional editing before final use. The paper also discusses concerns related to copyright, authenticity, and the importance of transparency in AI-generated content. These findings suggest that while generative AI tools offer

strong support for content creation, human intervention remains necessary to refine outputs and ensure quality. This reinforces the relevance of systems like GenSnap, which combine automated generation with user control to achieve reliable and practical social media content creation.

Zhang *et al.* [4] provide an overview of recent advances in image generation based on text diffusion models, showing how these approaches have significantly improved image generation quality. The study explains that diffusion models work by gradually refining noisy data into meaningful images, allowing them to convert text descriptions into realistic visuals. It highlights that newer models such as DALL·E 2 as well as Stable Diffusion perform better than older techniques, offering clearer images and better alignment with the given input. The paper also touches on improvements that make these models more efficient, along with their expanding applications and the need to address challenges such as high computational cost and ethical concerns.

Reuter *et al.* [5] introduce a tool called Trial Promoter that automates the creation, sharing, and evaluation of social media content, especially in the context of health and research. The study points out that while social media can reach a wide and varied audience, managing and testing large volumes of content manually can be difficult, making automation an effective solution. To address this, the proposed system automates key processes such as message creation using templates, randomization of content elements (images, hashtags, and URLs), and multi-platform distribution across social media channels. The tool also enables systematic data collection and performance analysis of messages, ensuring reliable evaluation of communication strategies. The findings demonstrate that automation can significantly improve efficiency and consistency in social media-based campaigns while reducing human effort, making it a valuable approach for large-scale digital communication and research applications.

A recent survey by Yang *et al.* [6] provides a detailed overview of image generation and editing techniques, highlighting the rapid progress made in this area with the help of models like autoregressive methods, GANs and especially diffusion-based approaches. The study explains that modern systems use advanced mechanisms to convert text prompts into high-quality images with strong relevance to the input. It also notes that diffusion models have become the most effective due to their stability and better visual results. In addition, the paper briefly discusses extensions to image editing and other related tasks, along with current challenges and future research directions.

Yadav *et al.* [7] present a study on text-to-image generation through Generative Adversarial Network (GAN) approaches, where textual descriptions are transformed into corresponding visual outputs. The proposed approach enhances traditional GAN models by incorporating conditional inputs and improved training mechanisms to generate more relevant images. The system converts text into embeddings and combines them with starting from random noise to create images, while a discriminator checks how realistic they appear. The results show that the model can produce images that generally match the given text descriptions, although challenges related to fine details and training efficiency remain. This study emphasizes the growing importance of GAN-based methods in linking textual information with visual content generation.

Another study presents **AutoPostX**, [8] an AI-powered social media management system designed to automate content creation, scheduling, and cross-platform publishing. The system uses a modern full-stack architecture with a React.js frontend and a Python FastAPI backend, integrated with the Google Gemini API for generating context-aware captions based on uploaded media and input keywords. A key feature of this framework is its “single-click publishing” mechanism, which allows users to post content simultaneously across multiple platforms such as LinkedIn, Facebook, and Instagram, thereby reducing repetitive manual effort. The study also highlights a human-in-the-loop approval stage, ensuring that AI-generated content is reviewed before publishing to maintain quality and brand safety. Overall, the work demonstrates how combining generative AI with automated workflows can significantly improve efficiency, consistency, and scalability in social media marketing systems.

This study by Nagendra Kumar et al. [9] focuses on how posting time significantly affects content visibility and audience engagement on social media brand pages, especially Facebook. Based on a huge dataset consisting of approximately 3000,000 posts and 10 million user interactions, the authors show that most engagement happens within the first few hours of posting, with nearly 84% of reactions occurring within a day. They emphasize that factors like posting time, content type, and audience behaviour strongly influence likes, comments, and shares. The paper also proposes optimized posting schedules based on temporal and behavioural analysis, showing that strategic timing can greatly increase engagement compared to random posting. Overall, the work highlights the importance of data-driven scheduling in social media marketing, which aligns with AI-based automation systems used in modern content optimization.

Sadiku et al. [10] explain that Artificial Intelligence plays an important role in modern social media platforms by enabling automation in content recommendation, advertising, user behaviour analysis, and chatbots. The study shows that AI improves personalization and engagement by analysing user data and delivering targeted content through machine learning techniques. It also highlights that while AI greatly enhances marketing efficiency and user experience, challenges like privacy concerns and lack of skilled professionals still exist. Overall, the paper emphasizes that AI is transforming social media into a more intelligent and data-driven system, which supports the use of AI-based automation in digital marketing.

### III. METHODOLOGY

The proposed system, GenSnap, is an intelligent social media automation platform designed to simplify content creation and posting. Many users find it challenging to maintain a consistent presence on social media due to the time and effort required for designing content and publishing it regularly. The proposed system addresses this issue by integrating AI-based image generation with automated scheduling in a single unified platform.

The working of the system follows a simple and structured flow. Initially, the user registers and logs into the application, where proper validation ensures secure access. After successful login, the user provides a text prompt describing the desired image. This input is processed by the backend, which generates a relevant image using an AI model and displays it to the user.

Once the image is generated, the user can add a caption based on their requirement. The system then provides two options: either post the content immediately or schedule it for a later time. Before final publishing, a confirmation step is included to allow the user to review the content and avoid unintended actions. If the scheduling option is selected, the post details are stored in the database, and the system automatically publishes the content at the specified time using a background scheduler.

Furthermore, the system includes a dashboard that allows users to view previously generated images and monitor the status of their posts, such as scheduled or published. Overall, the proposed system reduces manual effort, improves efficiency, and enables users to maintain an active and consistent social media presence with minimal intervention.

As shown in Fig. 1, the proposed GenSnap system follows a structured workflow that enables seamless interaction between the user, the AI model, and the backend services. The system flow begins with user authentication, where a new user can register or an existing user can access the system by entering valid credentials, and once authentication is verified, access is granted to the main dashboard of the application.

After logging in, the user is allowed to enter a text prompt describing the image they wish to generate. This prompt is sent to the backend system, where it is processed and forwarded to the Hugging Face Stable Diffusion XL model. The AI model creates a matching image from the given description, and the output is returned to the application and displayed to the user.

Once the image is generated, the user is provided with options to either add a custom caption and post immediately or schedule the post for a later time. If the user chooses to post immediately, the system asks for final confirmation before publishing the content to Instagram. Upon confirmation, the image along with the caption is uploaded, and the status is updated as “Posted”.

If the user chooses to schedule the post, the selected date and time are stored in the database. The scheduling module continuously monitors these entries and triggers execution at the specified time. Even in the scheduling workflow, the system requests user confirmation before final posting to ensure controlled content publishing. After successful execution, the post status is updated to “Posted”.

The system also maintains a history of all generated images, captions, and post statuses, allowing users to view previously created content. This ensures better tracking and management of all user activities within the application. The complete workflow of the system is shown in Figure 1.

The described flow ensures that all system components work in a coordinated manner, enabling smooth transitions between user input, AI-based processing, and content publishing. It also helps in maintaining efficiency by automating repetitive tasks such as image generation and scheduling, while still keeping the user in control through confirmation steps. This structured flow improves usability and ensures that the system operates in a reliable and user-friendly manner for managing social media content creation and posting.

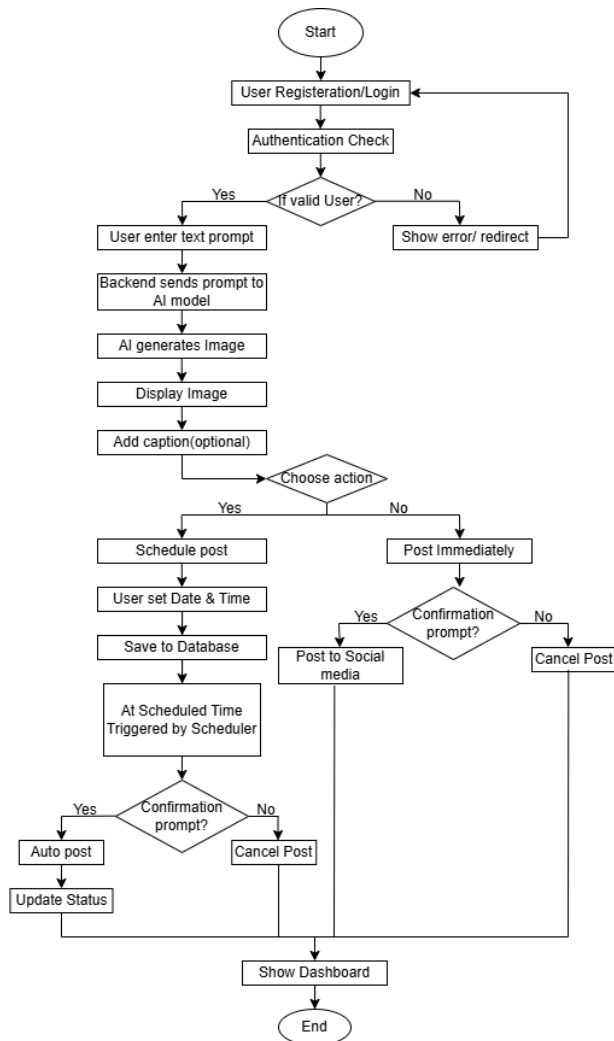


Figure 1. Flowchart

### A. System Architecture

The system is designed using a modular multi-layer architecture that integrates the front-end, back-end, database, scheduling service, and external AI APIs. This layered design ensures separation of concerns and enables smooth interaction between different components of the application. The complete system architecture is presented in Figure 2.

The frontend layer acts as the interface through which users interact with the system. It enables users to register, log in, enter text prompts, generate images, and manage scheduling options. It also displays generated images and post status updates, ensuring a smooth and interactive user experience.

The backend layer is developed using Flask and serves as the core processing component of the system, managing tasks such as user authentication, processes image generation requests, manages scheduling operations, and controls Instagram posting functionality. It also coordinates communication between the frontend, database, and external AI services. The system integrates an external AI service using the Hugging Face API, where the Stable Diffusion XL

model is utilized for generating images from text descriptions. The backend sends the user prompt to the model and receives a generated image as output, which is then stored and displayed to the user.

A scheduling module using APScheduler runs in the background and manages time-based post execution. It continuously monitors scheduled tasks stored in the database and triggers the posting process at the specified time. Before execution, user confirmation is requested to ensure controlled posting.

The database layer is implemented using SQLite and stores all essential information such as user credentials, prompts, captions, generated image paths, schedule times, and post status. This ensures proper data management and retrieval throughout the system.

Finally, the Instagram automation module handles posting of generated content. It logs into the user's account, uploads the image, attaches captions, and updates the status in the database once the post is successfully published.

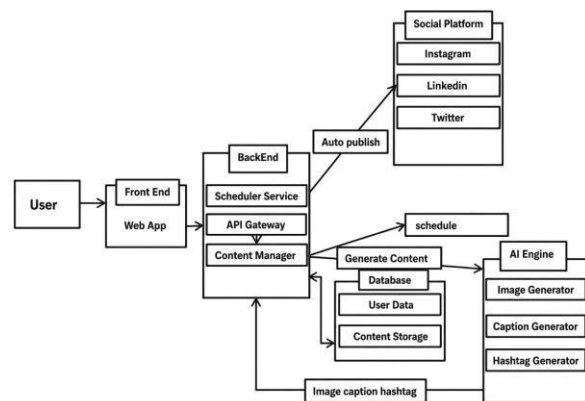


Figure 2. System Architecture

### B. Modules and Algorithms Used

The GenSnap system is implemented using a modular design, where each module is responsible for a specific functionality. The system also integrates multiple algorithms that support image generation, authentication, scheduling, and automated posting. This modular approach improves maintainability, scalability, and ease of development.

The system is divided into five main modules, each playing a role in the proper functioning of the application.

The **User Authentication Module** handles user registration and login by checking the entered credentials against the data stored in the database. Passwords are securely hashed before storage, ensuring basic security during authentication. Access is restricted to authenticated users only.

The **Image Generation Module** handles the conversion of text prompts into images using an AI model. The user input is sent to the Hugging Face Stable Diffusion XL model, which generates a high-quality image based on the given description.

The generated image is then returned and displayed to the user.

The **Instagram Posting Module** manages the uploading of generated images to Instagram. It uses an automation-based approach to log in to the user account, attach captions, and publish the image. Before posting, the system asks for user confirmation to ensure controlled publishing of content.

The **Scheduling Module** enables users to schedule posts for future dates and times. The selected schedule is stored in the database and monitored by a background scheduler. At the scheduled, the system triggers the posting process automatically after user confirmation.

The **Database Management Module** is responsible for storing and managing all system data. This includes user credentials, prompts, generated image paths, captions, scheduling details, and post status. It ensures proper data organization and retrieval throughout the system lifecycle.

The GenSnap system uses a combination of simple yet effective algorithms to support its core functionalities.

The **Text-to-Image (T2I) Generation Algorithm** is based on the Stable Diffusion pipeline. It converts the user's text prompt into embeddings and gradually transforms random noise into a coherent and meaningful image guided by the input description. This diffusion-based process results in high-quality image generation.

The **Authentication Algorithm** uses a hash-based verification mechanism. User passwords are securely stored by converting them into hash values using SHA-256. During login, the entered password is hashed in the same way and then matched with the stored hash to verify the user's identity.

The **Scheduling Algorithm** operates using a time-based trigger mechanism. The system continuously checks scheduled tasks stored in the database and executes the corresponding function when the current time matches the scheduled time. Before execution, user confirmation is requested to ensure safe posting.

The **Posting Algorithm** automates the process of uploading content to Instagram. It includes logging into the platform, formatting the image, attaching captions, and publishing the post. This process can be executed either immediately or through the scheduling system.

#### IV. RESULT

The proposed system, GenSnap, was implemented and tested to evaluate its ability to generate AI-based images and automate social media posting with scheduling and user confirmation. The results indicate that the system successfully integrates image generation, scheduling, and automated posting into a unified workflow.

To assess the performance and usability of the system, a set of functional tests were conducted on each module of the application. The system was tested for image generation accuracy, scheduling reliability, and successful automated posting to social media platforms. The following figures present the key interfaces and outputs of the system, demonstrating its working at different stages of the workflow.

Overall, the testing confirms that the application provides a reliable and user-friendly experience for automated content creation and posting.

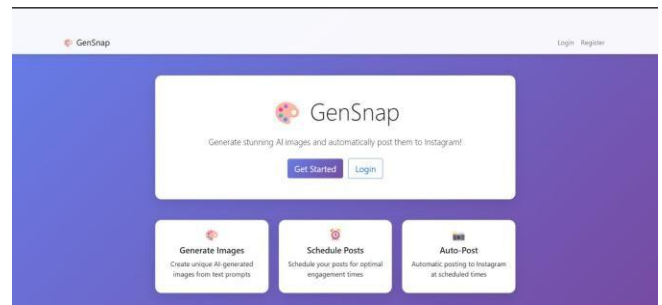


Figure 3. GenSnap Landing Page Interface

This figure illustrates the landing page of the GenSnap application, which provides an overview of the system's core functionalities. The interface presents options such as image generation, post scheduling, and automated posting. The design ensures ease of navigation with clear call-to-action buttons like "Get Started" and "Login." This confirms that the system offers a user-friendly entry point for new and existing users, thereby improving accessibility and usability.

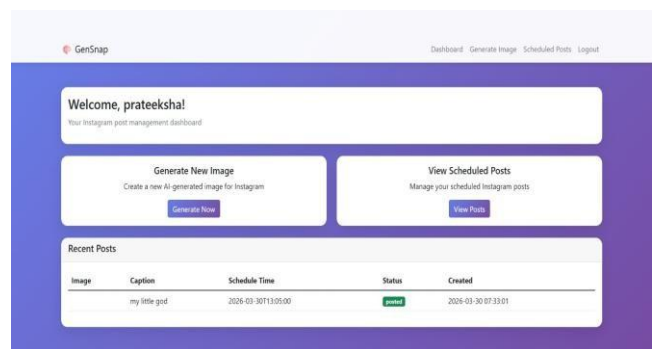


Figure 4. User Dashboard for Post Management

This figure illustrates the user dashboard after successful login. It displays key functionalities, including generating new images and viewing scheduled posts. Additionally, a table of recent posts is shown with attributes such as caption, schedule time, status, and creation timestamp. The presence of status indicators like "posted" confirms that the system can track and update post execution in real time. This demonstrates the system's capability to manage user activities efficiently.

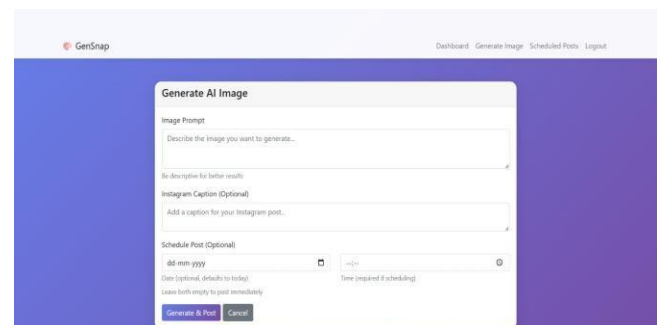


Figure 5. AI Image Generation and Scheduling Interface

This figure illustrates the core module of the system where users input text prompts to generate AI images. The interface allows users to optionally add captions and schedule posts by specifying date and time. The option to either post immediately or schedule for later highlights the flexibility of the system.

This confirms that the integration between AI-based image generation and scheduling mechanisms is functioning as intended.

Image	Caption	Schedule Time	Status	Created
	#shiva #dance #mandava	2026-04-01T11:25:00	pending	2026-04-01 05:53:07
	my little god	2026-03-30T13:05:00	posted	2026-03-30 07:33:01

Figure 6. Scheduled and Posted Content Tracking

This figure illustrates the tracking of recent posts with different statuses such as “pending” and “posted.” This indicates that the scheduling feature is working correctly, where posts are queued and executed at the specified time. The system maintains a structured log of all activities, ensuring transparency and reliability in post management.

demonstrates reliability, usability, and efficiency in handling end-to-end social media content automation.

## V. CONCLUSION

This work presents an integrated approach that combines AI-based image generation with automated social media content management. By leveraging the Stable Diffusion XL model for converting text prompts into images and integrating scheduling and posting automation, the system simplifies the process of creating and managing social media content in a single platform.

The implementation helps reduce the manual effort involved in designing posts and ensures consistent online activity through scheduled publishing. The inclusion of a user confirmation step before posting provides better control over content publication and helps prevent unintended uploads. Furthermore, the use of a structured database enables efficient storage and tracking of user inputs, generated images, captions, and post statuses.

Overall, the system demonstrates how artificial intelligence and automation can be effectively combined to enhance productivity in social media management. It is particularly useful for users who want to maintain an active online presence without continuous manual involvement. Future improvements can focus on deploying the application on cloud platforms, integrating official social media APIs, and enhancing image customization features for a more advanced user experience.

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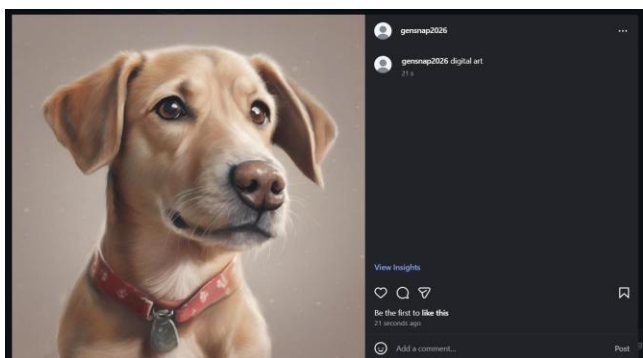
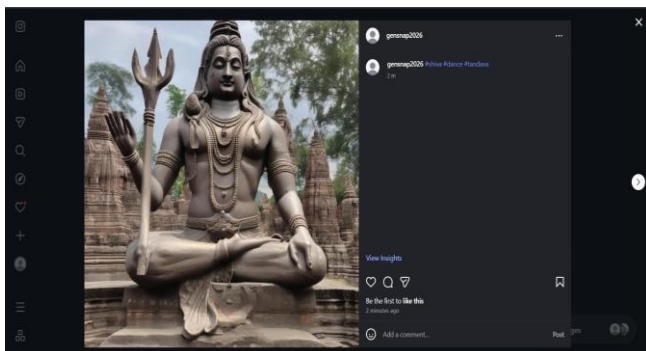


Figure 7. Automated Instagram Posting Output

This figure illustrates the final output of the system where the generated image is successfully posted on Instagram along with the user-defined caption. The example illustrates that the system is capable of generating visually coherent images from prompts and publishing them on social media platforms. The presence of the caption and timestamp confirms that the automation pipeline—from generation to posting—is executed successfully.

Overall, the results confirm that the system can successfully automate AI-based content creation and social media scheduling. The integration of user confirmation before posting enhances control and prevents unintended uploads. The system

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