



# International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

*(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)*



**Impact Factor: 8.699**

**Volume 15, Issue 3, March 2026**

# **Gemini Historical Artifact Description**

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**ABSTRACT:** This paper presents an intelligent system for historical artifact analysis using the advanced multimodal capabilities of the Gemini API. The proposed system enables users to upload images of historical artifacts along with optional textual inputs, allowing the model to perform comprehensive analysis by integrating both visual and textual data. The system generates structured outputs that include detailed descriptions such as origin, historical period, material composition, cultural significance, and functional usage. By leveraging artificial intelligence, this approach reduces dependency on manual research and provides quick, reliable insights into artifacts, making it valuable for students, researchers, and historians. Furthermore, the system is designed with a user-friendly interface that ensures accessibility for non-experts while maintaining high-quality analytical output. The integration of multimodal understanding enhances accuracy and contextual relevance, enabling deeper interpretation compared to traditional methods. This project demonstrates the potential of AI in the field of digital heritage preservation and education by bridging the gap between technology and historical studies. The proposed solution contributes to modernizing artifact analysis and opens new possibilities for interactive learning and automated documentation in the domain of cultural heritage. The system is implemented using Python along with modern tools such as Streamlit for the user interface and various supporting libraries for image processing and API communication. The workflow begins with user input, including artifact name, image upload, and desired word count, after which the image is processed and sent to the Gemini API for analysis and content generation. The results are displayed in a structured and readable format, ensuring smooth interaction between system components. In addition, the system provides flexibility by allowing users to customize the output based on their requirements, enabling both short summaries and detailed explanations. The application is designed to deliver fast responses and maintain efficiency, making it suitable for academic projects, research work, and self-learning. However, the performance of the system depends on factors such as image quality and internet connectivity, where high-quality inputs result in more accurate outputs. Despite these limitations, the system performs effectively in most scenarios and highlights the importance of integrating artificial intelligence in educational tools, demonstrating a practical approach to simplifying historical artifact analysis.

The proposed system also emphasizes scalability and adaptability, allowing it to be extended for various domains beyond historical artifacts. By integrating advanced AI models and improving data handling techniques, the system can be enhanced to support a wider range of objects and complex queries. The modular design ensures easy updates and maintenance, making it suitable for future technological advancements. This approach not only improves efficiency but also promotes the use of intelligent systems in digital learning environments. Overall, the project showcases how modern AI technologies can be effectively utilized to create smart, interactive, and user-centric applications. The system also ensures a smooth and efficient user experience by combining simplicity with powerful backend processing. It reduces the complexity of understanding historical artifacts and makes information easily accessible to users. With continuous improvements, the system can become more intelligent and reliable. This project highlights the growing importance of AI in transforming traditional learning methods into modern, technology-driven solutions.

## **I. INTRODUCTION**

The Gemini Historical Artifact Description System is an AI-based project designed to identify and describe historical artifacts from images. In today's digital world, understanding history can be made easier with the help of technology. This project allows users to upload an image of an artifact and receive detailed information instantly. It reduces the

need for manual research and provides quick results. The system uses modern tools to make learning more interactive. It is especially useful for students and history enthusiasts.

Historical artifacts play an important role in understanding past cultures and civilizations. However, identifying and learning about these artifacts can be difficult without proper knowledge or resources. Many people depend on books or online searches, which can take a lot of time. This project solves that problem by using artificial intelligence. It automatically analyzes images and provides meaningful descriptions. This makes learning faster and more efficient.

The core idea of this project is to combine image processing and AI-based text generation. The system uses advanced technologies to understand the visual features of an artifact. After analyzing the image, it generates information such as origin, material, cultural significance, and usage. This helps users get a complete understanding of the artifact. The process is simple and user-friendly. It makes complex information easy to understand.

To build this project, we used Python as the main programming language. Streamlit is used to create a simple and interactive web interface. The Gemini API is used for generating intelligent descriptions based on the uploaded image. Pillow is used for handling image processing tasks. Requests help in sending data to the API, and dot env is used to manage environment variables securely. These technologies work together to create an efficient system.

The system follows a simple workflow starting from image upload to result display. When a user uploads an image, it is first processed using image handling techniques. Then, the processed image is sent to the Gemini API for analysis. The API generates a detailed description based on the input. Finally, the result is displayed on the screen using Streamlit. This smooth workflow ensures fast and accurate outputs. It improves the overall user experience.

## II. LITERATURE SURVEY

In recent years, significant research has been conducted on the application of Artificial Intelligence in automated text generation. Generative AI models, particularly GPT and other transformer-based architectures, have demonstrated remarkable progress in producing human-like, coherent, and context-aware textual content. These models are increasingly being utilized across various domains, including content creation, conversational chatbots, and educational platforms. Studies indicate that such AI-driven approaches not only reduce manual effort but also enhance efficiency when generating large volumes of textual data.

In the field of history and education, digital platforms and knowledge-based systems have been developed to provide structured information about historical artifacts and events. However, traditional systems predominantly rely on static databases and pre-written content, which require continuous manual updates and often lack personalization. Although some modern applications have begun integrating AI to generate dynamic content, they frequently fall short in offering user control over the level of detail and customization of the output.

With the advancement of web technologies such as Streamlit and API-based integrations, the development of interactive AI-powered applications has become more accessible. Platforms like Open Router and various generative AI APIs allow developers to leverage powerful language models without the need to build complex systems from scratch. Despite these advancements, there remains a clear need for simple, user-friendly applications that combine real-time AI-generated content with flexible customization options.

The proposed system aims to address this gap by providing an efficient and adaptable solution for generating detailed descriptions of historical artifacts. It focuses on delivering personalized, context-aware outputs while allowing users to control the level of detail, thereby enhancing both usability and user experience.

## III. METHODOLOGY

The methodology of the Gemini Historical Artifact Description System explains the step-by-step process used to develop and implement the project.

### 1. Image Input:

The process starts when the user uploads an image of a historical artifact through the Streamlit web interface. The interface is designed to be simple and user-friendly so that anyone can easily upload an image without technical knowledge. This step acts as the input stage of the system.

### 2. Image Processing:

Once the image is uploaded, it is processed using the Pillow library in Python. This step ensures that the image is in the correct format and size before sending it to the AI model. Image preprocessing helps in improving the quality of input, which leads to better output generation.

### 3. API Integration:

After processing the image, it is sent to the Gemini API using the Requests library. The API acts as the core component of the system, where the image is analyzed using advanced AI models. The API request includes the image data and necessary parameters for generating the description.

### 4. AI-Based Content Generation:

The Gemini API processes the image and generates a detailed description of the artifact. The output may include information such as origin, material, historical importance, and usage. This step uses generative AI techniques to produce human-like and meaningful content.

### 5. Output Display:

The generated description is then displayed on the Streamlit interface. The user can view the result instantly after uploading the image. This step ensures smooth interaction and provides a clear and readable output for the user.

### 6. Secure Configuration Management:

To protect sensitive information like API keys, the dotenv library is used. It stores configuration details securely in environment variables. This improves the security and maintainability of the application.

### 7. Overall Workflow:

The complete system follows a simple flow:

User uploads image → Image is processed → Data sent to Gemini API → AI generates description → Output displayed to user.

This structured methodology ensures efficient performance and easy usability of the system..

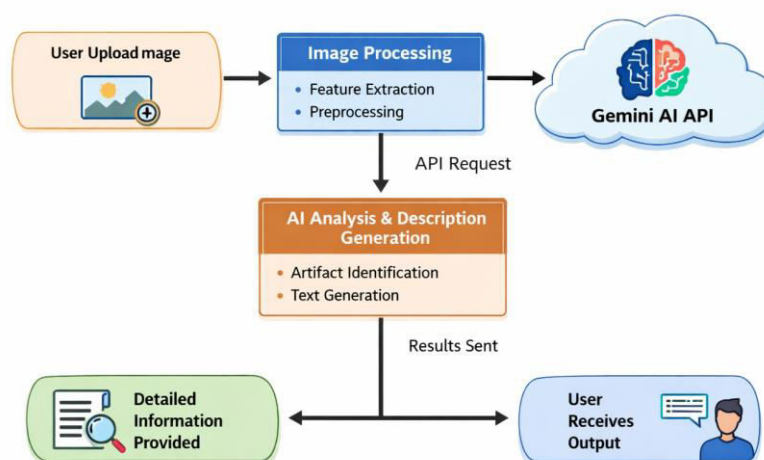


Fig. 2. Workflow of Proposed System

#### IV. RESULT AND WORK

The proposed system was successfully implemented and tested using different historical artifact images. The user first enters the artifact name and selects the desired word count for the description. Then, the user uploads an image through the interface and clicks on the “Generate Description” button. The system processes the input image and sends it to the Gemini API for analysis. Within a short time, the system generates a detailed and meaningful description based on the given inputs. The output is displayed clearly on the screen.

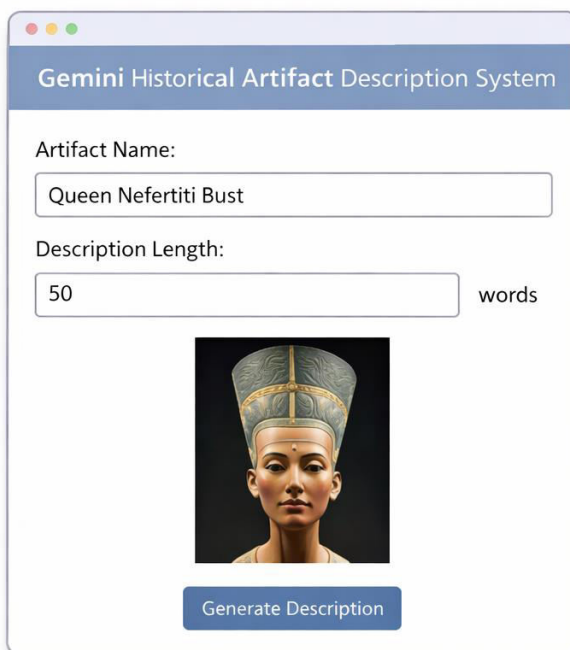


Fig. 3 Input Image Upload and Description Generation 



Fig. 4. Generated Output Description

#### V. FUTURE WORK

Future improvements can include voice input and audio output features. Users can speak instead of typing and listen to the generated

The system can be enhanced by adding support for multiple languages. This will help users from different regions to understand artifact descriptions in their preferred language. It will make the system more accessible and user-friendly. description. will improve user experience and make the system more interactive.

The accuracy of the system can be improved by using advanced AI models and better image processing techniques. This will help in generating more precise and detailed descriptions, even for complex artifacts.

A mobile application can be developed for this system in the future. This will allow users to access the application anytime and anywhere. It will increase usability and make the system more convenient.

## VI. CONCLUSION

In this project, we successfully developed the Gemini Historical Artifact Description System using Artificial Intelligence. The system allows users to upload an image of a historical artifact and generate a meaningful description instantly. It reduces manual effort and provides quick and accurate information. The integration of technologies like Python, stream lit, and Gemini API helped in building an efficient and user-friendly application.

Overall, the system proves to be a useful tool for students, researchers, and history learners. It simplifies the process of understanding historical artifacts and makes learning more interactive. Although there are some limitations, the system performs effectively and delivers good results. With further improvements, this project has the potential to become a powerful educational and research tool in the future.

## VII. ACKNOWLEDGEMENT

We would like to express our sincere gratitude to our guide Mr. Ananda Babu, Assistant Professor, for his valuable guidance, support, and encouragement throughout the development of this project. His suggestions and continuous motivation helped us to complete this work successfully.

We also thank our department and institution for providing the necessary resources and support. Finally, we express our gratitude to our friends and family members for their constant encouragement and support during the completion of this project.

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