Gemini Historical Artifact

1. INTRODUCTION

1.1. Project Overview

Gemini Historical Artifact is an AI-enabled web application developed to generate comprehensive and structured descriptions of historical artifacts using Google's Generative AI technology. The application allows users to enter the name of a historical artifact, monument, manuscript, or historical period and specify the required word count for the generated content. Based on this input, the system produces an informative and well-organized description within seconds.

The primary goal of this project is to simplify the process of creating historical content for students, researchers, museum professionals, and history enthusiasts. Traditionally, preparing detailed descriptions of artifacts requires extensive research, careful structuring, and time-consuming writing. This application automates that process through artificial intelligence.

The system is implemented using Python and Streamlit for the front-end interface, while the Gemini Generative AI model is integrated through an API for dynamic content generation. During processing, the application also presents an interesting historical fact to enhance user engagement.

Overall, the Gemini Historical Artifact project demonstrates the practical implementation of generative AI in the field of digital humanities by providing a fast, structured, and user-friendly solution for automated historical content generation.

1.2. Objectives

The major objectives of the Gemini Historical Artifact project are:

- To design and develop a web-based application that generates historical artifact descriptions using artificial intelligence

- To enable users to input artifact names or historical topics and receive structured content
- To allow customization of description length through user-defined word count
- To minimize the time required for researching and writing historical content manually
- To integrate Google Gemini Generative AI for efficient and reliable text generation
- To provide an intuitive and easy-to-use user interface using Streamlit
- To improve user engagement by displaying interesting historical facts during content generation
- To create a scalable system that can be deployed online for broader accessibility

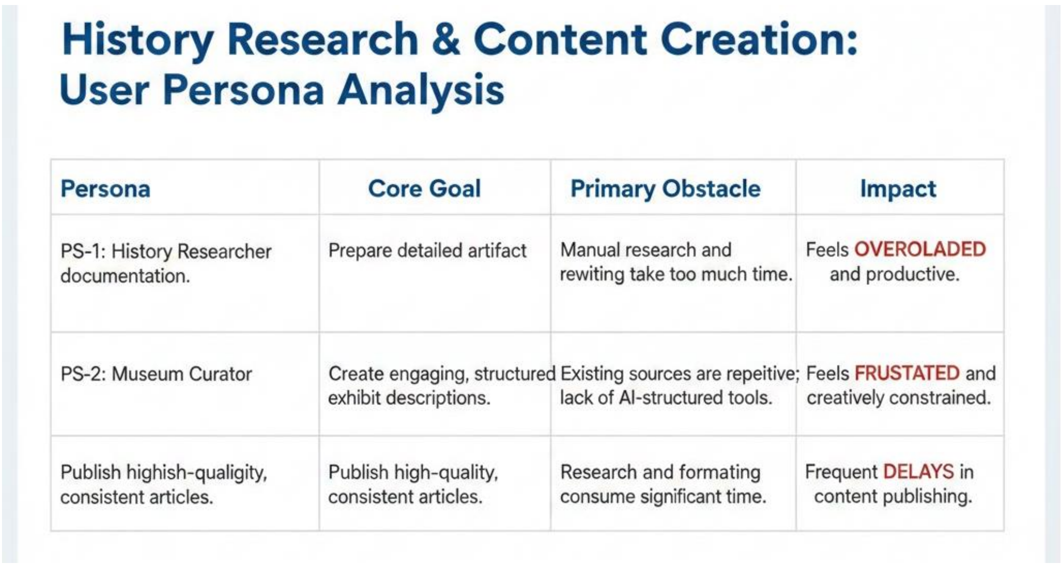
2. Ideation Phase

2.1. Problem Statement

In academic and cultural institutions, creating detailed descriptions of historical artifacts requires significant research effort, writing skill, and formatting precision. Students and researchers often spend hours gathering information from multiple sources before compiling structured content. Additionally, many online resources provide generic or incomplete descriptions that may not meet specific academic or professional requirements.

This leads to reduced productivity, repetitive work, and difficulty in maintaining consistency across multiple descriptions. There is a need for an intelligent system that can automatically gener ate accurate and structured historical descriptions based on user input.

The Gemini Historical Artifact application addresses this issue by using a generative AI model to instantly produce detailed and customized artifact descriptions tailored to the required word count.



History Research & Content Creation: User Persona Analysis

Persona	Core Goal	Primary Obstacle	Impact
PS-1: History Researcher documentation.	Prepare detailed artifact	Manual research and rewiting take too much time.	Feels **OVEROLADED** and productive.
PS-2: Museum Curator	Create engaging, structured exhibit descriptions.	Existing sources are repeitive; lack of AI-structured tools.	Feels **FRUSTATED** and creatively constrained.
Publish highish-qualigity, consistent articles.	Publish high-quality, consistent articles.	Research and formating consume significant time.	Frequent **DELAYS** in content publishing.

2.2. Empathy Map Canvas

Empathy Map Canvas:

An empathy map is a visualization tool used to understand user behavior, expectations, and challenges. It helps in identifying what users think, feel, say, and do while interacting with a system.

For the Gemini Historical Artifact application, the empathy map focuses on understanding students, historians, and cultural professionals who require structured historical information.

User Perspective:

Thinks:

- “I need reliable and structured historical information.”
- “Researching from multiple websites is time-consuming.”

Feels:

- Pressured by deadlines
- Overwhelmed by lengthy research processes

Says:

- “I wish I had a tool that generates historical content instantly.”

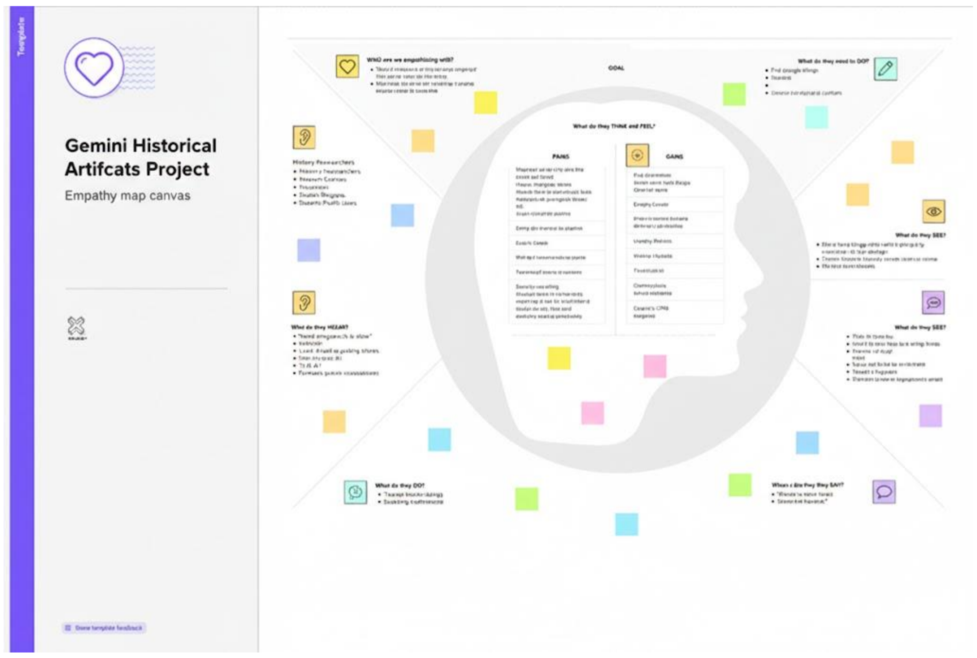
- "I need well-organized descriptions for academic or exhibition purposes."

Does:

- Searches online for artifact details
- Copies and edits information manually
- Spends time formatting content

By understanding these behaviors, the solution was designed to provide automated, structured, and customizable historical descriptions.

Example:



2.3 Brainstorming

Brainstorm & Idea Prioritization:

The brainstorming phase involved identifying multiple ways to apply generative AI in the historical domain. The team discussed several potential ideas including:

- AI-based historical chatbot
- Virtual museum guide system
- Image-based artifact recognition
- Automated historical content generator

- AI-powered timeline generator

After evaluating feasibility, development complexity, and implementation time, the team selected the concept of an AI-based artifact description generator as it provided:

- Clear problem definition
- Achievable scope
- Strong academic relevance
- Practical real-world application

Brainstorming Steps

Step 1: Problem Identification
Identified challenges in manual historical documentation and content writing.

Step 2: Idea Listing and Grouping
Generated multiple AI-related ideas and grouped them based on feasibility and impact.

Step 3: Idea Prioritization
Selected the historical artifact description generator based on practicality, innovation level, and technical viability.

3. Requirement Analysis

3.1. Solution Requirement

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Artifact Input Module	Enter artifact name / historical period & select word count
FR-2	Input Validation	Validate empty input & check word count limits

FR-3	AI Integration	Connect to Gemini Generative AI API and send structured prompt
FR-4	Description Generation	Generate structured historical artifact description
FR-5	Output Display	Display generated content in web interface
FR-6	Engagement Feature	Display an interesting historical fact during generation

Non-functional Requirements:

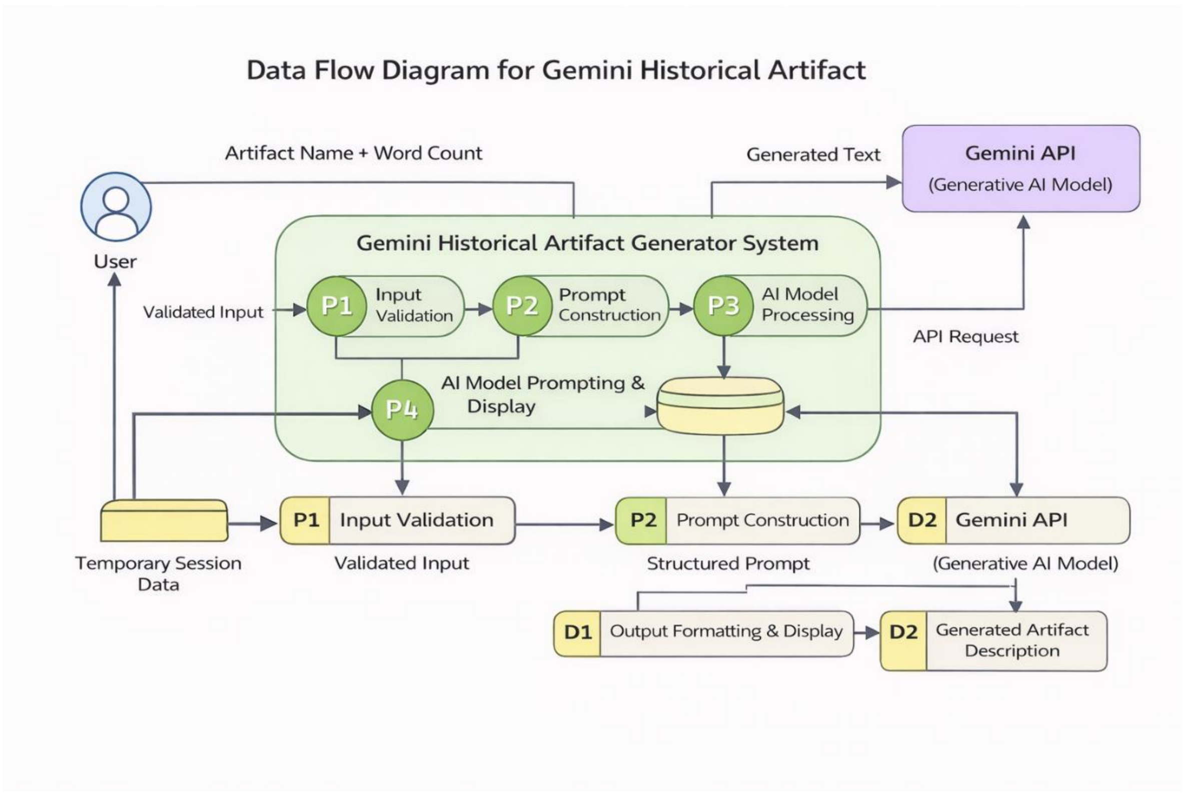
Following are the non-functional requirements of the proposed solution.

NFR No.	**Non-Functional Requirement**	**Description**
NFR-1	Usability	The interface must be simple and intuitive for all types of users
NFR-2	Security	API keys must be securely stored using environment variables
NFR-3	Reliability	The system must generate structured and relevant descriptions for valid inputs
NFR-4	Performance	Description generation should complete within a few seconds
NFR-5	Availability	The application must be accessible when deployed online
NFR-6	Scalability	The system should handle multiple user requests efficiently

3.2. Data Flow Diagram

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



User Stories

User Type	Functional Requirement	User Story No	User Story	Acceptance Criteria	Priority	Release
Student / Researcher	User Interface Setup	USN-1	As a user, I want to enter an artifact name and word count easily.	I can access and input data successfully	High	Sprint-1
Administrator	Input Validation	USN-2	As a user, I want input validation before generation.	System prevents invalid inputs	High	Sprint-1
Research Professional	AI Integration	USN-3	As a user, I want the system to generate artifact descriptions using Gemini AI.	AI generates structured content	High	Sprint-2
Student	Historical Fact Feature	USN-4	As a user, I want to see an interesting historical fact while content loads.	Fact appears during processing	Medium	Sprint-2

User Type	Functional Requirement	User Story No	User Story	Acceptance Criteria	Priority	Release
All Users	Output Display	USN-5	As a user, I want to view the generated description clearly.	Output displayed properly in UI	High	Sprint-3
Administrator	Deployment	USN-6	As a user, I want the system deployed online.	Application accessible via browser	Medium	Sprint-3

3.3. Technology Stack

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1	User Interface	Web interface for entering artifact details	Streamlit (Python Framework)
2	Application Logic-1	Input validation and prompt construction	Python
3	Application Logic-2	AI API request handling and response processing	Google Generative AI API
4	Application Logic-3	Output formatting and structured display	Python
5	File Storage	Local storage for source code and logs	Local File System
6	External API	Generative AI service for description generation	Gemini Generative AI Model
7	Machine Learning Model	Pre-trained large language model	Gemini Model
8	Infrastructure	Application hosting and deployment	Streamlit Cloud / Local Hosting

Table-2: Application Characteristics:

S.No	Component	Description	Technology
1	User Interface	Web interface for entering artifact details	Streamlit (Python Framework)
2	Application Logic-1	Input validation and prompt construction	Python
3	Application Logic-2	AI API request handling and response processing	Google Generative AI API
4	Application Logic-3	Output formatting and structured display	Python
5	File Storage	Local storage for source code and logs	Local File System

4. PROJECT DESIGN

4.1. Problem Solution Fit

Problem – Solution Fit Template:

Problem–solution fit ensures that the developed system directly addresses the real challenges faced by users. Many students, historians, and researchers require detailed historical information for academic writing, museum documentation, and content creation. However, collecting and organizing this information manually requires significant time and effort.

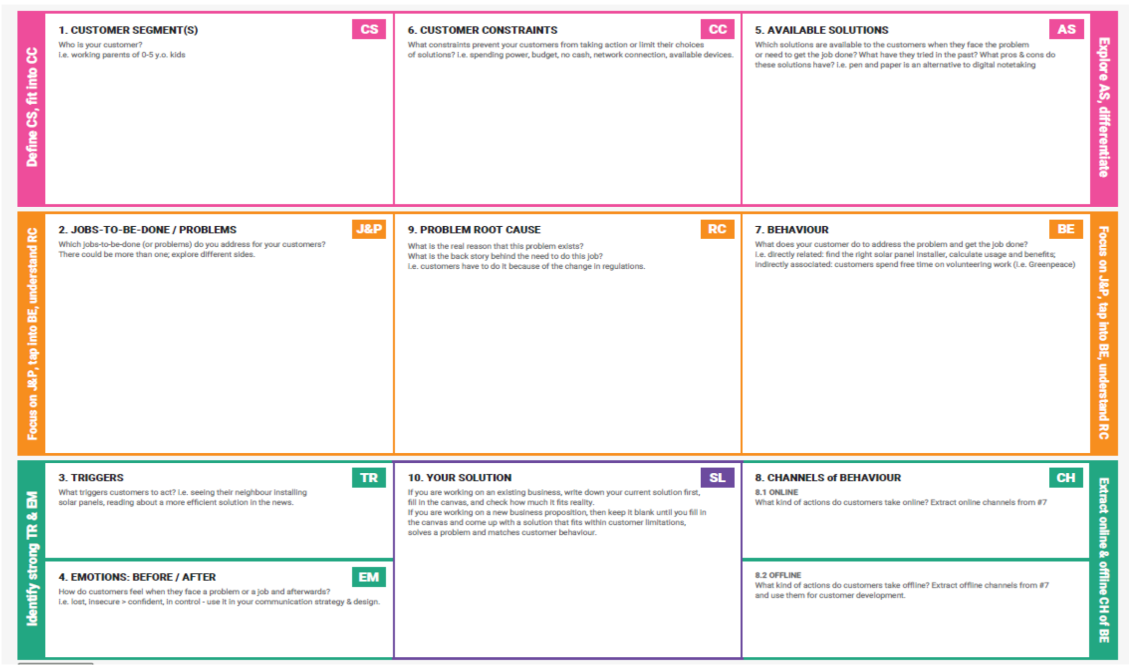
The Gemini Historical Artifact system addresses this issue by providing an automated platform that generates structured descriptions instantly using generative AI. The solution aligns with user needs by offering customizable content length, accurate information flow, and quick generation time.

Purpose of Problem–Solution Fit

- To address difficulties in manual historical content creation
- To provide fast and structured artifact descriptions
- To improve productivity for students and researchers
- To enhance user experience through automation
- To provide easily accessible historical information

The proposed system effectively matches user requirements by delivering automated, reliable, and structured historical descriptions based on user input.

Template:



Define CS, fit into CC	**1. CUSTOMER SEGMENT(S)** CS Who is your customer? i.e. working parents of 0-5 y.o. kids	**6. CUSTOMER CONSTRAINTS** CC What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.	**5. AVAILABLE SOLUTIONS** AS Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking	Explore AS, differentiate
Focus on J&P, tap into BE, understand RC	**2. JOBS-TO-BE-DONE / PROBLEMS** J&P Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.	**9. PROBLEM ROOT CAUSE** RC What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations.	**7. BEHAVIOUR** BE What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)	Focus on J&P, tap into BE, understand RC
Identify strong TR & EM	**3. TRIGGERS** TR What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news. **4. EMOTIONS: BEFORE / AFTER** EM How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure > confident, in control - use it in your communication strategy & design.	**10. YOUR SOLUTION** SL If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.	**8. CHANNELS of BEHAVIOUR** CH **8.1 ONLINE** What kind of actions do customers take online? Extract online channels from #7 **8.2 OFFLINE** What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.	Extract online & offline CH of BE

4.2. Proposed Solution

Proposed Solution Template:

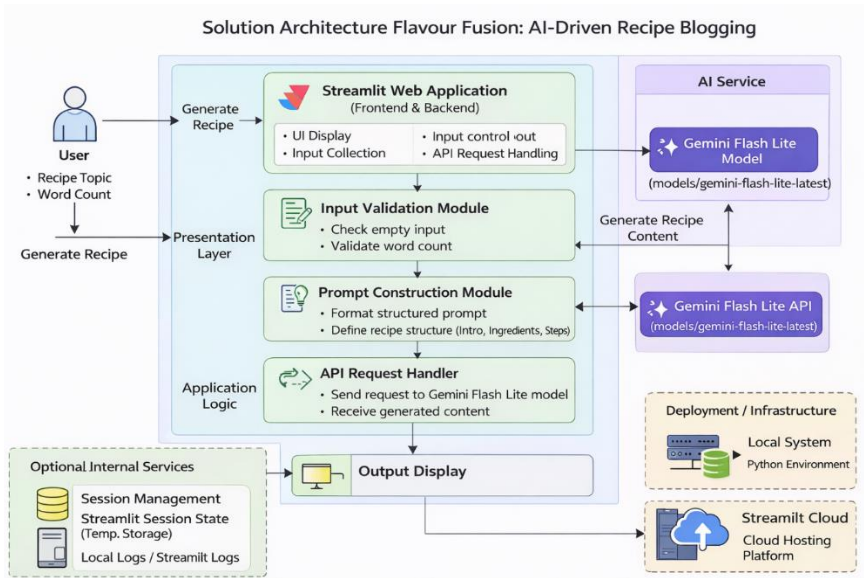
Project team shall fill the following information in the proposed solution template.

S.No	Parameter	Description
1	Problem Statement	Students, researchers, and historians often spend excessive time researching and writing detailed descriptions of historical artifacts. Manual documentation requires effort, consistency, and proper formatting. There is a need for an automated system that can generate structured historical descriptions quickly.
2	Idea / Solution Description	Gemini Historical Artifact is an AI-powered web application that generates detailed descriptions of historical artifacts based on user input. Users enter an artifact name or historical topic and specify word count. The system uses Gemini Generative AI to produce structured and informative content instantly through a Streamlit-based interface.
3	Novelty / Uniqueness	Unlike traditional history websites that provide static content, this system dynamically generates customized descriptions in real time. Users can control the word count and receive unique, structured content instantly.
4	Social Impact / Customer Satisfaction	The application supports students, educators, historians, and bloggers by reducing research time and improving productivity. It provides quick access to structured historical information, enhancing learning and content creation.
5	Business Model	The system can be expanded using a freemium model where basic description generation is free and advanced features such as multi-language support, image generation, and premium templates are available through subscription.
6	Scalability	The application can be deployed on cloud platforms and scaled to handle multiple users. Additional features such as user accounts, database storage, and artifact image recognition can be integrated in future versions.

4.3 Solution Architecture

Solution Architecture:

The solution architecture of Flavour Fusion consists of a Streamlit-based web application that collects user inputs and validates them. The application constructs a structured prompt and sends it to the Gemini Flash Lite generative AI model through an API call. The AI model generates a structured recipe blog, which is then formatted and displayed to the user. The system can be deployed locally or on a cloud platform such as Streamlit Cloud.



5. PROJECT PLANNING & SCHEDULING

5.1. Project Planning

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	**Functional Requirement**	**User Story No**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**
Sprint-1	UI Development	USN-1	Develop Streamlit interface for input	2	High	All members
Sprint-1	Input Validation	USN-2	Validate artifact name and word count	1	High	All members
Sprint-2	AI Integration	USN-3	Integrate Gemini API for description generation	3	High	All members

Sprint	Functional Requirement	User Story No	User Story / Task	Story Points	Priority	Team Members
Sprint-2	Historical Fact Feature	USN-4	Display random historical fact during generation	1	Medium	All members
Sprint-3	Output Display	USN-5	Display generated description clearly	2	High	All members
Sprint-3	Deployment	USN-6	Deploy application on web platform	2	Medium	All members

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint 1	20	4 Days	28 January 2026	31 January 2026	20	31 January 2026
Sprint 1	20	4 Days	28 January 2026	31 January 2026	20	31 January 2026
Sprint 2	20	8 Days	02 February 2026	09 February 2026	20	09 February 2026
Sprint 2	20	8 Days	02 February 2026	09 February 2026	20	09 February 2026
Sprint 3	20	7 Days	12 February 2026	18 February 2026	20	18 February 2026
Sprint 3	20	7 Days	12 February 2026	18 February 2026	20	18 February 2026

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

Test Scenarios & Results

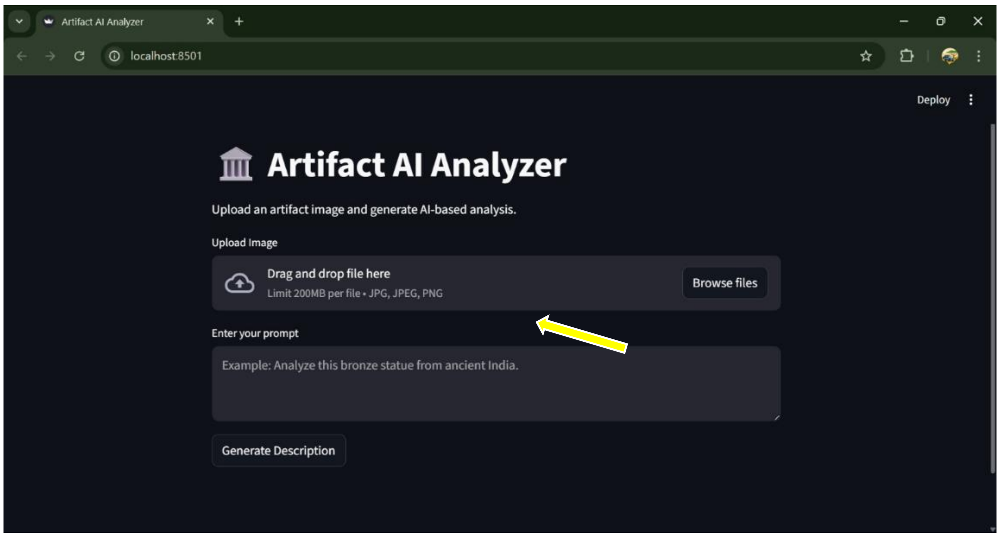
Test Case ID	Scenario	Test Steps	Expected Result	Actual Result	Status
FT-01	Input Validation	Enter valid and empty inputs	Valid accepted, empty rejected	As expected	Pass
FT-02	Word Count Validation	Enter different word limits	Accept valid range	As expected	Pass
FT-03	AI Description Generation	Click generate after input	Structured description generated	As expected	Pass
FT-04	API Connection	Use valid API key	Successful response	As expected	Pass
FT-05	Historical Fact Feature	Generate description	Fact displayed during generation	As expected	Pass
PT-01	Response Time	Measure generation time	Output within few seconds	Within limit	Pass
PT-02	Multiple Requests	Generate repeatedly	Stable performance	Stable	Pass
PT-03	Deployment Test	Access via browser	App runs correctly	Working	Pass

7. RESULTS

7.1. Output Screenshots

The complete execution of Flavour Fusion: AI-Driven Recipe Blogging application is represented step by step in the following screenshots.

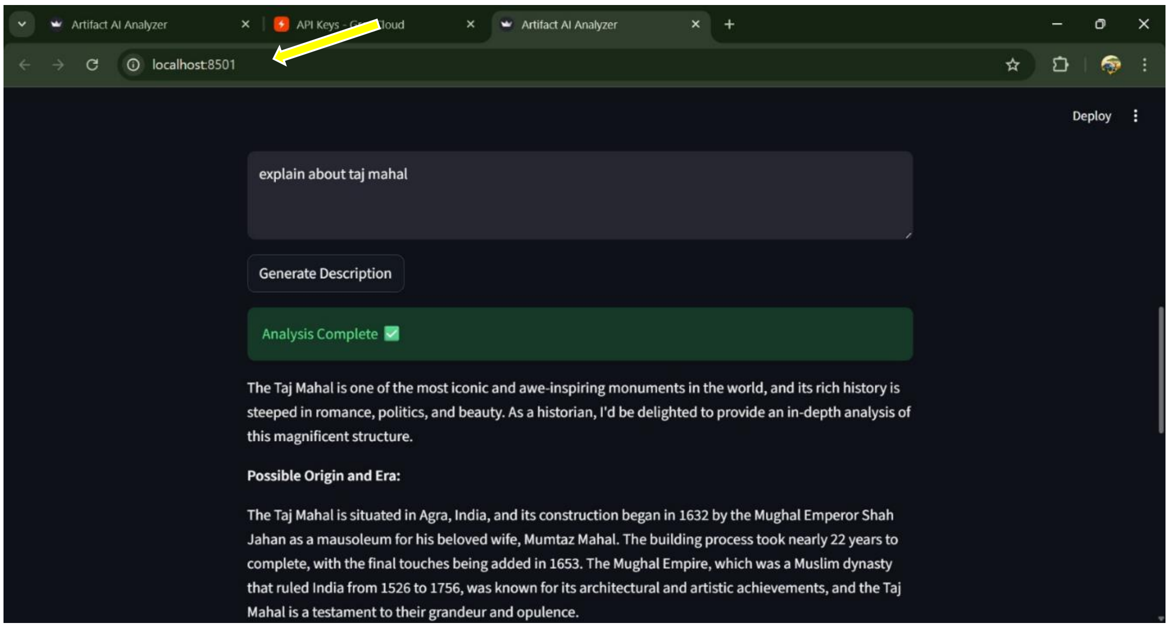
Step 1: To run the Streamlit Application we have to use the command streamlit run app.py in the terminal in path where the app.py file is located.



🏛️ Artifact AI Analyzer

Upload an artifact image and generate AI-based analysis.

Step 2: After running the command in terminal, the code will get executed and the webpage will open directly. Another way to open webpage is that a localhost link will get generated in the terminal, we can access the webpage using that link.

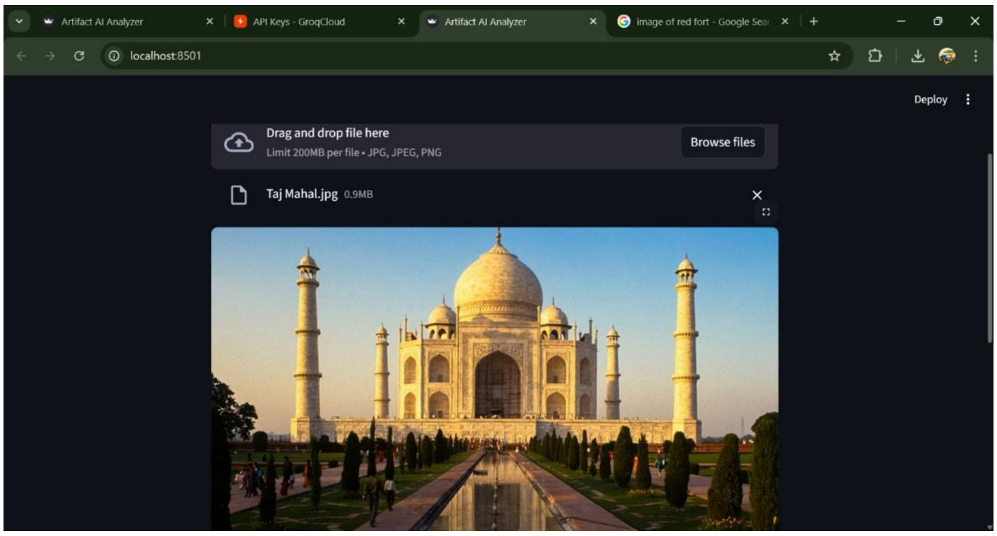


The Taj Mahal is one of the most iconic and awe-inspiring monuments in the world, and its rich history is steeped in romance, politics, and beauty. As a historian, I'd be delighted to provide an in-depth analysis of this magnificent structure.

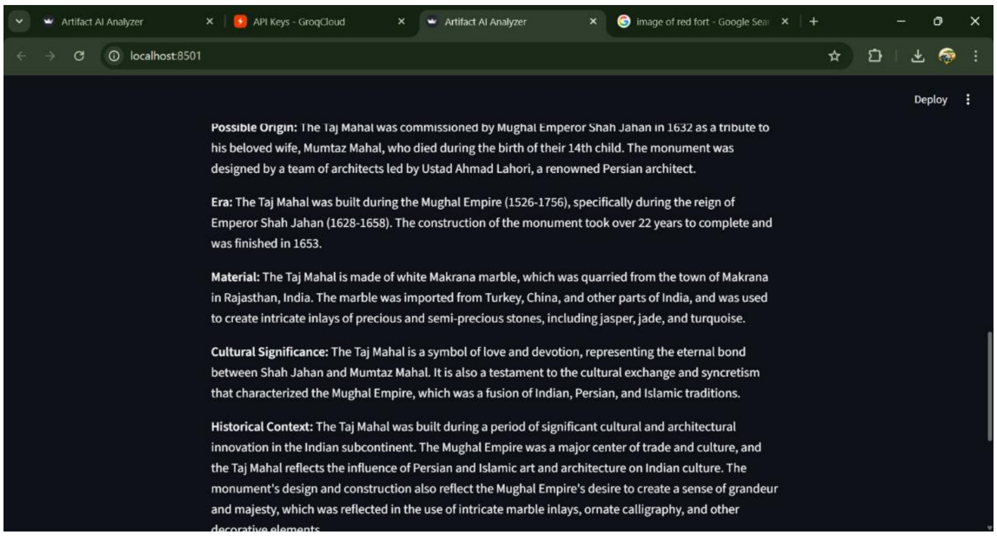
Possible Origin and Era:

The Taj Mahal is situated in Agra, India, and its construction began in 1632 by the Mughal Emperor Shah Jahan as a mausoleum for his beloved wife, Mumtaz Mahal. The building process took nearly 22 years to complete, with the final touches being added in 1653. The Mughal Empire, which was a Muslim dynasty that ruled India from 1526 to 1756, was known for its architectural and artistic achievements, and the Taj Mahal is a testament to their grandeur and opulence.

Step 3: The Streamlit webpage opens as shown in the figure given below. This is an automated webpage. No secondary HTML codes required to build this webpage. Python code itself consists the webpage building code.



Step 3: The user has to give inputs in the website such as a Recipe Name and Number of Words. The Number of words means with how many words the recipe should be generated. After entering the required details, the user should click on Generate Recipe button to generate the recipe. Here I chose the Chocolate Cake Recipe with 400 words count.



Possible Origin: The Taj Mahal was commissioned by Mughal Emperor Shah Jahan in 1632 as a tribute to his beloved wife, Mumtaz Mahal, who died during the birth of their 14th child. The monument was designed by a team of architects led by Ustad Ahmad Lahori, a renowned Persian architect.

Era: The Taj Mahal was built during the Mughal Empire (1526-1756), specifically during the reign of Emperor Shah Jahan (1628-1658). The construction of the monument took over 22 years to complete and was finished in 1653.

Material: The Taj Mahal is made of white Makrana marble, which was quarried from the town of Makrana in Rajasthan, India. The marble was imported from Turkey, China, and other parts of India, and was used to create intricate inlays of precious and semi-precious stones, including jasper, jade, and turquoise.

Cultural Significance: The Taj Mahal is a symbol of love and devotion, representing the eternal bond between Shah Jahan and Mumtaz Mahal. It is also a testament to the cultural exchange and syncretism that characterized the Mughal Empire, which was a fusion of Indian, Persian, and Islamic traditions.

Historical Context: The Taj Mahal was built during a period of significant cultural and architectural innovation in the Indian subcontinent. The Mughal Empire was a major center of trade and culture, and the Taj Mahal reflects the influence of Persian and Islamic art and architecture on Indian culture. The monument's design and construction also reflect the Mughal Empire's desire to create a sense of grandeur and majesty, which was reflected in the use of intricate marble inlays, ornate calligraphy, and other decorative elements

Step 4: After clicking the Generate Recipe button, in fraction of seconds a simple joke will be generated as shown in the below figure to engage the users if recipe generation get delayed. The Food Recipe will be generated based on the user inputs as shown in the following four images.

8. ADVANTAGES AND DISADVANTAGES

Advantages

- Reduces time required for researching and writing historical descriptions
- Automatically generates structured and informative artifact content
- Provides customized output based on user input and word count
- Simple and user-friendly interface built using Streamlit
- Fast and efficient content generation using Gemini Generative AI
- No need for dataset collection or manual training of models
- Useful for students, historians, researchers, and bloggers
- Can be accessed online when deployed on cloud

Disadvantages

- Requires internet connection for AI model access
- Depends on third-party API services for content generation
- Output accuracy depends on quality of user input
- Limited to text-based descriptions in current version
- Advanced features require further development

9. CONCLUSION

The Gemini Historical Artifact project demonstrates the effective use of generative artificial intelligence in automating historical content creation. The system allows users to generate well-structured and detailed descriptions of historical artifacts by simply entering the artifact name and required word count. This reduces manual research effort and saves significant time for students, researchers, and historians.

By integrating the Gemini Generative AI model with a Streamlit-based interface, the application provides fast and reliable results while maintaining simplicity and usability. The project successfully highlights how modern AI tools can be utilized in educational and research domains to enhance productivity and accessibility of information.

Overall, the developed system provides an efficient and scalable solution for generating historical artifact descriptions and can be further enhanced with additional intelligent features in the future.

10. FUTURE SCOPE

The Gemini Historical Artifact project can be expanded with several advanced features to improve functionality and user experience. Future enhancements may include support for multiple languages, allowing users from different regions to generate descriptions in their preferred language. Image-based artifact recognition can also be integrated, enabling users to upload artifact images and receive detailed descriptions automatically.

Additional improvements such as voice input support, user login systems, cloud database storage, and mobile application deployment can make the system more interactive and accessible. Integration with virtual museum platforms and augmented reality applications could further extend the usability of the system in educational and cultural domains.

With continuous development and integration of advanced AI capabilities, the system has strong potential to evolve into a comprehensive digital history assistant for academic and professional use.

11. APPENDIX

11.1. Source Code

The source code of the Gemini Historical Artifact project includes the implementation of the Streamlit user interface, integration of the Gemini Generative AI model using the Google Generative AI API, input validation module, description generation logic, and historical fact feature.

The application is developed using Python programming language and follows a modular structure for easy maintenance and scalability.

11.2 GitHub & Demo

11.2. Github & Project Demo Link

Github Repository Link:

Demo Link: