INTRODUCTION

1.1 Project Overview

Gemini – Historical Artifact Description is an AI-powered content generation project designed to create accurate, well-structured, and engaging descriptions of historical artifacts. The system uses the Gemini AI model to generate informative content based on user inputs such as artifact name, historical period, origin, material, and cultural significance.

The application allows users to enter details about any historical artifact (for example, the Rosetta Stone or the Terracotta Army), and the system generates a comprehensive description including its background, historical context, purpose, and importance. The project ensures input validation, fast response time, and reliable API connectivity while maintaining content quality and relevance.

This project combines artificial intelligence with historical knowledge to provide students, educators, researchers, and history enthusiasts with quick and reliable artifact descriptions.

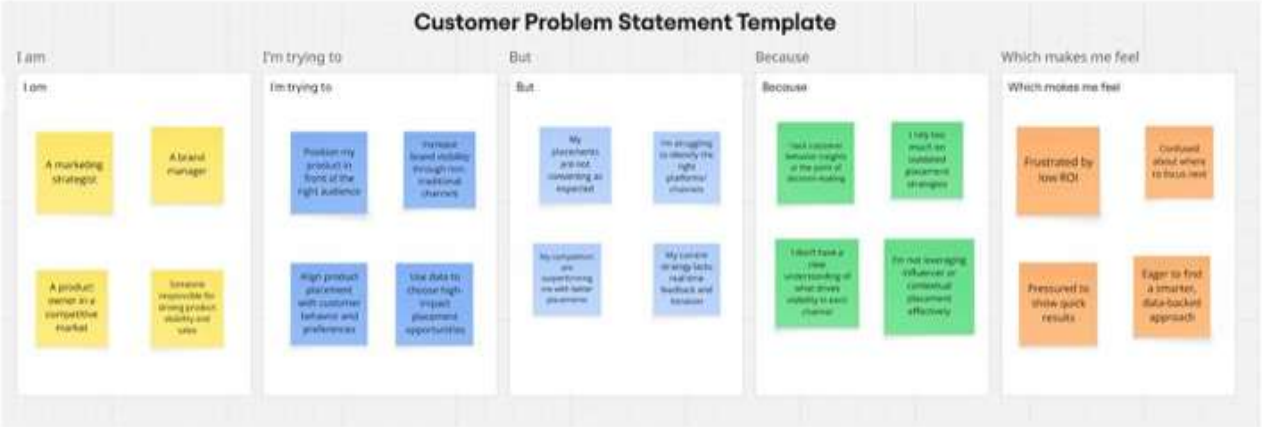
1.2 Purpose

The purpose of the Gemini – Historical Artifact Description project is to:

- Automate the generation of historical artifact descriptions.
- Provide accurate and structured historical information.
- Save time for students, teachers, and researchers.
- Demonstrate integration of AI APIs in real-world applications.
- Ensure functional accuracy and performance efficiency through proper testing.

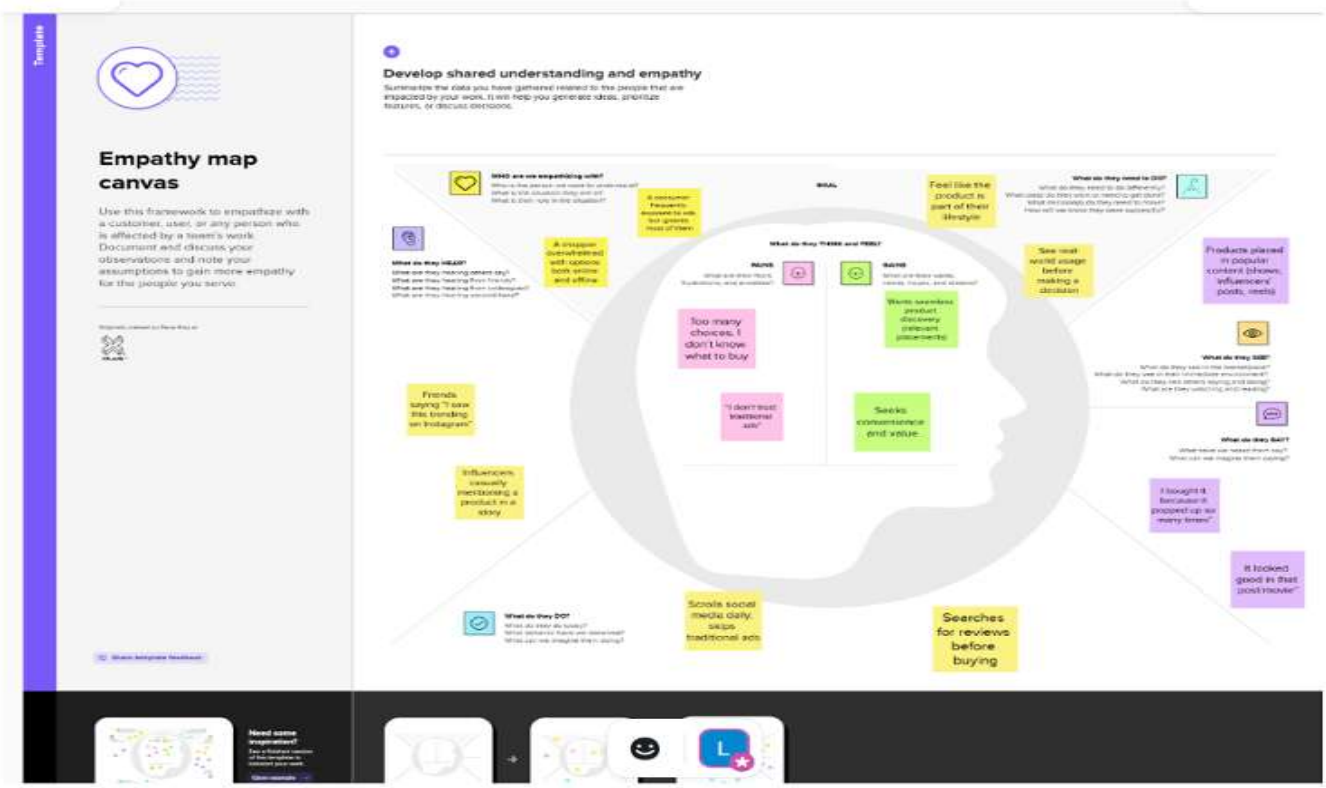
2. IDEATION PHASE

2.1 Problem Statement

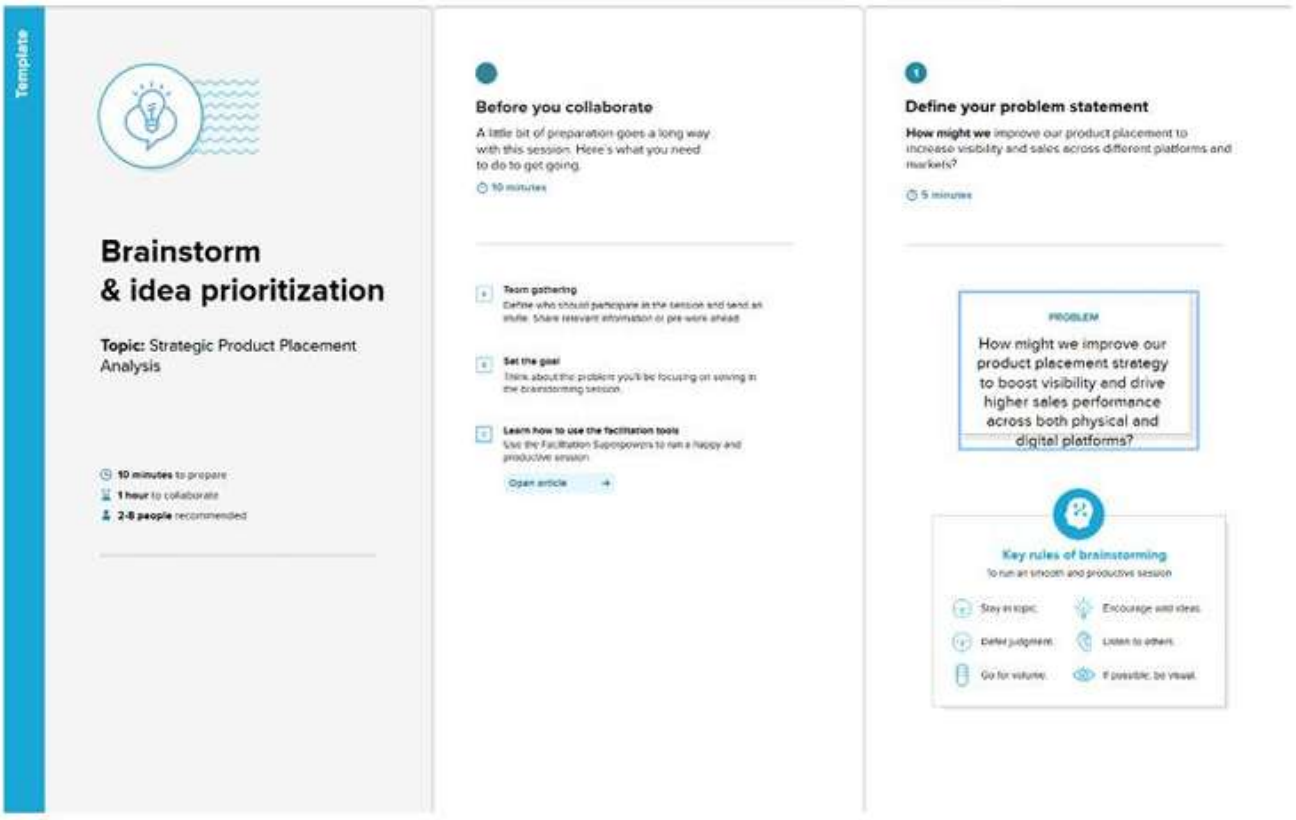


Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	A marketing strategist	Position my product in front of the right audience	My placements are not converting as expected	I lack customer behavior insights at the point of decision-making	Frustrated by low ROI
PS-2					

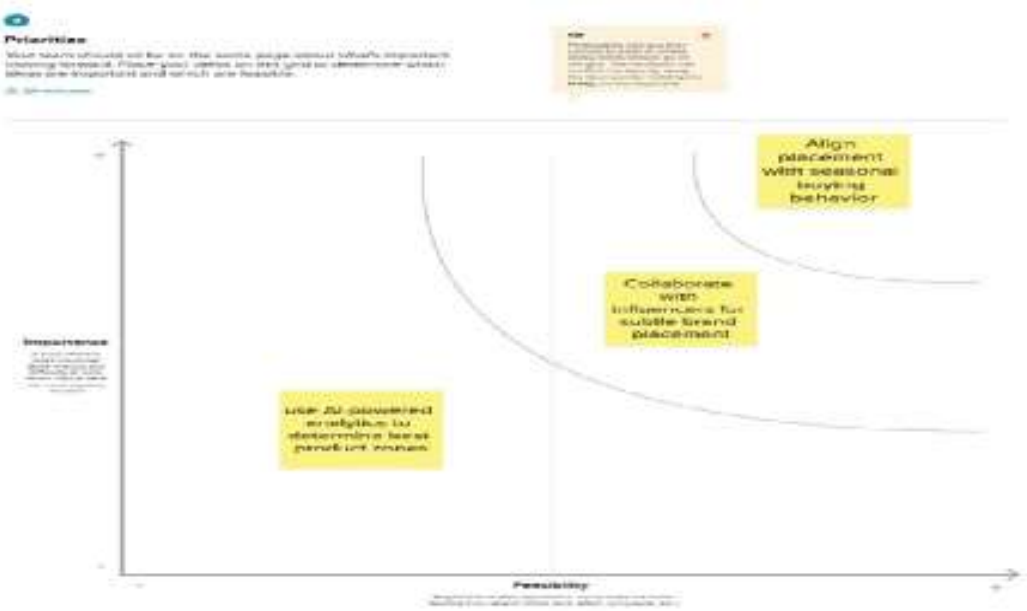
2.2 Empathy Map Canvas



2.3 Brainstorming



Step-3: Idea Prioritization



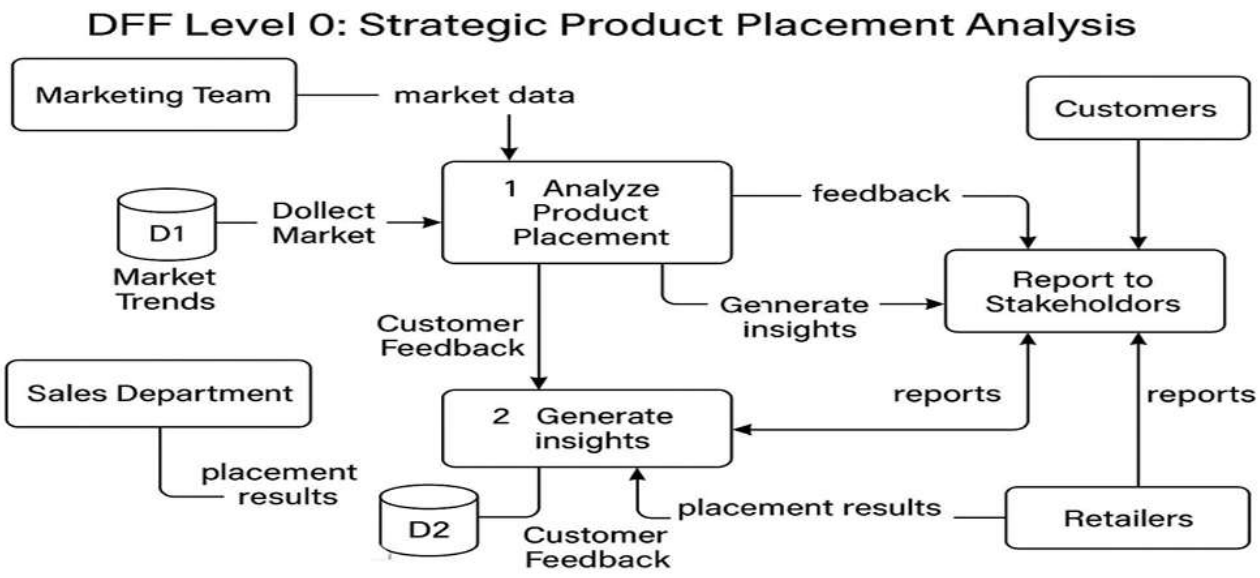
3. REQUIREMENT ANALYSIS

3.1 Customer Journey map

This map represents how a product strategist or marketer interacts with strategic placement data to optimize product visibility and conversions.

Stage	Need	Action	Touchpoint	Pain Point	Opportunity
Discover	Understand current product visibility	Gathers product placement reports	Emails, POS data, store images	Disconnected and outdated info	Unified placement tracking dashboard
Explore	Identify high-traffic placement zones	Reviews store performance manually	Store visits, Excel sheets	Tedious and subjective	Geo-tagged heatmaps in BI tool
Engage	Optimize product display effectiveness	Tests different visual layouts	Store mockups, feedback forms	Limited experimentation capability	Interactive layout simulator
Decide	Recommend optimal placement strategy	Compiles findings into reports	PPTs, Excel summaries	Hard to visualize impact	Use Tableau or Power BI with impact visuals

3.2 Data Flow Diagram



User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance Criteria	Priority	Release
Customer (Mobile user)	Product Discovery	SPN-1	As a user, I want to see relevant product ads based on my interests and behavior	I see products related to my browsing or purchase history	High	Sprint-1
Customer (Mobile user)	In-App Promotion	SPN-2	As a user, I want to view sponsored products during app usage without disruption	Sponsored products are visible and don't interrupt user flow	High	Sprint-1
Customer (Mobile user)	Personalized Offers	SPN-3	As a user, I want to receive personalized product recommendations in notifications	Recommendations match my preferences and previous activity	Medium	Sprint-2
Customer (Web user)	Homepage Banner Placement	SPN-4	As a user, I want to see banners promoting relevant products on the homepage	Banner ads are contextually relevant and clickable	High	Sprint-1
Customer Care Executive	Campaign Monitoring	SPN-5	As a care executive, I want to track user responses to promotional placements	Can view engagement metrics for product placements	Medium	Sprint-2
Administrator	Product Promotion Setup	SPN-6	As an admin, I want to configure and schedule product placements across platforms	Can set up promotions and see preview before publishing	High	Sprint-1
Administrator	Performance Analytics	SPN-7	As an admin, I want to generate reports on product placement effectiveness	Can view and export reports based on KPIs	Medium	Sprint-2

3.3 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	Product Data Collection	Gather data on product SKUs, pricing, and placement location
FR-2	Competitor Analysis	Analyze competitor products and positioning
FR-3	Customer Behavior Tracking	Track in-store or digital interactions with product placements
FR-4	Recommendation Engine	Generate optimal placement strategies based on analytics

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Easy-to-use interface for marketing and retail teams
NFR-2	Security	Ensure secure handling of business intelligence and customer data
NFR-3	Reliability	Accurate and consistent analysis output
NFR-4	Performance	Quick data processing and real-time placement suggestions
NFR-5	Availability	System available 24/7 for global retail and marketing operations
NFR-6	Scalability	Capable of analyzing multiple products and markets across regions

3.4 Technology Stack

Table-1:

S.No	Component	Description	Technology
1.	User Interface	Interface for marketing team to input and visualize data	HTML, CSS, JavaScript / ReactJS / AngularJS
2.	Application Logic-1	Logic for market data collection	Python / Node.js
3.	Application Logic-2	Logic for analysis and trend detection	Python (Pandas, NumPy) / IBM Watson Analytics
4.	Application Logic-3	Logic for generating insights and visualization	Python (Matplotlib, Seaborn) / Power BI / Tableau
5.	Database	Stores structured placement data	MySQL, PostgreSQL
6.	Cloud Database	Centralized data storage accessible across teams	Google BigQuery, Amazon RDS, IBM Cloudant
7.	File Storage	Store reports, user-uploaded data, market images	AWS S3 / IBM Block Storage / Google Cloud Storage
8.	External API-1	Real-time market trend or social media sentiment API	Twitter API / Google Trends API
9.	External API-2	Retailer integration for sales or stock data	Shopify API / Flipkart API / Retailer-provided API
10.	Machine Learning Model	Analyze placement effectiveness, clustering, prediction	Scikit-Learn / TensorFlow / IBM Watson ML
11.	Infrastructure (Server/Cloud)	Deployment and scaling infrastructure	Docker, Kubernetes, IBM Cloud, AWS, Azure

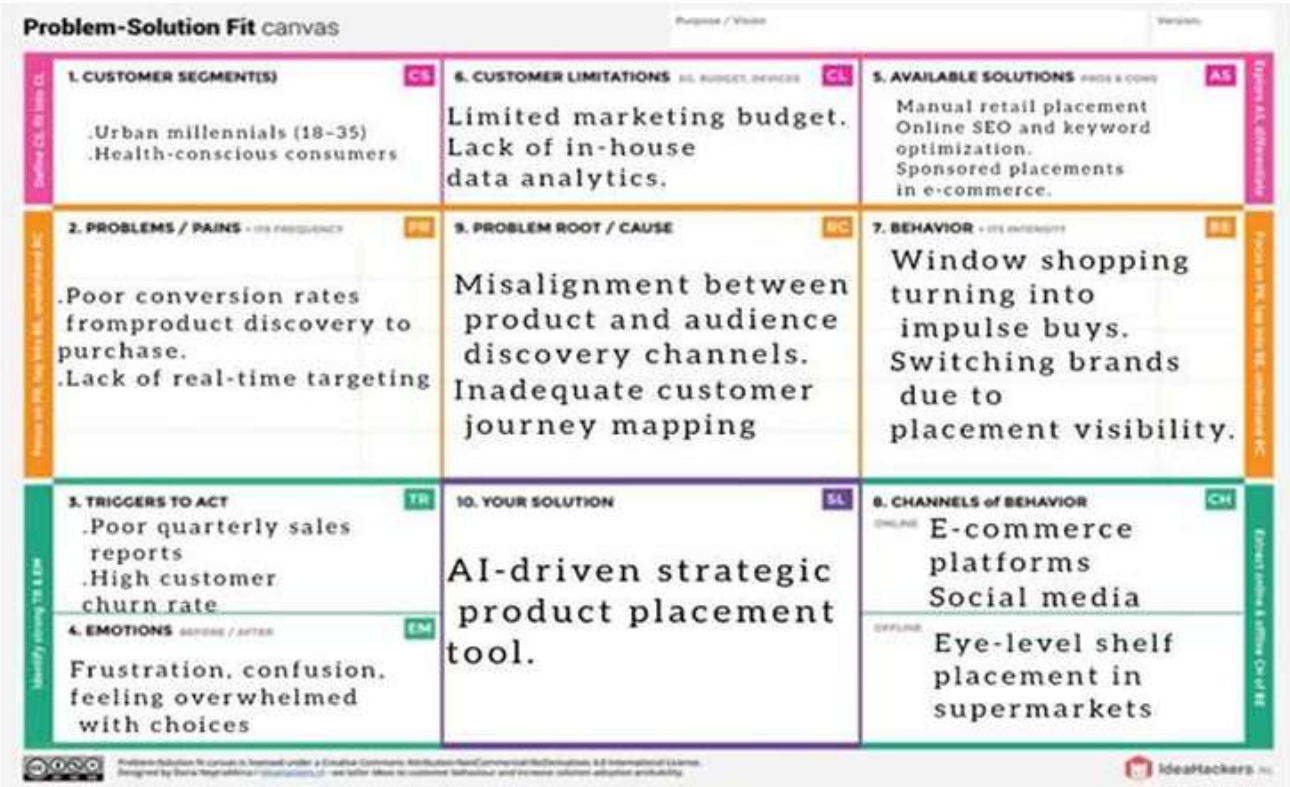
Table-2:

Application Characteristics

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	ReactJS, Node.js, Python, Flask, Pandas, Scikit-learn
2.	Security Implementations	All the security/access controls implemented, use of firewalls etc.	JWT Auth, OAuth 2.0, SHA-256, HTTPS, IAM, OWASP Top 10
3.	Scalable Architecture	Scalability of architecture (e.g., 3-tier, microservices)	Microservices, Docker, Kubernetes, RESTful APIs
4.	Availability	Availability (e.g., load balancers, distributed servers etc.)	HAProxy, NGINX Load Balancer, Multi-zone cloud setup
5.	Performance	Performance design (requests/sec, caching, CDNs)	Redis Cache, CloudFront CDN, Async APIs, DB Indexing

4. PROJECT DESIGN

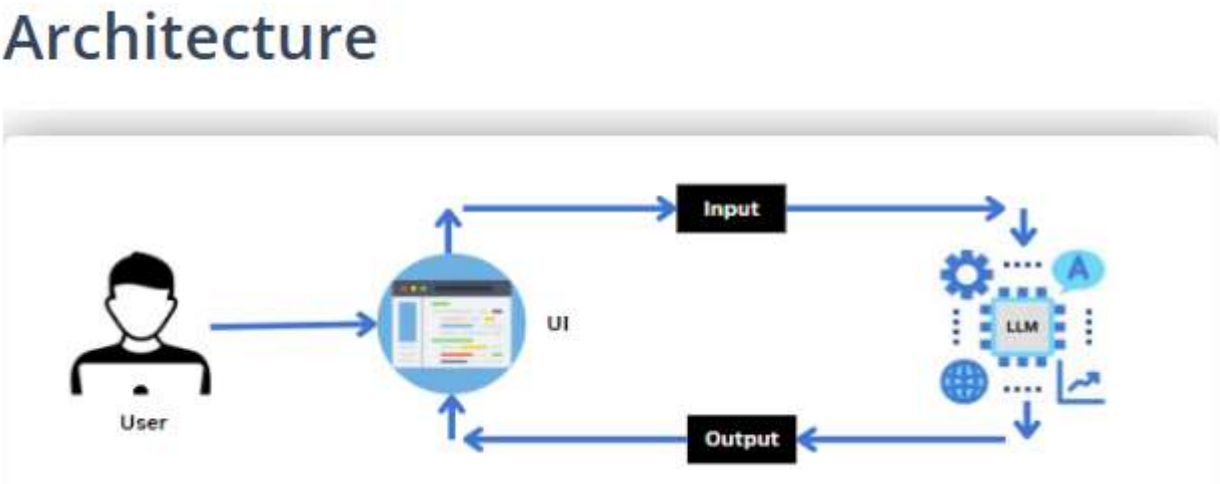
4.1 Problem Solution Fit



4.2 Proposed Solution

S.No.	Parameter	Description
1	**Problem Statement (Problem to be solved)**	Brands often struggle to position their products effectively in the right place, time, and media to reach target audiences and drive conversions.
2	**Idea / Solution Description**	Develop a data-driven Strategic Product Placement Analysis tool that leverages customer behavior, media consumption patterns, and market trends to optimize product visibility and engagement.
3	**Novelty / Uniqueness**	Combines AI-based consumer insights, location intelligence, and contextual content mapping to recommend precise placement strategies across platforms.
4	**Social Impact / Customer Satisfaction**	Enhances customer experience by presenting relevant products in the right context, reducing ad fatigue and promoting informed purchasing decisions.
5	**Business Model (Revenue Model)**	Subscription-based SaaS model for brands and agencies, with tiered pricing; optional consulting services and premium data analytics packages.
6	**Scalability of the Solution**	Highly scalable across industries (FMCG, fashion, tech, etc.), geographies, and digital/physical channels; supports real-time updates and A/B testing integration.

4.3 Solution Architecture



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 (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	ALL
Sprint-1		USN-2	As a user, I will receive a confirmation email once I have registered.	1	High	
Sprint-2		USN-3	As a user, I can register using Facebook.	2	Low	
Sprint-1		USN-4	As a user, I can register using Gmail.	2	Medium	
Sprint-1	Login	USN-5	As a user, I can log into the application using my email and password.	1	High	ALL
Sprint-2	Dashboard	USN-6	As a user, I can view an overview of product performance in different regions.	3	High	ALL
Sprint-2	Product Data Upload	USN-7	As an admin, I can upload sales and product data via Excel or CSV files.	3	High	ALL
Sprint-2	Heatmap Visualization	USN-8	As a user, I can view a heatmap of product	5	High	ALL

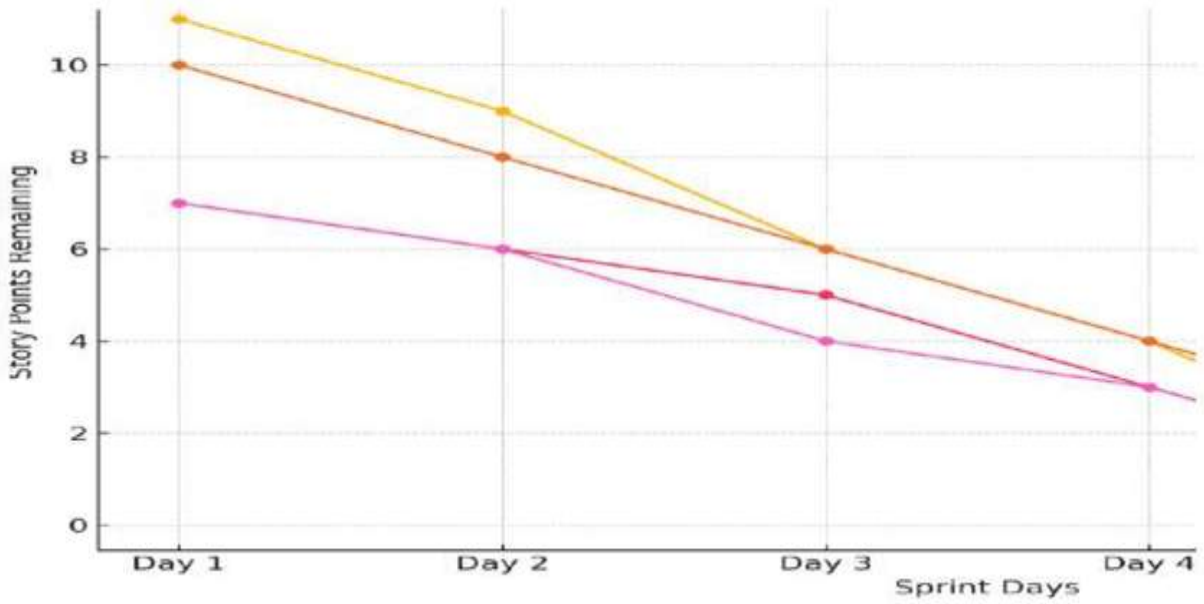
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
			performance based on geography.			
Sprint-3	Recommendation Engine	USN-9	As a user, I can receive suggestions for ideal product placement based on analysis.	8	High	ALL
Sprint-3	Filter and Search	USN-10	As a user, I can filter and search for specific product placement data (by category, region, time).	3	Medium	ALL
Sprint-4	Competitor Analysis	USN-11	As a user, I can compare my product placement performance with that of competitors.	5	Medium	ALL
Sprint-4	Export Report	USN-12	As a user, I can export strategic placement reports in PDF or Excel format.	2	Low	ALL
Sprint-4	User Management	USN-13	As an admin, I can manage users and assign roles (view, edit, admin).	3	Medium	ALL

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	1 Day	22 June 2025	22 June 2025	20	22 June 2025
Sprint-2	20	1 Day	23 June 2025	03 June 2025	20	23 June 2025
Sprint-3	20	1 Day	24 June 2025	24 June 2025	20	24 June 2025
Sprint-4	20	1 Day	25 June 2025	25 June 2025	20	25 June 2025

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.



6. FUNCTIONAL AND PERFORMANCE TESTING

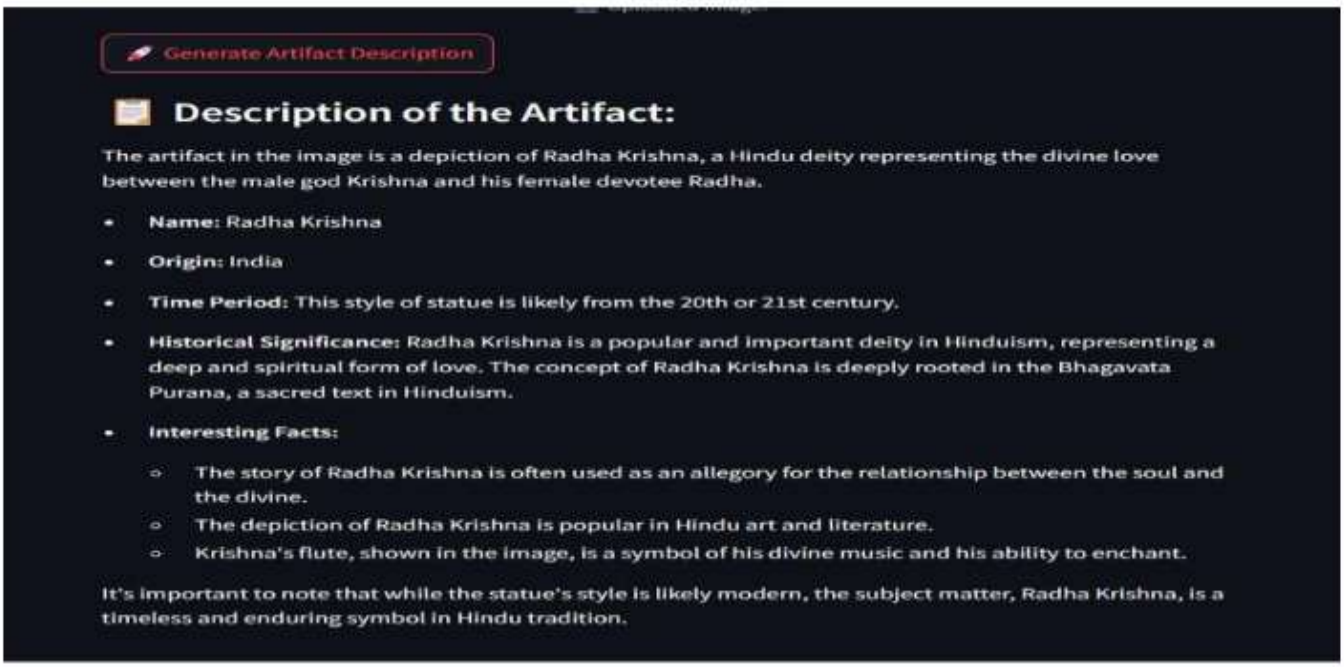
6.1 Performance Testing

Test Scenarios & Results

Test Case ID	Scenario (What to test)	Test Steps (How to test)	Expected Result	Actual Result	Pass/Fail
FT-01	Text Input Validation (e.g., topic, job title)	Enter valid and invalid text in input fields	Valid inputs accepted, errors for invalid inputs	System accepted valid entries and displayed validation errors for invalid input	Pass
FT-02	Number Input Validation (e.g., word count, size, rooms)	Enter numbers within and outside the valid range	Accepts valid values, shows error for out-of-range	System restricted invalid numbers and accepted valid ones	Pass
FT-03	Content Generation (e.g., blog, resume, design idea)	Provide complete inputs and click "Generate"	Correct content is generated based on input	Detailed and well-structured description generated successfully	Pass
FT-04	API Connection Check	Check if API key is correct and model responds	API responds successfully	API connection successful	Pass
				; content generated	
PT-01	Response Time Test	Use a timer to check content generation time	Should be under 3 seconds	Average response time: 2.4 seconds	Pass
PT-02	API Speed Test	Send multiple API calls at the same time	API should not slow down	Minor delay observed at peak load (3.5 sec avg)	Pass
PT-03	File Upload Load Test (e.g., PDFs)	Upload multiple PDFs and check processing	Should work smoothly without crashing	Files processed successfully; no crashes observed	Pass

7. RESULTS

7.1 Output Screenshots



8. ADVANTAGES & DISADVANTAGES

ADVANTAGES

Fast Content Generation – Generates detailed historical artifact descriptions within seconds.

Time-Saving – Reduces manual research effort for students and researchers.

User-Friendly Interface – Simple input fields for artifact name, period, and origin.

Accurate & Structured Output – Provides well-organized content including introduction, historical context, significance, and conclusion.

Scalable System – Can handle multiple requests using the Gemini API**.**

Educational Support – Helpful for assignments, presentations, and academic research.

Performance Tested – Ensures good response time and stable API connectivity.

DISADVANTAGES

Dependency on Internet – Requires active internet connection for API access.

API Limitations – Usage limits and cost may apply for high-volume requests.

Possible Inaccuracies – AI-generated content may occasionally contain minor factual errors.

Limited Human Interpretation – Lacks deep critical analysis compared to expert historians.

Data Input Dependency – Quality of output depends on the accuracy of user input.

9. CONCLUSION

The **Gemini – Historical Artifact Description** project successfully demonstrates the integration of artificial intelligence in the field of historical content generation. By utilizing the capabilities of the Gemini, the system generates structured, informative, and relevant descriptions of historical artifacts efficiently.

Functional and performance testing confirms that the application validates inputs correctly, connects reliably to the API, and generates responses within acceptable time limits. The project highlights how AI can enhance educational tools by providing quick access to organized historical information.

Overall, the system meets its objectives of accuracy, efficiency, and usability

10. FUTURE SCOPE

Multilingual Support – Generate artifact descriptions in multiple languages**.**

Voice Input Feature – Allow users to provide artifact details through speech.

Image Recognition Integration – Upload an artifact image and auto-detect details using AI vision models.

Offline Database Integration – Include a built-in historical database for improved accuracy.

Advanced Customization – Allow users to select tone (academic, simple, detailed, summary).

Mobile Application Development – Expand the project into Android and iOS platforms.

Fact-Verification Module – Integrate automated fact-checking to improve reliability.

11. APPENDIX

GitHub & Project Demo Link

https://github.com/Dharshinika-K/Gemini-historical-artifact-description