

AI Ad Creative Generator

End-to-End Web Application for Generating Advertising Creatives

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Abstract

This report documents the design, implementation, features, and deployment instructions for an AI-powered Ad Creative Generator—a small end-to-end web application that generates advertising creatives (headline, call-to-action, and survey question) based on a user-provided campaign description. The system leverages Groq API for fast text generation and Google Gemini API for automatic image generation. Generated ads are persisted in a MySQL database, with selective saving of user-preferred suggestions. Key features include multiple ad variations, automatic image generation upon selection, fallback placeholders, search functionality, and history display.

The application is built with a clean, modern tech stack emphasizing simplicity and performance. Additional visualizations (illustrative images of ad creatives, UI elements, and related concepts) have been incorporated for better insights.

- **GitHub Repository:** https://github.com/Arjunvankani/AI_ads
- **LinkedIn Profile:** <https://www.linkedin.com/in/arjunvankani/>

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1 Introduction

The objective of this project is to build a fully functional web application that assists marketers in generating high-quality ad creatives using AI. Users input a campaign description (e.g., product details), and the system generates multiple ad variations. Upon selecting a preferred ad, it is saved to the database, and an accompanying advertising image is automatically generated using Google Gemini. The app supports searching historical ads and displays recent ones, making it a practical tool for iterative creative development.

Core AI integrations:

- Text generation: Groq API with `gpt-oss-120b` model (fast and cost-effective).
- Image generation: Google Gemini API.

2 Tech Stack

- **Backend:** Java 17, Spring Boot (Web, Data JPA, WebFlux for reactive handling).
- **Database:** MySQL (schema auto-managed by Hibernate; images stored as base64 in LONGTEXT column).
- **Frontend:** Single `index.html` with vanilla JavaScript (no frameworks for lightweight design).
- **AI APIs:** Groq for text, Google Gemini for images.

3 Key Features

- Generate 3 diverse ad suggestions per request.
- Selective persistence: Only user-selected ads are saved.
- Automatic image generation for saved ads (with fallback placeholder).
- Full-text search across saved ads (by prompt, headline, CTA, or survey question).
- History view: Displays last 5 saved ads with images.
- Defensive JSON parsing and error handling.

Here are illustrative examples of AI-generated advertising creatives, similar to what the application produces:

4 System Architecture

- Frontend sends requests to Spring Boot backend endpoints.
- Backend calls Groq API to generate text creatives in JSON format.
- Upon user selection, backend saves to MySQL and triggers Gemini image generation.
- Images stored as base64 data URLs for easy frontend rendering.

Example database schema visualization (similar to the ad creatives table):

5 API Endpoints

- POST /api/ad/generate: Generate one ad (used internally for multiples).
- POST /api/ad/save: Persist selected ad.
- GET /api/ad/history: Fetch last 5 ads.
- GET /api/ad/search?q=term: Search ads.
- POST /api/ad/image: Generate image for a saved ad.

6 Frontend UI Illustrations

The application uses a simple vanilla JavaScript frontend. Below are examples of similar clean web UIs and Spring Boot application interfaces:

```
C:\Users\Arjun vankani\Desktop\AI_vision\AI_ad>mvn clean spring-boot:run
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.example:ai-ad-generator >-----
[INFO] Building AI Ad Generator 0.0.1-SNAPSHOT
[INFO]   from pom.xml
[INFO] -----[ jar ]-----
[INFO]
[INFO] --- clean:3.3.2:clean (default-clean) @ ai-ad-generator ---
[INFO] Deleting C:\Users\Arjun vankani\Desktop\AI_vision\AI_ad\target
[INFO]
[INFO] >>> spring-boot:3.3.5:run (default-cli) > test-compile @ ai-ad-generator >>>
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ ai-ad-generator ---
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO] Copying 2 resources from src\main\resources to target\classes
[INFO]
[INFO] --- compiler:3.13.0:compile (default-compile) @ ai-ad-generator ---
[INFO] Recompiling the module because of changed source code.
[INFO] Compiling 11 source files with javac [debug parameters release 17] to target\classes
```

Figure 1: Spring Boot application startup logs in terminal (mvn clean spring-boot:run

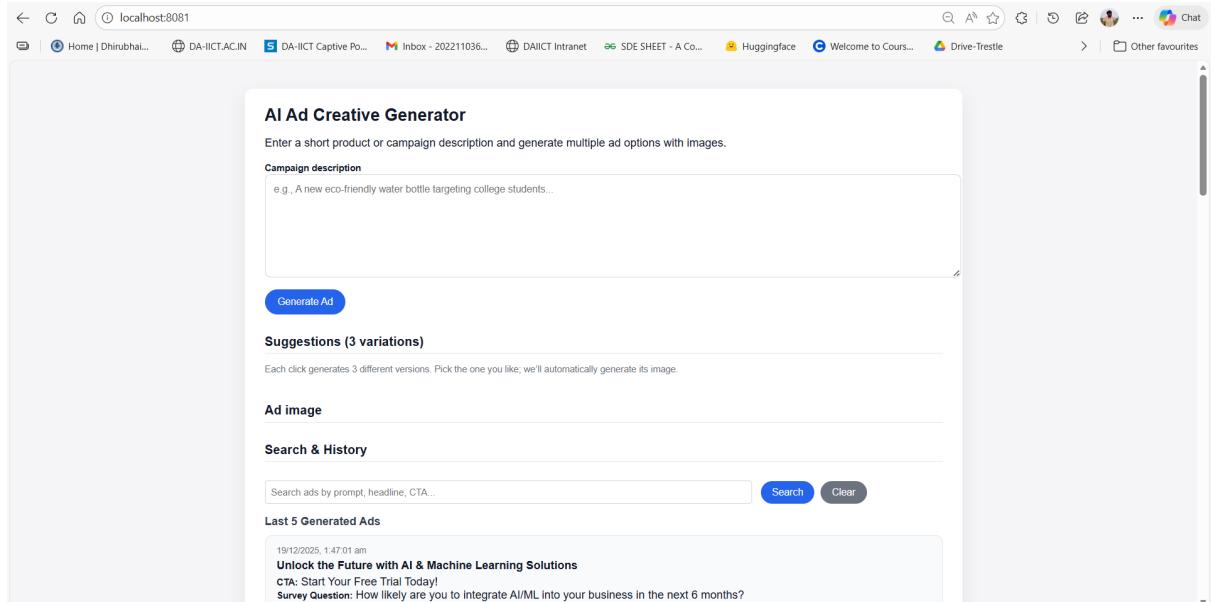


Figure 2: The clean minimalist frontend allows users to enter a campaign description and generate ads.

AI Ad Creative Generator

Enter a short product or campaign description and generate multiple ad options with images.

Campaign description

Italian Pasta and Pizza at Peris



Generate Ad

Suggestions (3 variations)

Each click generates 3 different versions. Pick the one you like; we'll automatically generate its image.

Savor Authentic Italian Pasta & Pizza at Peri's!

CTA: Book Your Table Today and Taste Italy!
Survey: Which classic dish are you craving most—Pasta or Pizza?

Prompt: Italian Pasta and Pizza at Peris

Use this ad

Savor Authentic Italian Pasta & Pizza at Peri's!

CTA: Reserve Your Table Today!
Survey: Which classic would you love to taste first – our hand-rolled pasta or wood-fire pizza?

Prompt: Italian Pasta and Pizza at Peris

Use this ad

Taste Italy: Fresh Pasta & Pizza at Peri's!

CTA: Reserve Your Table Today
Survey: What are you craving most at Peri's – classic pasta or wood-fire pizza?

Prompt: Italian Pasta and Pizza at Peris

Use this ad

Ad image

Search & History

Figure 3: User can enter an idea, prompt for ad generation, from this LLM create the ads!

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CTA: Reserve Your Table Today
Survey: What are you craving most at Peri's – classic pasta or wood-fire pizza?

Prompt: Italian Pasta and Pizza at Peris

Use this ad

Ad image

Generating image...

Search & History

Figure 4: Now from 3 ads we can select an appropriate post.

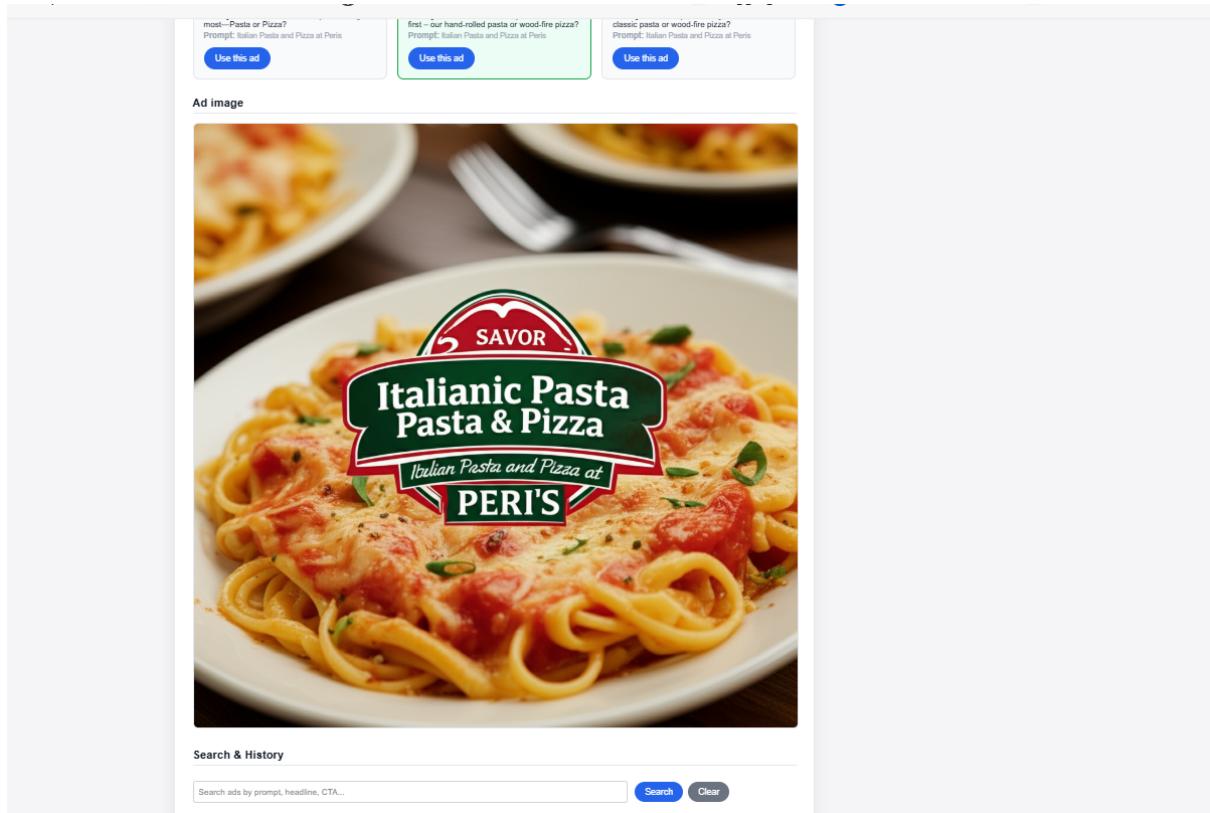


Figure 5: After that, clicking on the use advertisement, it will generate image and represent.

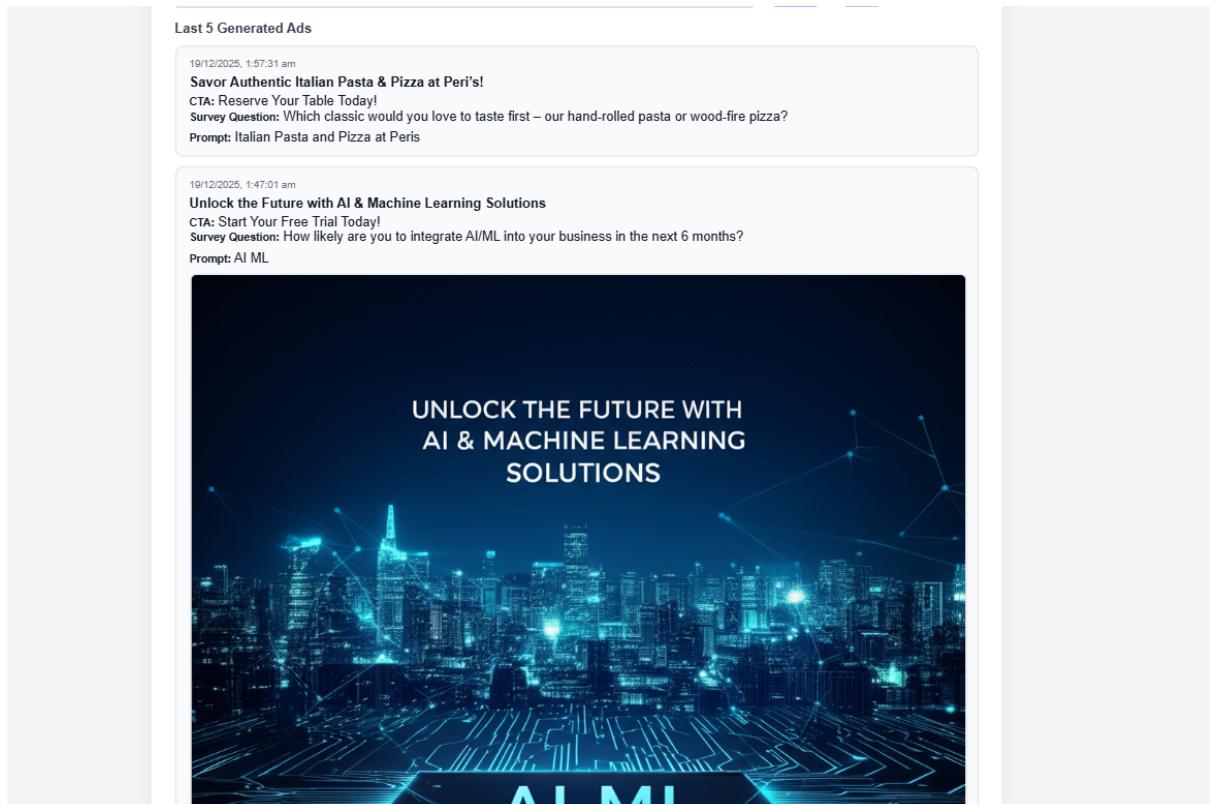


Figure 6: The app displays the last 5 saved ads and supports keyword search across saved creatives.

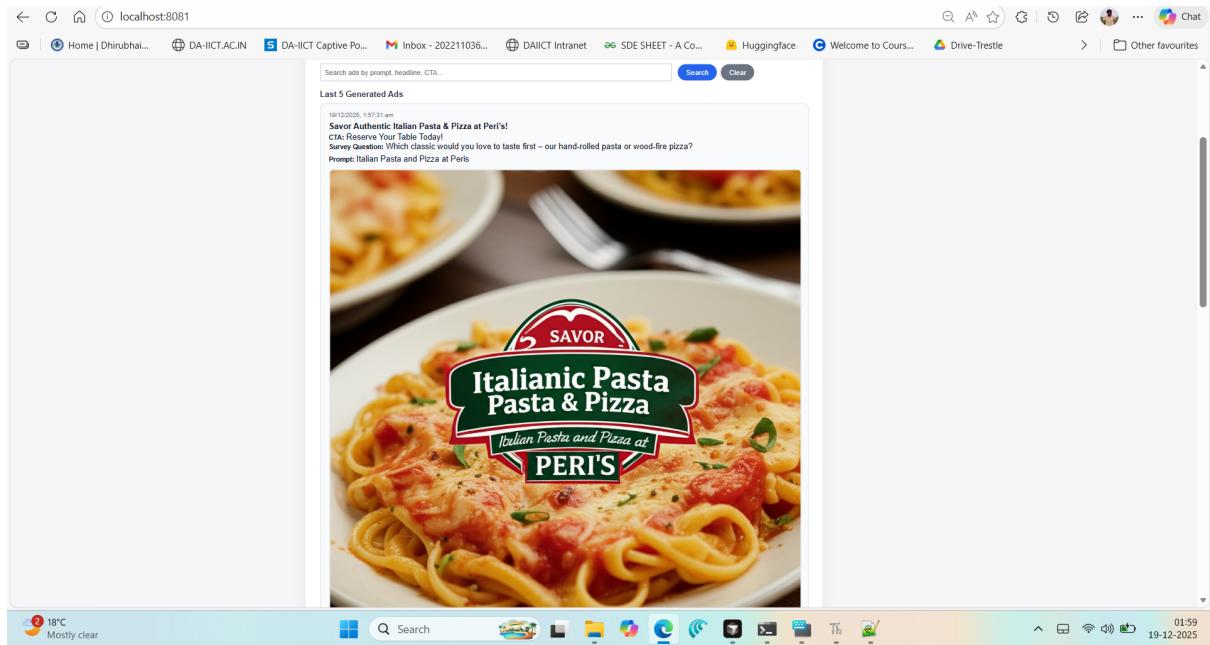


Figure 7: It supports keyword search across saved data, and retrieves back

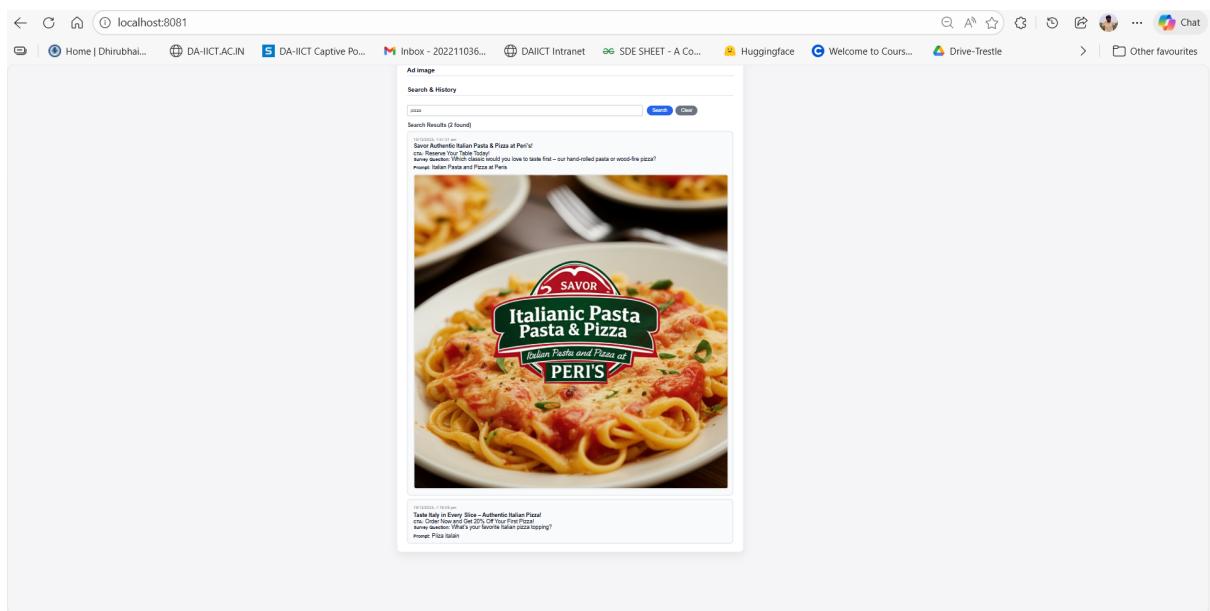


Figure 8: Search results view for saved ads with thumbnails and details

1 2023-12-18 19:16:08.892957 Order Now and Get 20% Off Your First Pizza! NULL Taste Italy in Every Slice? Authentic Italian Pizza! Pizza Italien What's your favorite Italian pizza topping?					
2 2023-12-18 19:19:56.986426 Grab yours now and sip sustainably! NULL Stay Hydrated, Stay Green: The Campus?friendly Bottle A new eco-friendly water bottle targeting college students.. What feature matters most to a campus water bottle?					
3 2023-12-18 19:23:04.662821 Grab yours today and stay hydrated sustainably! NULL Sip Smart: The Eco Bottle Designed for Campus Life A new eco-friendly water bottle targeting college students.. What feature matters most to you in a reusable water bottle durability, design, or cost-effect?					
4 2023-12-18 19:27:39.282135 Try It Free? Generate Your First PhotoRealistic Image Now! Create Stunning Realism with Google's HighFidelity Image Generator for your projects! NULL Google's high-fidelity image generation model, capable of generating realistic and high quality images How likely are you to use AI-generated images					
5 2023-12-18 19:33:53.758451 Enroll Now and Transform Your Tech Career! NULL Master Practical Engineering, AI Integration, and Sharp ProblemSolving Judgment practical engineering skills, AI integration, and problem-solving judgment Which area would you like to improve most: hands-on engineering, AI integration, or decision-making?					
6 2023-12-18 19:35:54.293118 Enroll Now and Build Real-World Solutions https://via.placeholder.com/600x400.png?text=Engineer+the+Future%26AI%26ProblemSolving Engineer the Future: Master AI-Driven Problem Solving practical engineering skills, AI integration, and problem-solving judgment Which area would you like to improve most: hands-on engineering, AI integration, or decision-making?					
7 2023-12-18 19:37:54.883946 Enroll Now and Master Real-World Solutions https://via.placeholder.com/600x400.png?text=Engineer+the+Future%26AI%26ProblemSolving Boost Your Engineering Edge with AI-Driven Problem Solving practical engineering skills, AI integration, and problem-solving judgment Which area would you like to improve most: hands-on engineering, AI integration, or decision-making?					
8 2023-12-18 19:41:04.369259 Grab the Action! Shop Now! NULL Ride into the Future: Meet the Robot on a Red Skateboard! Robot holding a red skateboard What would you name a robot that skateboards on a red board?					
9 2023-12-18 19:41:44.842196 Grab Yours Now! https://via.placeholder.com/600x400.png?text=Meet+the+Robot+on+Red+Skateboard Ride into the Future: Robot on a Red Skateboard! Robot holding a red skateboard What feature would make a robot skateboard even cooler?					
10 2023-12-18 19:41:55.788219 Grab Your Red Skateboard Robot Now! NULL Roll into the Future with Robot-Board! Robot holding a red skateboard What feature would make your robot skateboard experience even better?					
11 2023-12-18 22:02:45.234966 Start Measuring Success Today using Marketing? NULL Unlock Real Insights with Opinideas Opinideas is a brand intelligence platform providing marketing measurement technology and data What's the biggest challenge you face in measuring marketing?					
12 2023-12-18 22:02:42.791358 Get Started with a Free Demo NULL Unlock Deep Brand Insights with Opinideas Opinideas is a brand intelligence platform providing marketing measurement technology and data How confident are you in your current brand?					

Figure 9: Search results view for saved ads with thumbnails and details

7 Running Locally

Detailed instructions are provided in the repository README (reproduced here for completeness):

1. Set up Java 17, Maven, and MySQL.
2. Create database ai_add .
3. Configure application.properties with DB credentials.
4. Set environment variables: GROQ API KEY and
5. Run mvn spring-boot:run.
6. Access at <http://localhost:8081/>.

8 Discussion and Tradeoffs

- Simplicity prioritized: Vanilla JS frontend, no authentication.
- Reliability: Fallback images, defensive parsing.
- Scalability notes: Base64 storage is simple but not ideal for very large scale (consider cloud storage in production).
- Performance: Groq chosen for speed; Gemini for high-quality images.

9 Conclusions

This AI Ad Creative Generator demonstrates a practical, production-ready integration of modern AI APIs in a full-stack Java application. It streamlines ad creative ideation while providing persistence and search capabilities. Future enhancements could include user authentication, more advanced prompting, or integration with ad platforms.

Acknowledgements

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