An

Internship Project Report

On

AI FOR MARKETING

at

WORKCOHOL SOLUTIONS Pvt. Ltd

during

25/4/2025 to 11/7/2025

Submitted by;

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Sai Sushmitha Reddy. Tammineni

Acknowledgment

We would like to express our sincere gratitude to **Workcohol Solutions Pvt. Ltd.** for providing us with the opportunity to work on this exciting and innovative project titled **"AI for Marketing"** as part of our role as an AI Engineer.

We are especially thankful to our tutor and the entire team at Workcohol for their constant support, guidance, and encouragement throughout the development of this project. The collaborative environment and real-world challenges provided invaluable hands-on experience in AI model integration, prompt engineering, and building scalable tools using LangChain, Streamlit, and other modern technologies.

This project not only enhanced our technical skills but also deepened our understanding of how AI can revolutionize marketing automation and content generation. We are truly grateful for the opportunity to contribute to impactful work in a professional setting.

INTERNSHIP EXPERIENCE

This internship report provides a detailed overview of our internship experience with ***Workcohol Solutions Pvt. Ltd.*** *from* **25/4/2025 to 11/7/2025.** We applied for this internship with the intent to gain practical experience in AI-driven product development, and we have managed to achieve far more than we initially set out to accomplish. **Workcohol Solutions Pvt. Ltd**, located in **Tidel Park, Module 115 - D, North Block, Rajiv Gandhi Salai, Taramani, Chennai – 600113,** is a forward-thinking technology company that focuses on building intelligent automation solutions across various domains. We were particularly drawn to this organization because its mission to apply AI in real-world business scenarios strongly aligns with our academic and professional interests.

EXECUTIVE SUMMARY

1. Project Objectives

- Develop a platform that helps marketers and content creators generate high-quality slogans, ad copy, and campaign ideas using AI.
- Integrate support for voice and image input to create a more accessible user experience.
- Leverage advanced AI models to produce multilingual, readable, and platform-specific content.

2. Tools & Technologies Used

Frontend*:** Streamlit ***Backend: Python, LangChain

***AI Models**:* Google Gemini Pro (via langchain_google_genai), OpenAI GPT-3.5 (via langchain_openai)

***Libraries & APIs**:* pytesseract for OCR, speech_recognition for voice-to-text, diffusers, torch for image generation, textstat, langdetect for evaluation, pandas, xlsxwriter for data export

3. Work Done

- Built an interactive UI using Streamlit for content generation.
- Added support for text, image (OCR), and voice (speech-to-text) input.
- Integrated two AI models (Gemini Pro and GPT-3.5) with LangChain for prompt-based content generation.
- Enabled users to customize tone, language, word limit, and platform.
- Implemented evaluation metrics like readability and language detection.
- Integrated Stable Diffusion to generate marketing images.
- Supported export options (CSV, Excel, JSON).

4. Outcomes

A complete AI-powered marketing assistant that enable, Real-time generation of campaign content, Multilingual and tone-based personalization, Image generation based on text outputs, Evaluation of content readability and quality, Exporting content for reuse and collaboration

5. Key Learnings

- Learned to work with multiple AI models in a unified framework (LangChain).
- Gained experience in managing API keys and secure configuration using .streamlit
- Discovered real-world challenges in OCR accuracy and voice-to-text processing.
- Understood the importance of caching and session state in Streamlit apps.
- Improved ability to build scalable, modular AI applications for marketing use-cases.

SKILLS ACQUIRED AND ACHIEVEMENTS

During my internship, we had the opportunity to both polish our existing skills and learn a range of new technical and professional competencies. We gained hands-on experience in using Streamlit for UI development, LangChain for managing multi-model AI pipelines, and tools like Tesseract OCR, Google Speech Recognition, and Stable Diffusion. We made significant contributions to the project by integrating dual-model support, enhancing multimodal input capabilities, and implementing evaluation metrics that added value to the platform. Through this experience, we were able to deliver a complete, functional AI-powered content generator that meets real-world marketing needs**.**

CONTENTS

ABSTRACT

The AI Marketing Generator is a next-generation platform that harnesses the power of generative AI to streamline and enhance the creation of marketing content across various digital channels. In an era where speed, personalization, and localization are crucial to successful marketing campaigns, this platform provides a scalable and intelligent solution that empowers users—especially marketers, brand managers, and small businesses—to create high-impact content with minimal manual effort.

Developed using Python and Streamlit, and orchestrated through LangChain, the platform integrates large language models such as Google Gemini Pro and OpenAI GPT-3.5 to generate human-like marketing copy. It also supports multimodal input, including image-based text extraction via Tesseract OCR and voice-to-text transcription through Google Speech Recognition, enabling users to input content in the most convenient format for them. Furthermore, the platform offers multilingual content generation, tone and word limit control, and platform-specific optimization for channels like Instagram, LinkedIn, Twitter, and Email.

To ensure content effectiveness, it includes built-in evaluation metrics such as language detection and readability scoring using libraries like langdetect and textstat. Additionally, users can optionally generate campaign visuals using Stable Diffusion models, and export the results in multiple formats including CSV, Excel, and JSON. By bringing together various AI and NLP tools into a cohesive user interface, the AI Marketing Generator addresses key challenges in content ideation, speed, quality control, and personalization, offering a glimpse into the future of AI-assisted marketing

1. INTRODUCTION

In today's digital-first world, businesses constantly face the challenge of creating fresh, engaging, and platform-specific marketing content that resonates with diverse audiences. Traditional content creation processes are often time-consuming, require specialized skills, and can result in inconsistent messaging across different campaigns and platforms. Moreover, with the increasing demand for multilingual content and the rise of micro-targeting, manual content creation becomes a bottleneck in marketing operations.

This growing complexity has highlighted the need for **AI-driven solutions** that can assist marketers in generating high-quality content faster, more efficiently, and with greater personalization. Generative AI offers a transformative approach by automating content ideation and copywriting while preserving brand tone and platform relevance. With advancements in large language models, AI can now generate compelling, human-like text tailored to specific use cases and audiences.

The **AI Marketing Generator** platform was developed to meet these needs by providing an all-in-one solution for marketing content generation. Its primary objectives are:

- To reduce the time and effort involved in content creation
- To enable marketers to generate campaign ideas, slogans, and ad copy using minimal input
- To support input via text, images (OCR), and voice (speech recognition)
- To offer content in multiple languages and tones for diverse platforms
- To ensure content quality with built-in evaluation metrics and export capabilities

AI has simplified building client profiles and comprehending the customer journey process. It allows brands to quickly and easily provide valuable personalised content for the various client profiles in any marketing funnel stage and throughout each avenue. Based on historical data, AI applications in digital marketing can determine what content is most likely to bring customers back to the site. AI identifies which customers are most likely to unsubscribe from a specific service and analyses which features are standard among un subscribers. As a result of these analytics, marketers can plan their future campaigns and implement practices encouraging people to stay

AI applications in digital marketing can sift through billions of data points on the internet.

It will describe what price will get the most conversions, when is the best time to post, what subject line will get the most attention, etc. Intelligent marketers stay current with all trends. It simplifies jobs and allows for more creativity and out-of-the-box thinking. It also adds value to the customers who benefit. This paper examined AI and its need in the marketing sector. We briefly cover the various applications of AI in several marketing segments. The paper also looks at other AI-based transformations for the marketing industries. Finally, the study identifies and discusses important uses of AI in marketing.

Artificial intelligence

AI is a computer science technology that teaches computers to comprehend and emulate human communication and behaviour. Based on the data provided, AI has created a new intelligent machine that thinks, responds, and performs jobs the same way people do. AI can do highly technical and specialised activities such as robotics, speech and picture recognition, natural language processing, problem-solving, etc. AI is a collection of several technologies capable of executing tasks that need human intelligence. When applied to standard commercial processes, these technologies can learn, act, and perform with human-like intelligence. It simulates human intelligence in machines, saving us time and money in business transactions.

AI is concerned with creating intelligent machines that can think and act like humans. It provides exceptional opportunities for a wide range of industries. Every industry mentioned is either terrified or enthralled by the arrival of AI. AI creates intelligent machines and devices that can think and react like humans. This technology has been dubbed the “next step” in the industrial revolution. It is believed that AI and ML hold solutions to most of today's problems.

Furthermore, AI may aid in the prediction of future problems. AI can create new technologies, industries, and environments. In a nutshell, AI simulates human intelligence processes by machines. This may include learning, reasoning, and, most importantly, the ability to self-correct.

AI can analyse, comprehend, and make decisions. It is for existing user data and is used to make market predictions and predict user behaviour. It is also known as data forecast, and organisations worldwide use it to fine-tune their sales and marketing strategies to increase sales. Most AI applications in marketing nowadays employ ML, from personalising product suggestions to assisting in discovering the most successful promotion channels, estimating churn rate or customer lifetime value, and building superior customer groups.

Need for artificial intelligence in marketing

AI is a fascinating and cutting-edge technology that complements a company's current content strategy. This technology is a broad term that encompasses a wide range of technologies such as natural language processing, ML, deep learning, computer vision, and many others. ML significantly impacts the digital marketing scenario because of its ability to analyse data and provide analytical tools. As a result, it assists marketing teams in conducting needs-based analyses. Businesses that use AI tools save time by focusing on other aspects of digital marketing. AI is a vast and ongoing technological evolution with far-reaching consequences. As a result, it is advised to embrace AI in digital marketing to foster innovation and improve productivity in the coming years.

Marketers can use AI to gain deeper consumer insights and better understand how to categorise and drive customers to the next step in their journey, providing the best possible experience. Marketers can increase ROI without spending on ineffective attempts by thoroughly examining consumer data and knowing what they truly want. They can also avoid wasting time on mind-numbing advertising that irritates clients. AI will personalise marketing in several ways. Many firms are already using AI to personalise their websites, emails, social media posts, videos, and other materials to better respond to customer demands. One of the primary goals of AI is to automate jobs that formerly needed human intellect. This decrease in the number of labour resources required by an organisation to execute a project, or the amount of time an individual must dedicate to routine chores, allows for significant efficiency benefits.

2. AI UTILITIES IN MARKETING

The various primary marketing segments of AI initiatives are depicted in the figure below. Pricing, strategy and planning, product, promotion, and place management have been vital in targeting AI-based systems in marketing scenarios. The importance and significance of other issues such as targeting and positioning, situations, and thinking models towards the product design and end-customer needs have been targeted as essential aspects of marketing for AI applications.

Figure: Several Segments for AI applications in Marketing Domain

1. Content Creation

- Automatically generates slogans, ad copy, social media posts, product descriptions, and emails
- Ensures consistency in brand voice across channels
- Supports multilingual and tone-specific content for global campaigns

2. Audience Targeting & Segmentation

- Analyzes customer data to create micro-segments
- Predicts customer behavior using machine learning
- Delivers personalized marketing messages based on preferences and habits

3. Customer Insights & Sentiment Analysis

- Uses Natural language processing (NLP) to extract insights from reviews, social media, and feedback
- Detects customer sentiment to adapt messaging and strategy
- Helps in product development by understanding consumer needs

4. Marketing Automation

- Schedules and optimizes email campaigns, social posts, and ad placements
- Triggers responses based on user actions (e.g., cart abandonment, browsing behavior)
- Saves time and reduces manual effort

5. Visual Content Generation

- AI tools like Stable Diffusion generate product images, banners, and ad visuals
- Supports A/B testing by rapidly producing creative variants
- Enables visual storytelling even without a graphic design team

6. Chatbots & Conversational Marketing

- Provides 24/7 customer support via AI chatbots
- Collects lead information and answers queries in real-time
- Enhances user experience and conversion rates

7. Predictive Analytics & Campaign Optimization

- Forecasts future trends and consumer responses
- Suggests optimal campaign timing, budget allocation, and channel strategy
- Increases ROI through data-driven decision-making

8. Voice & Image Recognition

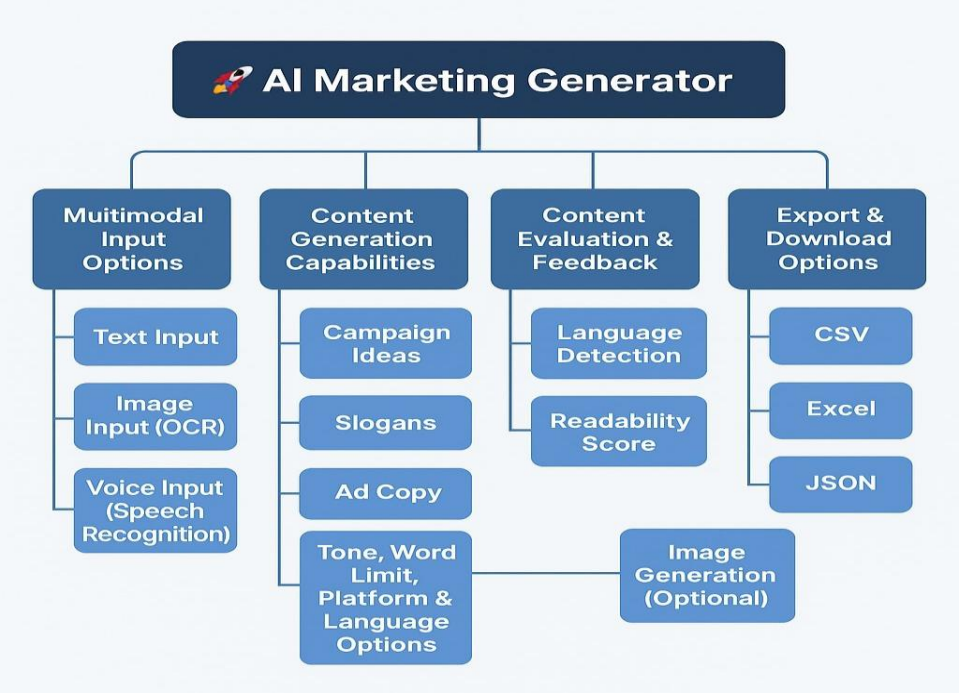
- Converts voice input into actionable data using speech-to-text AI
- Uses image recognition to analyze visual content for branding and compliance
- Extracts content from physical media (e.g., posters, packaging)

9. SEO & Website Optimization

- Recommends keywords and blog topics
- Audits website structure for better search performance
- Improves organic traffic and engagement

10. Data-Driven Personalization

- Delivers real-time content and offers based on user activity
- Creates dynamic landing pages, product recommendations, and offers
- Improves customer loyalty and lifetime value.



3. SYSTEM ARCHITECTURE

3.1 Frontend: Streamlit

The frontend of the AI Marketing Generator is implemented using Streamlit, an open-source Python framework specifically designed for developing data and AI-based applications with minimal effort. Streamlit enables the creation of dynamic, interactive, and responsive web interfaces without requiring extensive frontend development expertise. In this platform, the frontend acts as the primary point of user interaction. Users can enter product names, brand details, and campaign preferences through a clean and organized UI. It allows selection of tone (e.g., casual, persuasive, professional), word limit via a slider widget, and the target platform such as Instagram, LinkedIn, or Twitter, so the generated content aligns with audience expectations on each channel.

Beyond standard text input, the frontend is designed to be multimodal. Users can upload images (JPEG, PNG) of product labels, posters, or advertisements, which the platform processes using Optical Character Recognition (OCR). Similarly, voice input is supported by uploading audio files (MP3, WAV, M4A), which are transcribed using speech-to-text technology. This feature is especially helpful for marketers who prefer verbal brainstorming or are on-the-go. Once the content is generated, it is displayed with a sleek UI showing additional analytics like detected language and Flesch readability score. Users can also choose to generate a related image using Stable Diffusion and export their final content into formats like CSV, Excel, or JSON for downstream marketing tasks or integration into CRM/automation systems.

3.2 Backend: Python + LangChain

The backend system is developed in Python, which provides both flexibility and an extensive ecosystem of AI, NLP, and data processing libraries. Central to the backend is LangChain, an open-source framework that serves as a middleware to interface with multiple large language models (LLMs), manage prompt engineering, and streamline workflow logic. When a user submits a request from the frontend, the backend dynamically assembles a structured prompt. This prompt incorporates various parameters including the product name, the chosen content type (e.g., ad copy or campaign idea), tone, word limit, platform guidelines, and preferred language.

LangChain manages the routing logic between different LLMs based on user preferences. For example, if a user selects "Gemini Pro" as the model, LangChain invokes the appropriate API wrapper and handles model-specific parameters under the hood. The backend also stores and manages session state, ensuring user interactions persist across multiple steps. For instance, text extracted from an uploaded image is stored and automatically prefilled into the product input field for convenience. Once an AI response is received, the backend performs response parsing to split output into multiple choices, cleans formatting issues, and applies evaluation metrics. The backend then passes all this processed data back to the frontend in real-time.

3.3 AI Models Integrated

The platform leverages the capabilities of two cutting-edge large language models, accessed via LangChain integrations: Google Gemini Pro and OpenAI GPT-3.5 Turbo. These models differ in their strengths, giving users the flexibility to select the best fit for their content needs. Gemini Pro, known for its deep understanding and multilingual capabilities, excels in structured, formal content generation such as email campaigns, LinkedIn posts, or global product launches. It provides high accuracy in sentence structure, grammar, and tone, especially in non-English languages such as Hindi, French, or Spanish.

GPT-3.5, on the other hand, is optimized for speed, creativity, and casual expression. It is often preferred for short-form content like slogans, tweets, and social captions, where humor, punchiness, and brevity are valued. Users can switch between models through a dropdown and compare outputs instantly. This dual-model approach not only enhances creativity but also supports A/B testing for campaign variants. Both models are used via secure API keys stored in environment variables, and are invoked programmatically using LangChain’s abstraction layer to ensure smooth interoperability.

3.4 Tools and APIs

To enrich the platform's capabilities beyond traditional text generation, several auxiliary tools and APIs have been seamlessly integrated. The first is Tesseract OCR, an open-source optical character recognition engine that can extract printed or handwritten text from image files. This allows marketers to upload product packaging, labels, or physical flyers and instantly convert them into editable digital content.

The second is Google Speech Recognition API, which converts voice recordings into text using advanced speech-to-text models. This feature is particularly useful for users who prefer dictation over typing, such as during brainstorming sessions or client meetings.

For visual content, the platform integrates Stable Diffusion, a state-of-the-art deep learning model for text-to-image generation. Marketers can generate banners, social visuals, or concept art directly from the generated text—turning slogans or campaign ideas into compelling visuals. The model is accessed via the diffusers library, and is automatically loaded onto GPU if available to ensure fast image generation. Together, these tools enable the platform to process and generate text, audio, and visual marketing assets from a single interface.

3.5 Data Flow Overview

The overall data flow in the AI Marketing Generator follows a clean, modular pipeline that begins with user input and ends with final content delivery and export. When the user inputs a product name or uploads an image/voice file, the system first handles preprocessing using OCR or speech recognition tools. The cleaned input is then formatted into a natural language prompt, customized with campaign parameters like tone, platform, and language.

Next, the prompt is passed into the LangChain orchestration layer, which routes it to the selected AI model—either Gemini or GPT-3.5—and invokes the appropriate API to retrieve a generated response. The response is then parsed, evaluated, and refined by the backend. Metrics such as readability score and language detection are applied, and options are presented to the user via radio buttons for final selection. If requested, the selected text is forwarded to Stable Diffusion to generate a matching image. Finally, the content can be exported as a structured file and used for marketing deployment.

This streamlined architecture ensures real-time interactivity, flexibility across input types, and high-quality AI-driven outputs—making it a robust solution for modern marketing teams seeking agility, automation, and personalization.

4. KEY FEATURES

4.1 Input Options

The AI Marketing Generator platform distinguishes itself by offering multiple flexible input modalities to accommodate users with varying workflows, technical abilities, and device preferences. The most straightforward mode is manual text input, where users can directly type brand names, product descriptions, or campaign themes. This method supports real-time editing and is ideal for users who already have a rough idea in mind and wish to shape it into professional content.

The platform also enables image-based input, leveraging the power of Tesseract OCR (Optical Character Recognition). Users can upload images such as product labels, promotional flyers, scanned handwritten notes, or even billboards captured on mobile phones. Tesseract extracts the visible text from these images and injects it into the platform as structured content, reducing manual effort and digitizing printed assets. This is particularly helpful for marketing professionals who want to repurpose legacy print materials or use design mockups as campaign seeds.

Another major input method is voice-based input, where users can upload audio clips in formats like .wav, .mp3, or .m4a. Using Google Speech Recognition, the platform transcribes spoken content into editable text. This functionality is invaluable for busy marketers, field agents, or team meetings, where recording spoken brainstorming sessions is quicker than typing. By enabling voice input, the platform also makes content creation more inclusive for users with visual impairments or physical disabilities.

4.2 Content Generation

Once the input is captured, the system transitions into its core functionality—AI-powered content generation. Users can instruct the system to produce a range of marketing assets such as ad copies, slogans, taglines, campaign ideas, and promotional blurbs. The platform tailors each response according to the content type, ensuring that slogans are punchy, campaign ideas are strategic, and ad copy is persuasive and emotionally engaging.

A key innovation lies in the ability to control the tone of the content. Whether a brand prefers a casual, professional, exciting, or persuasive voice, the AI adjusts its vocabulary, punctuation, sentence structure, and phrasing to match the intent.

The language flexibility allows users to create content in a wide range of global languages including English, Hindi, Telugu, Tamil, Spanish, French, and more—ideal for multilingual campaigns in international or regional markets.

Another differentiator is platform-aware formatting. The system generates content optimized for platforms like Instagram (hashtag-rich and visual), LinkedIn (business tone), Twitter (concise with 280-character limit), or Email (personalized and professional). This built-in intelligence ensures that the same idea can be adapted across multiple channels without extra effort, maintaining voice and message consistency while respecting channel constraints.

4.3 Model Selection

To ensure high-quality and tailored content generation, the platform offers dynamic model selection, giving users a choice between two powerful LLMs: Google Gemini Pro and OpenAI GPT-3.5 Turbo. This flexibility enables marketing professionals to compare model behavior and select outputs that align best with their brand tone and content goals.

Gemini Pro, Google's advanced conversational AI model, excels in structured, formal, and multilingual content. It is ideal for generating long-form email content, professional campaign proposals, and regionally localized content. It performs well in business environments and is known for its precision in grammar, vocabulary, and tone matching.

GPT-3.5 Turbo, developed by OpenAI, is known for its speed and creativity. It is particularly useful for short-form content such as catchy slogans, punchy ad lines, and informal social media content. GPT-3.5 handles colloquial language, humor, and trend-driven vocabulary effectively, making it a favorite for marketers targeting Gen Z or millennial demographics.

The backend uses LangChain to dynamically route prompts to the selected model, embedding all user-selected configurations (tone, language, word limit, platform) into structured prompts. LangChain also simplifies multi-model support, allowing easy future expansion to include newer models such as Claude, Mistral, or Meta LLaMA.

4.4 Evaluation Metrics

Beyond simply generating content, the platform performs automated evaluation and feedback, helping users select the most suitable and effective outputs. After content is generated, each option is analyzed for language detection using the langdetect library.

This ensures that the model-generated language matches the user's selected language and enables the platform to verify the accuracy of translations in multilingual campaigns.

The second key metric is the readability score, derived using the textstat library's Flesch Reading Ease algorithm. This score helps users determine whether the content is suitable for their target audience. For example, a readability score of 80+ indicates that the content is easy to read and suitable for general consumers, while a score below 50 might be better suited for technical or niche readers. This kind of feedback helps marketers fine-tune their content to fit both the message and the audience.

Displaying these metrics alongside the generated outputs not only informs content selection but also introduces a layer of transparency and accountability. Marketing teams can use these scores as part of their quality control process or to compare performance across different AI-generated variations.

4.5 Image Generation

To support visual storytelling, the platform integrates Stable Diffusion, a deep learning model capable of generating photorealistic or artistic images based on textual input. Once a user selects a slogan or piece of ad copy, they have the option to generate a relevant image that reflects the content's theme, tone, or product category.

For instance, a campaign slogan like "Glow Naturally with Herbal Essence" could generate a visual of nature, greenery, and organic cosmetics. This image generation capability allows teams to prototype and visualize their campaign creatives without needing a graphic designer or third-party design software.

Stable Diffusion is accessed via the diffusers library and is deployed either on CPU or GPU, depending on system capability. The model runs locally, ensuring data privacy and faster response times. It enables fast iteration, encouraging marketing teams to A/B test not just text content, but also the accompanying visuals—making the platform a complete content ideation engine.

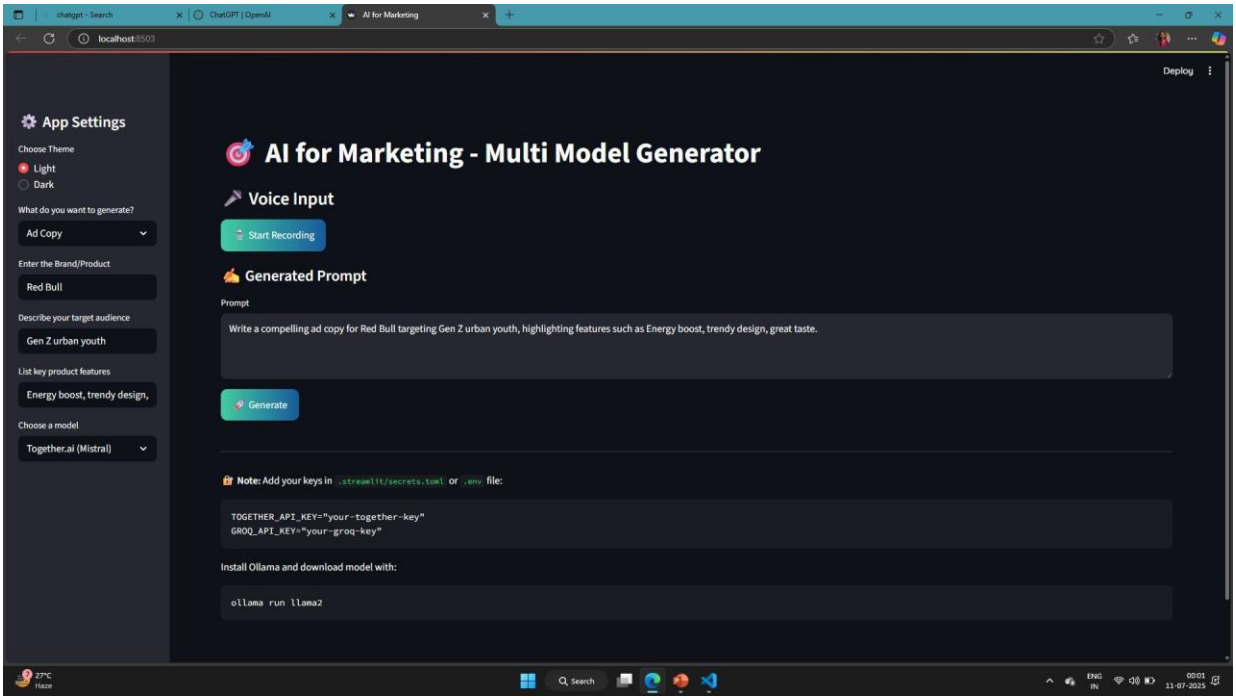
4.6 Export & Download

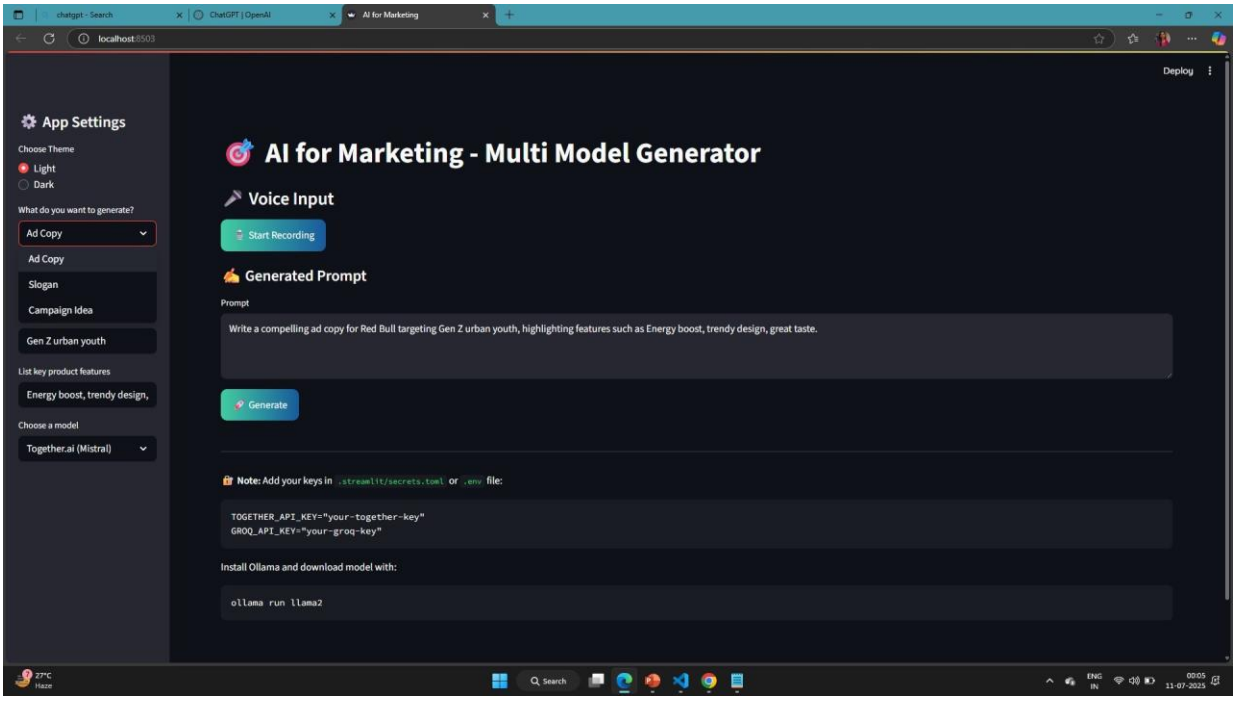
Recognizing the need for collaboration, archiving, and integration, the platform supports comprehensive export features. Users can download generated content and evaluation metrics in CSV for spreadsheet analysis, Excel (.xlsx) for reporting and presentation, and JSON for integration with other software systems or automation workflows.

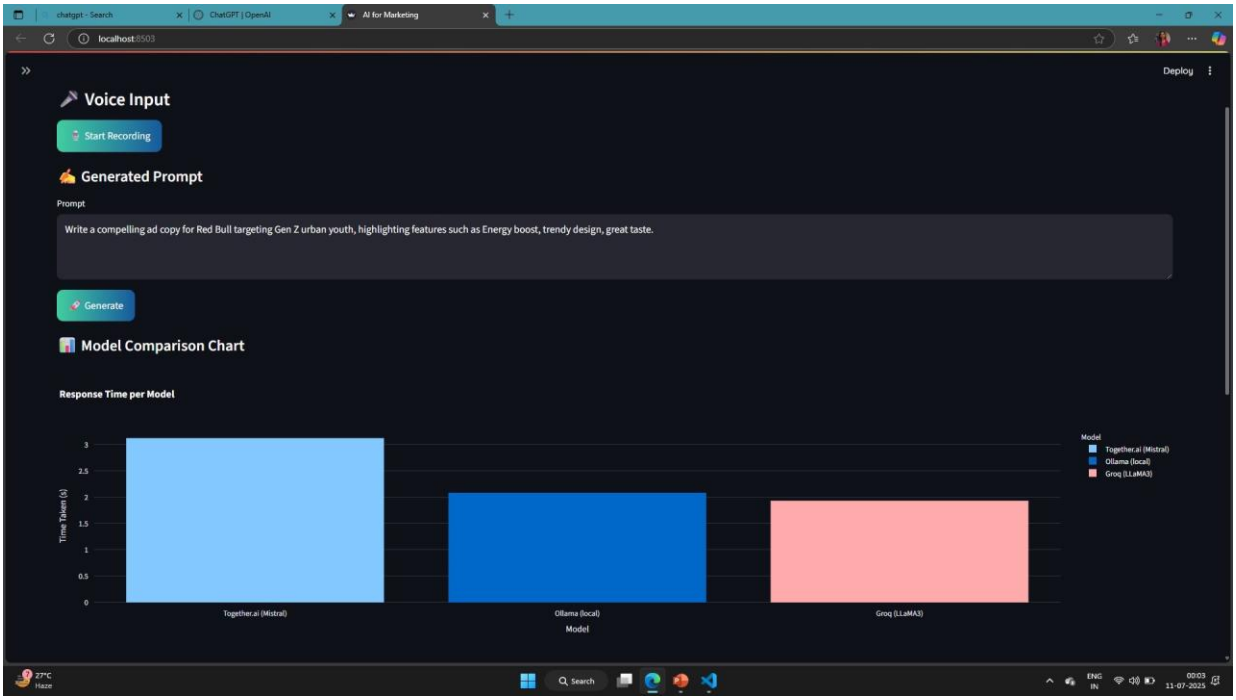
Each export includes detailed information such as product name, content type, selected model, output text, language detected, readability score, and time of generation. These structured datasets allow marketing teams to track content versions, evaluate historical changes, and maintain records for legal or compliance purposes.

Moreover, these files can be used directly in platforms like Google Sheets, Airtable, Notion, or internal CRMs to streamline campaign deployment workflows. For teams using tools like Zapier or Make.com, the JSON export can be integrated into automated publishing systems—enabling true end-to-end marketing automation from idea to execution.

5. SCREENSHOTS






chatgpt - Search
ChatGPT | OpenAI
AI for Marketing
localhost:8503
Deploy
Voice Input
Start Recording
Generated Prompt
Prompt
Write a compelling ad copy for Red Bull targeting Gen Z urban youth, highlighting features such as Energy boost, trendy design, great taste.
Generate
Model Comparison Chart
Response Time per Model
Time Taken (s)
3
2.5
2
1.5
1
0.5
0
Together.ai (Mistral)
Ollama (local)
Groq (LLaMA3)
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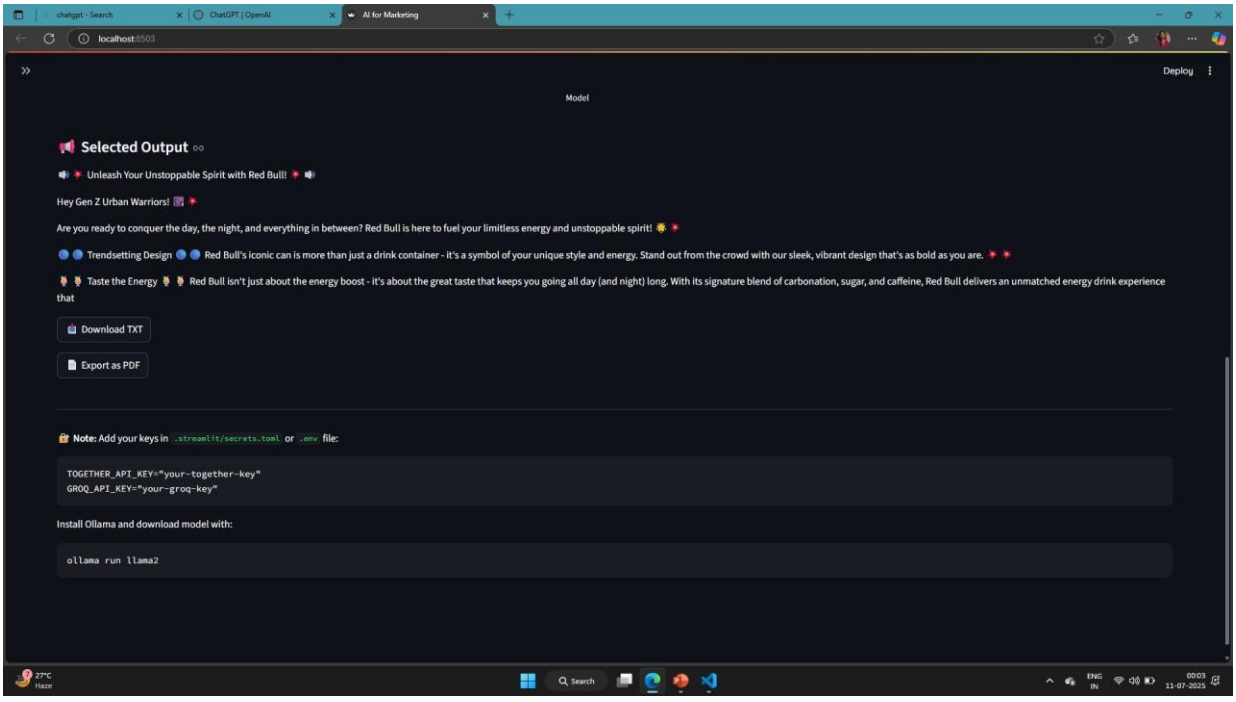
chatgpt - Search
ChatGPT | OpenAI
AI for Marketing
localhost:8503
Deploy
Model
Selected Output
Unleash Your Unstoppable Spirit with Red Bull!
Hey Gen Z Urban Warriors!
Are you ready to conquer the day, the night, and everything in between? Red Bull is here to fuel your limitless energy and unstoppable spirit!
Trendsetting Design Red Bull's iconic can is more than just a drink container - it's a symbol of your unique style and energy. Stand out from the crowd with our sleek, vibrant design that's as bold as you are.
Taste the Energy Red Bull isn't just about the energy boost - it's about the great taste that keeps you going all day (and night) long. With its signature blend of carbonation, sugar, and caffeine, Red Bull delivers an unmatched energy drink experience that
Download TXT
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Note: Add your keys in .streamlit/secrets.toml or .env file:
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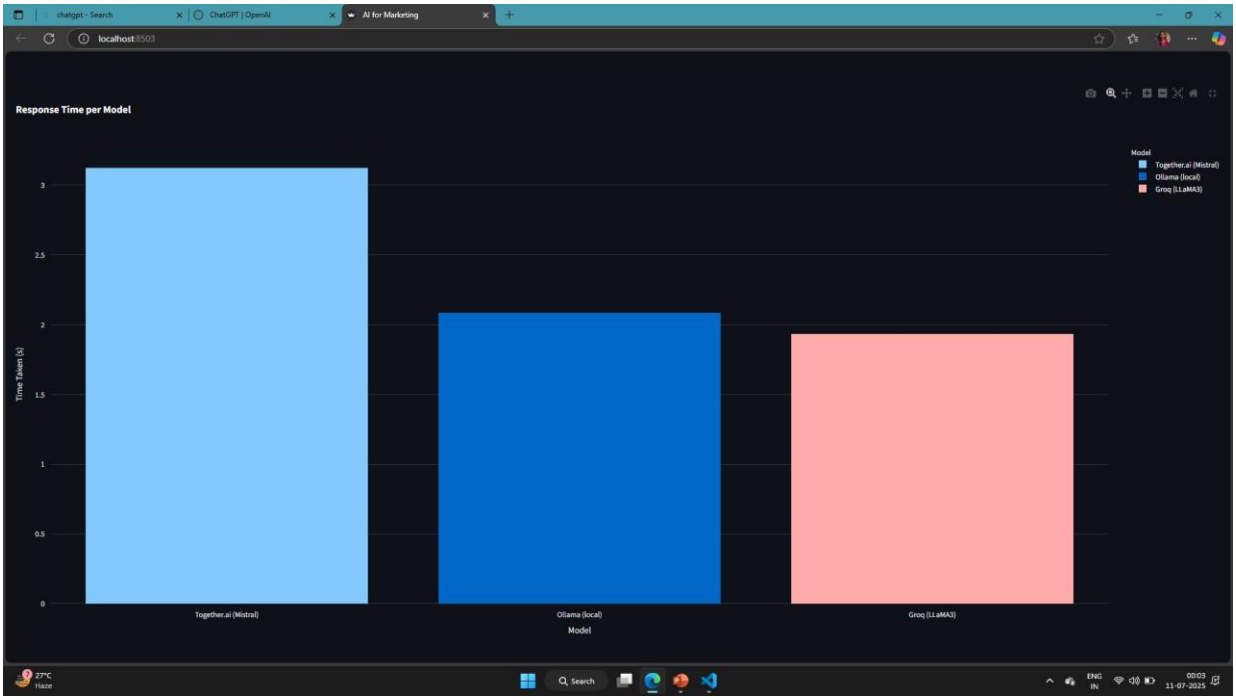
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Model
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Ollama (local)
Groq (LLaMA3)
Time Taken (s)
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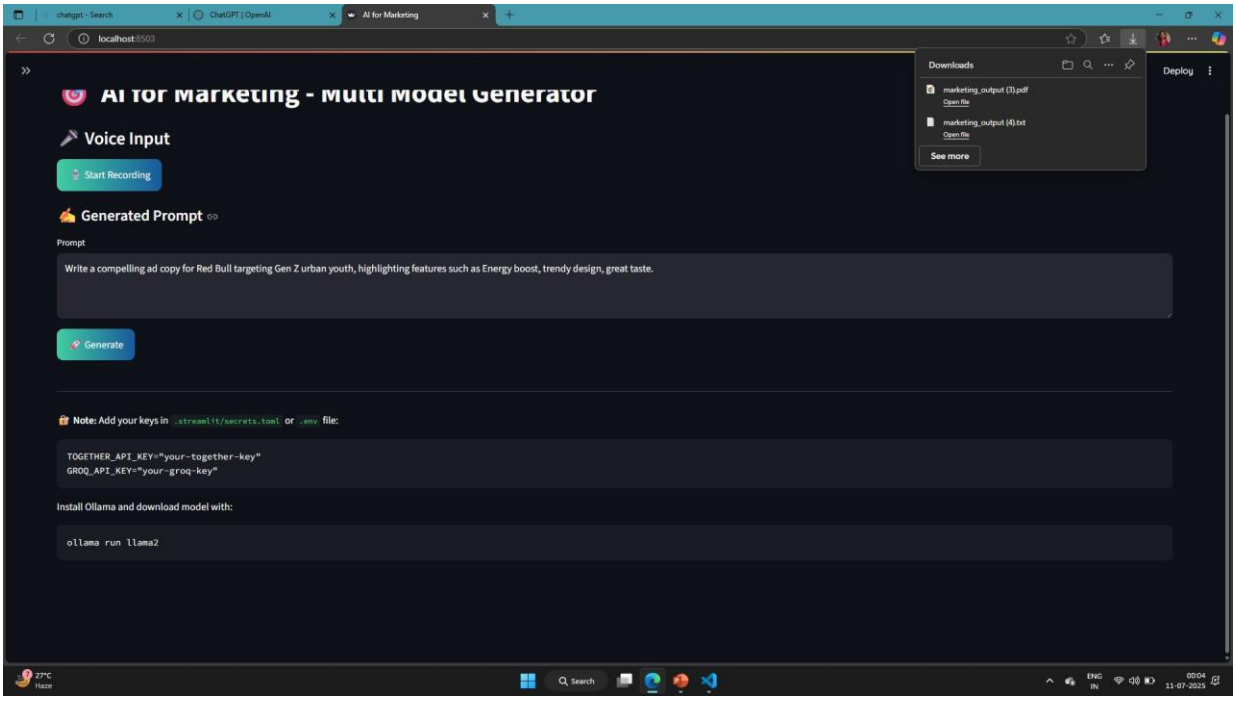
2.5
2
1.5
1
0.5
0
Together.ai (Mistral)
Ollama (local)
Groq (LLaMA3)
Model


AI for Marketing - Multi Model Generator
Voice Input
Start Recording
Generated Prompt
Prompt
Write a compelling ad copy for Red Bull targeting Gen Z urban youth, highlighting features such as Energy boost, trendy design, great taste.
Generate
Note: Add your keys in .streamlit/secrets.toml or .env file:
TOGETHER_API_KEY="your-together-key"
GROQ_API_KEY="your-groq-key"
Install Ollama and download model with:
ollama run llama2
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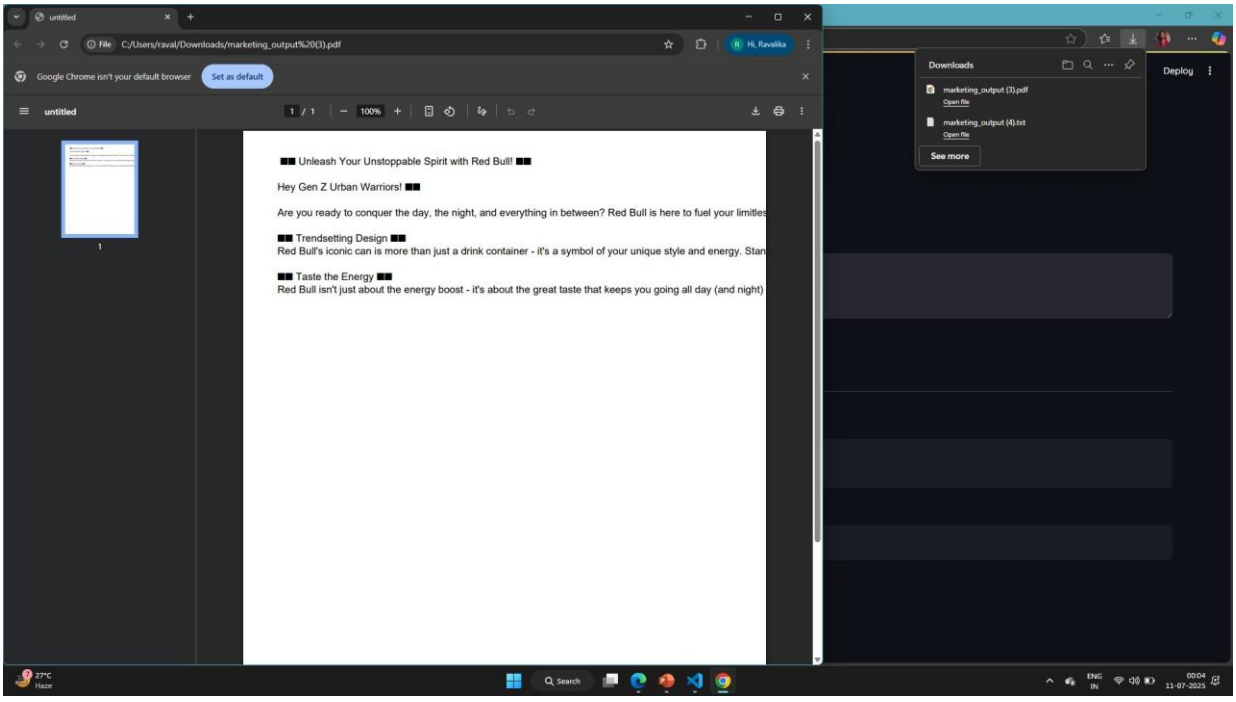
See more
Deploy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Hey Gen Z Urban Warriors! ■■
Are you ready to conquer the day, the night, and everything in between? Red Bull is here to fuel your limitles
■■ Trendsetting Design ■■
Red Bull's iconic can is more than just a drink container - it's a symbol of your unique style and energy. Stan
■■ Taste the Energy ■■
Red Bull isn't just about the energy boost - it's about the great taste that keeps you going all day (and night)
Downloads
marketing_output (3).pdf
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marketing_output (4).txt
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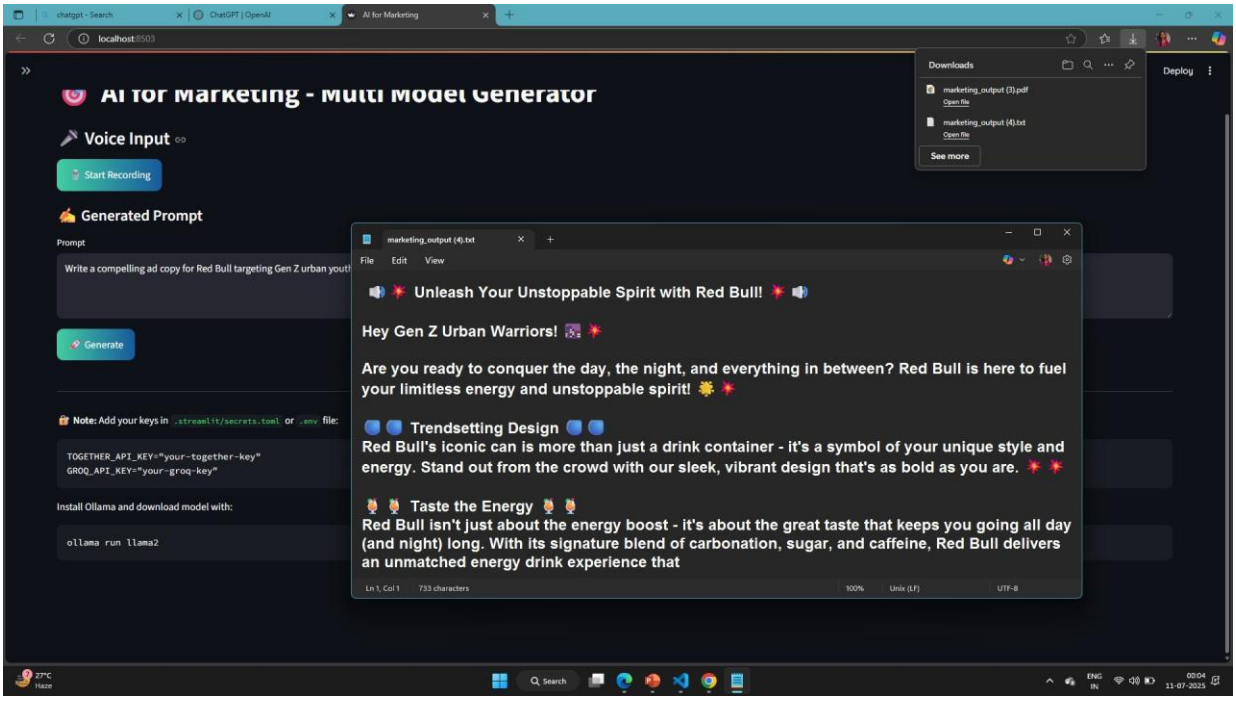
localhost:8503
AI for Marketing - Multi Model Generator
Voice Input
Start Recording
Generated Prompt
Prompt
Write a compelling ad copy for Red Bull targeting Gen Z urban youth
Generate
Note: Add your keys in .streamlit/secrets.toml or .env file:
TOGETHER_API_KEY="your-together-key"
GROQ_API_KEY="your-groq-key"
Install Ollama and download model with:
ollama run llama2
marketing_output (4).txt
File Edit View
Unleash Your Unstoppable Spirit with Red Bull!
Hey Gen Z Urban Warriors!
Are you ready to conquer the day, the night, and everything in between? Red Bull is here to fuel your limitless energy and unstoppable spirit!
Trendsetting Design
Red Bull's iconic can is more than just a drink container - it's a symbol of your unique style and energy. Stand out from the crowd with our sleek, vibrant design that's as bold as you are.
Taste the Energy
Red Bull isn't just about the energy boost - it's about the great taste that keeps you going all day (and night) long. With its signature blend of carbonation, sugar, and caffeine, Red Bull delivers an unmatched energy drink experience that
Ln 1, Col 1 733 characters 100% Unix (LF) UTF-8
Downloads
marketing_output (3).pdf
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marketing_output (4).txt
Open file
See more
Deploy

6. IMPLEMENTATION

Environment Setup:

- API keys (GEMINI_API_KEY, OPENAI_API_KEY) are securely stored in a .env file.
- Keys are accessed using Python's os.getenv() after being loaded via load_dotenv().
- This setup ensures credentials are not hardcoded, improving security and portability.
- This configuration also supports cloud deployment scenarios where credentials need to be abstracted from the source code.
- The .gitignore file is configured to exclude the .env file from version control.

Model Integration:

- Models used: Google Gemini Pro (ChatGoogleGenerativeAI), OpenAI GPT-3.5 (ChatOpenAI).
- Integration is handled via the LangChain framework for prompt management, model abstraction, and modular pipeline design.
- Model selection is dynamic based on user input via the frontend dropdown, allowing seamless switching without reloading the interface.
- LangChain's modular design allows future scalability, including the addition of models from Groq, Together AI, or Ollama.

Model Loading and Caching:

- Stable Diffusion image generation pipeline is loaded using StableDiffusionPipeline.from_pretrained().
- GPU is utilized if available (torch.cuda.is_available()), otherwise CPU fallback is implemented.
- Cached using @st.cache_resource to avoid reloading on each interaction and boost performance.
- This caching mechanism prevents performance bottlenecks, especially during repeated image generation operations.
- Hugging Face's model repository access is streamlined without requiring authentication tokens.

Session State Usage:

- st.session_state is used to persist user data such as:
  - Extracted text from image/voice input
  - Last selected model
  - AI-generated content mapped by product name
  - Exported files (CSV, Excel, JSON) and generated image previews
- Ensures a seamless user experience with remembered selections and reduced redundancy.
- Also enables advanced workflows such as selective content evaluation and iterative refinements.

OCR and Speech-to-Text Utilities:

- pytesseract processes uploaded images and extracts text.
- Image input supports multiple formats (JPEG, PNG) and is previewed in the Streamlit UI.
- speech_recognition module transcribes uploaded audio to text using Google Speech API.
- Audio input supports .mp3, .wav, and .m4a, enabling mobile-friendly and voice-first user workflows.

Evaluation Tools:

- langdetect automatically detects the language of AI-generated output.
- textstat computes readability scores (Flesch Reading Ease) for quality analysis.
- These metrics are shown in real-time, helping users assess clarity, accessibility, and language appropriateness.
- Each generated output is accompanied by evaluation data, allowing comparison across variations.

Technologies Used:

- Programming Language: Python 3.10+
- Frontend Framework: Streamlit
- Backend Components: LangChain, Python
- AI APIs and Models: OpenAI GPT-3.5, Google Gemini Pro
- Utility Libraries:

- pytesseract for OCR
- speech_recognition for audio transcription
- textstat and langdetect for evaluation
- diffusers and torch for image generation with Stable Diffusion

This modular, extensible, and secure implementation ensures that the AI Marketing Generator can deliver real-time, high-quality outputs with a responsive user interface. It supports rapid content ideation, multilingual capabilities, and integrated visuals—providing a complete end-to-end solution for modern digital marketing teams.

The implementation of the AI Marketing Generator platform involves a combination of modular Python scripts, third-party AI model APIs, and seamless integration through the Streamlit interface. A key focus of the implementation is ensuring that the app remains responsive, secure, and capable of handling diverse user inputs while maintaining a smooth user experience.

To begin with, the environment is configured using a .env file, which is essential for keeping API keys secure and hidden from the main source code. This file typically contains sensitive credentials like the GEMINI_API_KEY and OPENAI_API_KEY. These variables are loaded using Python's dotenv library (load_dotenv()), and accessed within the script using os.getenv(). This setup allows the application to run safely both in local environments and in production deployments like Streamlit Cloud, without hardcoding any sensitive information in the codebase.

The application integrates multiple AI models, such as Google Gemini Pro and OpenAI GPT-3.5, using the langchain_google_genai and langchain_openai modules respectively. These models are wrapped inside LangChain's ChatGoogleGenerativeAI and ChatOpenAI classes. Each model is loaded with its respective API key, and invoked based on user selection via a dropdown interface in the Streamlit frontend. This modular design ensures that adding new models in the future (such as Claude or Mistral) would require minimal changes.

One of the critical performance enhancements comes from caching heavy components using Streamlit's @st.cache_resource decorator. This is used specifically to load and store the Stable Diffusion image generation pipeline, which is memory-intensive and computationally expensive. Caching ensures that the model is loaded only once per session, dramatically reducing wait times for image generation and improving overall responsiveness. The pipeline is loaded from the CompVis/stable-diffusion-v1-4 model via Hugging Face's diffusers library, and automatically leverages GPU (torch.cuda.is_available()) when available.

saving the uploaded text from an image or voice input, tracking the user's last selected model, and storing the AI-generated content for each product. By maintaining this state, the app avoids repetitive input steps and ensures that content selections and preferences are remembered during navigation. For instance, once content is generated for a product, it is stored in the session and can be viewed later or exported without regeneration.

In addition, various utility libraries support the AI pipeline. pytesseract is used for OCR (Optical Character Recognition) on uploaded images, converting visuals into raw text input. speech_recognition is used for converting uploaded voice files into text using the Google Speech API. For evaluation, langdetect identifies the language of the generated content, and textstat calculates the Flesch Reading Ease score to help users understand the complexity and accessibility of the AI-generated text.

Together, these implementation choices ensure a fast, secure, and extensible AI-driven platform that balances real-time interactivity with the power of cloud-based generative AI models—suitable for marketing professionals, content creators, and creative teams alike.

7. CHALLENGES FACED

- Model Integration Issues:
    - Integrating both Gemini Pro and GPT-3.5 with LangChain required careful configuration and management of different API structures.
    - Prompt formatting had to be fine-tuned to align with each model's expected schema for optimal results.
- Audio/Text/Image Processing Difficulties:
    - Handling large image and audio files led to memory and performance constraints.
    - OCR sometimes failed with poor-quality images or handwritten text.
    - Voice transcription could be inaccurate with noisy backgrounds or non-English accents.
- API Rate Limits and Access Errors:
    - Free-tier API limits for Google and OpenAI were frequently hit during testing.
    - Some requests were delayed or throttled, requiring retry mechanisms.
    - Ensuring stable API connectivity during peak usage was critical.
- OCR Accuracy Concerns:
    - Tesseract OCR had limitations in recognizing stylized fonts and low-contrast text.
    - Accuracy was highly dependent on image quality and resolution.
    - Preprocessing images (e.g., resizing or enhancing contrast) was sometimes necessary to improve OCR performance.
- Session State Complexity:
    - Managing dynamic session data like multiple outputs, selections, and exports became increasingly complex.
    - Required careful use of key-based dictionaries within st.session_state to avoid data overwriting.
- Performance Optimization:
    - Stable Diffusion required significant resources, and image generation latency was a challenge without GPU acceleration.
    - Caching helped, but initial model loading still took several seconds.

These challenges were addressed through iterative debugging, code optimization, conditional logic, and leveraging Streamlit's caching and UI feedback features.

8. FUTURE ENHANCEMENTS

- User Authentication and History:
    - Enable secure user login to allow personalized content history, saved sessions, and usage tracking.
    - This will help users resume past work, compare outputs over time, and manage multiple brand projects.
- Brand Voice Consistency Management:
    - Implement custom prompt templates and reusable tone profiles to maintain consistent brand messaging.
    - Include brand-specific keywords, style guides, and persona alignment tools.
- A/B Testing Integration:
    - Add tools to generate content variations and run A/B testing for performance evaluation.
    - Integration with marketing platforms (like Mailchimp or Meta Ads Manager) to test in real campaigns.
- Advanced Analytics Dashboard:
    - Visualize user behavior, content generation trends, model usage statistics, and readability insights.
    - Include exportable reports and key performance indicators (KPIs) to guide content strategy.
- Third-party Tool Integrations:
    - Integrate with Canva for design editing, Google Sheets for collaborative workflows, and Notion for content management.
    - Allow one-click publishing or export to common platforms for marketing and social media.

These enhancements aim to evolve the platform from a single-use generator to a robust, intelligent marketing co-pilot tailored for real-world use in agencies and businesses.

9. CONCLUSION

The AI Marketing Generator stands as a powerful example of how artificial intelligence can be harnessed to revolutionize content creation and campaign ideation in the marketing industry. By merging the capabilities of advanced language models like OpenAI's GPT-3.5 and Google's Gemini Pro with accessible frontend technology such as Streamlit, this platform empowers marketers, brands, and content creators to generate compelling, platform-specific marketing content in multiple languages and tones. The integration of OCR, speech-to-text, evaluation metrics, and image generation tools further enhances the user experience, making the tool not just intelligent, but also versatile and inclusive.

Beyond just generating slogans or ad copy, this tool enables users to experiment creatively with voice input, extract content ideas from visuals, and optimize the readability and linguistic appropriateness of the generated content. The ability to evaluate outputs based on language and reading ease helps maintain quality, while the export options support sharing and further collaboration.

With future plans for user authentication, analytics dashboards, brand consistency features, and A/B testing integration, the platform has a clear roadmap to evolve into a comprehensive marketing assistant. It demonstrates how modern AI can democratize creativity, reduce content production time, and support strategic decision-making in digital marketing. Overall, the AI Marketing Generator is not only a technical innovation but also a valuable real-world tool for the evolving needs of today’s marketers.

10. REFERENCES

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- OpenAI API Documentation: https://platform.openai.com/docs
- Google AI (Gemini Pro) API Docs: https://ai.google.dev

11. APPENDIX

Full Source Code

The complete implementation of the platform resides in the main.py file. It includes Streamlit UI components, LangChain model integration, OCR and voice input processing, image generation logic, and content evaluation workflows.

Sample .env File

GEMINI_API_KEY=”your_google_gemini_api_key”

OPENAI_API_KEY=”your_openai_api_key”

Place this file in the project root and ensure it's listed in .gitignore for security.

Deployment Instructions

a) Use pip to install required packages:

pip install -r requirements.txt

b) Add your API keys to a .env file in the root directory.

c) Launch the application with Streamlit:

streamlit run main.py

d) Optional Cloud Deployment

- Deploy via Streamlit Cloud or platforms like Heroku, AWS, Azure.
- For Stable Diffusion, ensure GPU compatibility and setup.

This appendix ensures developers and users can replicate, deploy, and customize the AI Marketing Generator across environments with ease.