ARTIFICIAL INTELLIGENCE IN MARKETING CAMPAIGNS: A WAY TO ADAPT MARKETING TO NEW TECHNOLOGIES

INTELIGENCIA ARTIFICIAL NAS CAMPANHAS DE MARKETING: UMA FORMA DE ADAPTAÇÃO DO MARKETING ÀS NOVAS TECNOLOGIAS

INTELIGENCIA ARTIFICIAL EN LAS CAMPAÑAS DE MARKETING: UNA FORMA DE ADAPTAR EL MARKETING A LAS NUEVAS TECNOLOGÍAS

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ABSTRACT

The contemporary landscape of Digital Marketing is marked by the incessant demand for personalized and optimized content, which poses a critical challenge to teams: the inefficiency in the manual analysis of information and the subsequent slowness in writing campaigns, limiting the scalability of corporate communication. The aim is to mitigate this limitation through the development of SocialGen-AI, a generative Artificial Intelligence system designed for end-to-end automation of the creation of promotional texts for social media, starting from the structural and semantic analysis of web pages. The implementation methodology is based on Agile Software Engineering, culminating in a solution implemented in Python and structured via API, which integrates with the Ollama framework for the optimized execution of the DeepSeek large language model. The process includes data extraction, contextualized semantic analysis, and the generation of copy with tone and style

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adjustments. Thus, SocialGen- AI allows for a substantial reduction in content time-to-market, in addition to ensuring high consistency and personalization at scale. In conclusion, an architecture based on local LLMs and dedicated APIs represents a viable and scalable technological solution for optimizing marketing productivity, paving the way for future research focused on native integration with social media platforms and the continuous improvement of AI's contextual accuracy.

RESUMO
O cenário contemporâneo do Marketing Digital é marcado pela demanda incessante por conteúdo personalizado e otimizado, o que impõe um desafio crítico às equipes: a ineficiência na análise manual de informações e a subsequente morosidade na redação de campanhas, limitando a escalabilidade da comunicação corporativa. Objetiva- se mitigar essa limitação por meio do desenvolvimento do SocialGen-AI, um sistema de Inteligência Artificial generativa concebido para a automação end-to-end da criação de textos promocionais para mídias sociais, partindo da análise estrutural e semântica de páginas web. A metodologia de implementação baseia-se na Engenharia de Software Ágil, culminando em uma solução implementada em Python e estruturada via API, que se integra ao framework Ollama para a execução otimizada do modelo de large language DeepSeek. O processo compreende a extração de dados, a análise semântica contextualizada e a geração de copy com ajuste de tom e estilo. Desse modo, observa-se que o SocialGen-AI permite uma redução substancial no time-to-market do conteúdo, além de garantir alta consistência e personalização em escala. Conclui-se que a arquitetura baseada em LLMs locais e APIs dedicadas representa uma solução tecnológica viável e escalável para a otimização da produtividade em Marketing, pavimentando o caminho para futuras pesquisas focadas na integração nativa com plataformas de redes sociais e no aprimoramento contínuo da precisão contextual da IA.

RESUMEN
El panorama actual del marketing digital se caracteriza por la demanda constante de contenido personalizado y optimizado, lo que supone un desafío crucial para los equipos: la ineficiencia del análisis manual de la información y la consiguiente lentitud en la creación de campañas, limitando la escalabilidad de la comunicación corporativa. El objetivo es mitigar esta limitación mediante el desarrollo de SocialGen-AI, un sistema de Inteligencia Artificial generativa diseñado para la automatización integral de la creación de textos promocionales para redes sociales, a partir del análisis estructural y semántico de páginas web. La metodología de implementación se basa en la Ingeniería de Software Ágil, culminando en una solución implementada en Python y estructurada mediante API, que se integra con el framework Ollama para la ejecución optimizada del modelo de lenguaje DeepSeek. El proceso incluye la extracción de datos, el análisis semántico contextualizado y la generación de textos con ajustes de tono y estilo. De este modo, SocialGen-AI permite una reducción sustancial del tiempo de lanzamiento del contenido, además de garantizar una alta coherencia y personalización a gran escala. En conclusión, una arquitectura basada en LLM locales y API dedicadas representa una solución tecnológica viable y escalable para optimizar la productividad del marketing, allanando el camino para futuras investigaciones centradas en la integración nativa con las plataformas de redes sociales y la mejora continua de la precisión contextual de la IA.

Palabras clave: Inteligencia Artificial. Marketing Digital. Automatización de Contenido. LLM. FastAPI.

1 INTRODUCTION

In recent years, social media has consolidated itself as one of the main communication channels between brands and consumers. In an increasingly competitive digital environment, maintaining an active, relevant, and coherent online presence has become essential for the strategic positioning of organizations. However, the traditional process of creating content for these platforms requires continuous effort from marketing teams, who need to analyze products, study trends, write texts, and adjust the tone of each publication to the audience of different networks. According to a study applied to the banking sector, sentiment analysis on social networks is essential to monitor public perceptions and guide strategic decisions, since these platforms have become essential sources for capturing opinions and trends in real time (DOS SANTOS; FERREIRA; BOENTE, 2025).

This process, while critical, is labor-intensive and time-consuming, which limits the agility and scalability of communication strategies. In addition, the speed with which new trends and information emerge makes exclusively human monitoring unfeasible. Faced with this challenge, Artificial Intelligence (AI) emerges as a powerful tool to automate content generation steps, reducing manual effort and increasing team efficiency. According to Goodfellow, Bengio, and Courville (2016), advances in deep learning have revolutionized the way machines process natural language, allowing neural models to generate text that is increasingly similar to human-written text.

Additionally, the automation provided by AI allows repetitive and operational activities to be performed more quickly and accurately, freeing up professionals to dedicate themselves to strategic tasks. This logic is widely recognized in Software Engineering, where automation "significantly reduces the human effort required in routine and repetitive tasks, increasing productivity and the quality of the development process" (SOMMERVILLE, 2019, p. 25). Applying this premise to marketing, the SocialGen-AI system was conceived in this context, seeking to transform a repetitive process into an automated and intelligent practice.

2 THEORETICAL FRAMEWORK

The theoretical framework in this study comprises a critical and organized analysis of the literature that underlies the development of the SocialGen-AI system, providing a technological and market contextualization. The analysis focuses on the pillars of Generative Artificial Intelligence, the application of these tools in Digital Marketing and the Software Architecture concepts that make the solution viable.

2.1 GENERATIVE ARTIFICIAL INTELLIGENCE AND DEEP LEARNING

Advances in deep learning models play a key role in the implementation of intelligent systems capable of understanding and generating language with a high level of coherence. This capability has become the basis for Large Language Models (LLMs), which are the heart of generative AI systems.

According to Goodfellow, Bengio and Courville (2016), deep learning has revolutionized natural language processing by enabling models to understand semantic and syntactic patterns in a hierarchical way, making systems more capable of performing tasks previously restricted to the human intellect (GOODFELLOW; BENGIO; COURVILLE, 2016). This capacity for contextual representation and semantic adaptation is what enables the practical application of generative models, such as the DeepSeek used in SocialGen-AI, in creative tasks, such as the automated production of advertising campaigns.

2.2 AUTOMATION, AI, AND DIGITAL MARKETING STRATEGIES

The contemporary Digital Marketing landscape requires organizations to maintain an active and relevant online presence, but the process of manual content creation is labor-intensive, time-consuming, and limits the scalability of communication. The manual production of posts consumes significant time and limits the frequency and relevance of publications, justifying the need for an automated solution (DOS SANTOS; FERREIRA; BOENTE, 2025).

Artificial intelligence emerges as the key technology to mitigate these challenges, playing an essential role in automating processes and generating strategic insights, allowing organizations to optimize resources and increase their operational efficiency (SILVA, 2023).

Additionally, the automation provided by AI allows repetitive and operational activities to be performed more quickly and accurately, freeing up professionals to dedicate themselves to strategic tasks. SocialGen-AI adopts this principle, using AI to automate content creation steps, improving the efficiency of marketing work.

2.3 RESTFUL SYSTEMS ARCHITECTURE AND APIS

The technical feasibility of SocialGen-AI lies in its modular architecture. The system was designed in the RESTful API format, which is a fundamental software architecture style for building scalable web services, where communication between client and server systems occurs in a standardized way, usually using the HTTP protocol (GUPTA, 2025). SocialGen-

AI's API endpoints are capable of receiving and returning data in JSON, favoring scalability and integration with other services (TIANGOLO, 2025).

The API was developed using the FastAPI framework, chosen for its high performance and simplicity in building modern web services. This architecture is essential for integration with Ollama, which acts as a local intermediary, functioning as a layer that manages the execution, loading, and processing of the DeepSeek model directly in the local environment (OLLAMA, 2025). Local processing eliminates dependence on cloud services, ensuring greater control over data flow and ensuring privacy, as well as reducing costs (DEEPSEEK API, 2025).

3 METHODOLOGY AND SYSTEM ARCHITECTURE

The development of SocialGen-AI followed a structured methodological approach, divided into stages of conception, implementation and testing. The main objective was to create a system capable of automatically processing web pages and generating, from them, personalized marketing campaigns.

The methodology adopted for the development is based on a systematic approach, divided into interdependent steps that aim to ensure the efficiency of the process of collecting, processing and generating automated content. Initially, a requirements survey was carried out to identify the main needs of the target audience and define the criteria for selecting information sources.

Next, the architecture of the system was established, contemplating the definition of the operating flow, from data capture to the generation and storage of draft posts. At this stage, the technologies to be used were also selected, such as the Python language and specific libraries for web scraping and feed reading.

With the architecture defined, the data collection and extraction stage was carried out. The collected material was subjected to a generative artificial intelligence API, responsible for processing and transforming the raw data into draft posts. Finally, the methodology included the validation stage of the system with real users, through practical tests and feedback collection. The process was completed with the preparation of technical and use documentation.

The methodology of an article outlines the procedures employed to conduct the research, including the type of study, sample selection, methods of data collection and analysis, ethical considerations, and limitations of the study. Its detailed and transparent

description is essential to ensure the replicability and reliability of the results, in addition to providing a solid basis for the interpretation and generalization of the findings.

3.1 DESIGN AND DEFINITION OF REQUIREMENTS

In the initial phase, a requirements analysis determined the essential functionalities of the system. Among the demands identified were:

1. Receive a link from a website as input;
2. Automatically collect and process the textual content of the page;
3. Send the processed text to an advanced language model (DeepSeek) executed locally via Ollama;
4. Generate a marketing campaign adapted to the product or service present in the link;
5. Return the result in a structured format, allowing future integration with other applications.

Based on these requirements, the use of Python as the main language was defined. The system was designed in the RESTful API format, with endpoints capable of receiving and returning data in JSON, favoring scalability and integration with other services.

Figure 1

Input from the site to be analyzed

Source: Prepared by the authors themselves (2025).
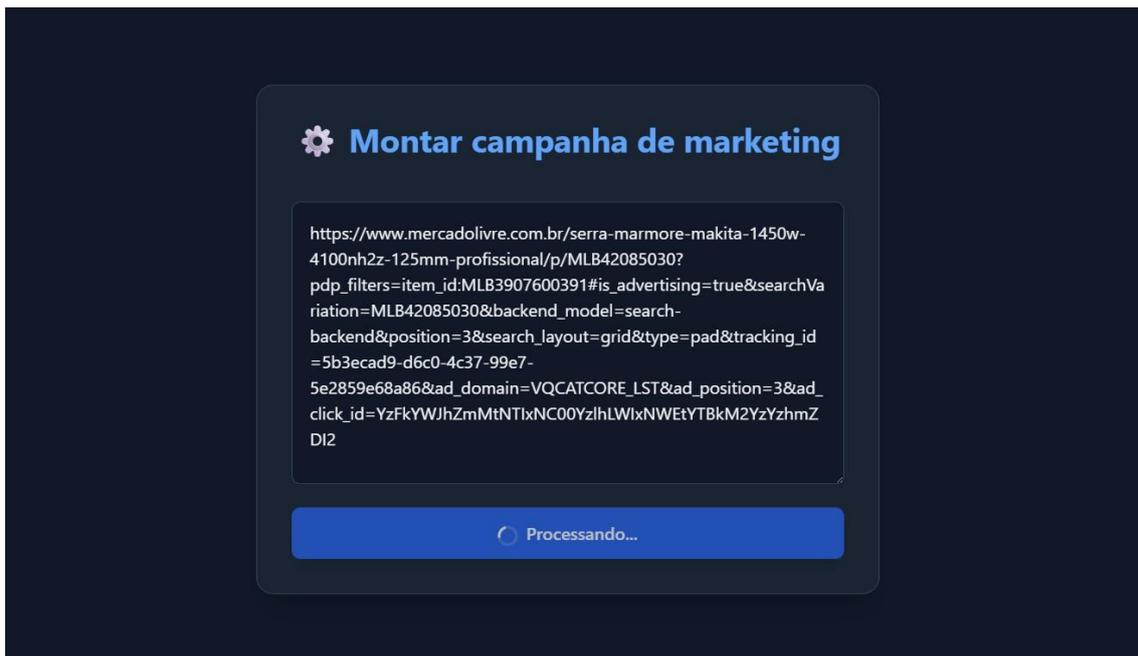
3.2 GENERAL SYSTEM ARCHITECTURE

The architecture of SocialGen-AI is designed based on three main layers:

- Input Layer: Receives the link sent by the user or client system.
- Processing Layer: In charge of extracting the textual content from the website, sending the text to the AI model via Ollama and handling the response received.
- Output Layer: Responsible for structuring and making available the final result of the generated campaign text in a standardized format.

This modular structure allows each component to work independently, ensuring greater maintainability, scalability, and clarity in data flow.
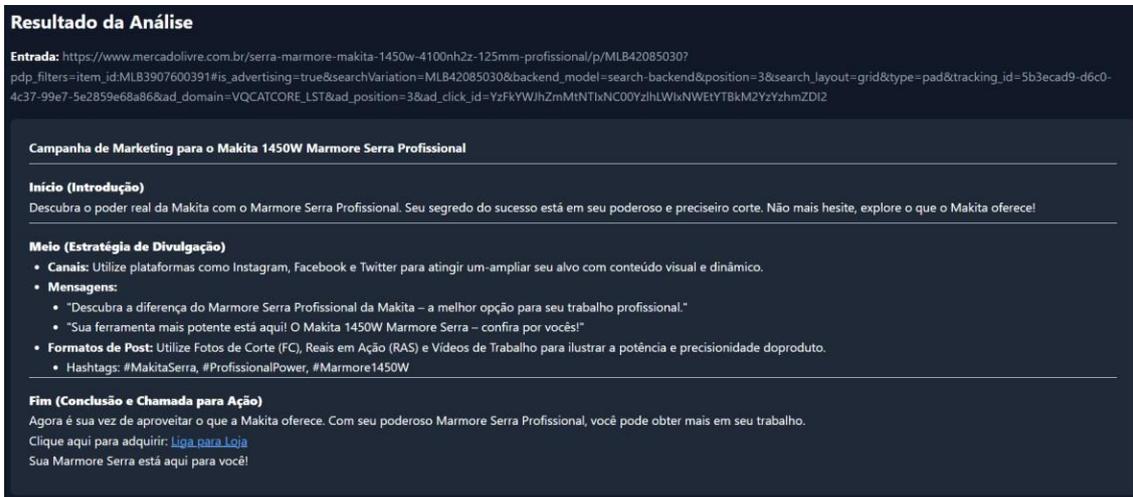
Figure 2

Processing of the embedded website

Source: Prepared by the authors themselves (2025).

Figure 3

Data returned after search

Caption text from figure:
Resultado da Análise

Entrada: https://www.mercadolivre.com.br/serra-marmore-makita-1450w-4100nh2z-125mm-profissional/p/MLB42085030?
pdp_filters=item_id:MLB3907600391#is_advertising=true&searchVariation=MLB42085030&backend_model=search-backend&position=3&search_layout=grid&type=pad&tracking_id=5b3ecad9-d6c0-
4c37-99e7-5e2859e68a86&ad_domain=VQCATCORE_LST&ad_position=3&ad_click_id=YzFkYWJhZmMtNTIxNC00YzlhLWIxNWEtYTBkM2YzYzhmZDI2

Campanha de Marketing para o Makita 1450W Marmore Serra Profissional

Início (Introdução)
Descubra o poder real da Makita com o Marmore Serra Profissional. Seu segredo do sucesso está em seu poderoso e preciseiro corte. Não mais hesite, explore o que o Makita oferece!

Meio (Estratégia de Divulgação)
- **Canais:** Utilize plataformas como Instagram, Facebook e Twitter para atingir um-ampliar seu alvo com conteúdo visual e dinâmico.
- **Mensagens:**
  - "Descubra a diferença do Marmore Serra Profissional da Makita – a melhor opção para seu trabalho profissional."
  - "Sua ferramenta mais potente está aqui! O Makita 1450W Marmore Serra – confira por vocês!"
- **Formatos de Post:** Utilize Fotos de Corte (FC), Reais em Ação (RAS) e Vídeos de Trabalho para ilustrar a potência e precisionidade doproduto.
  - Hashtags: #MakitaSerra, #ProfissionalPower, #Marmore1450W

Fim (Conclusão e Chamada para Ação)
Agora é sua vez de aproveitar o que a Makita oferece. Com seu poderoso Marmore Serra Profissional, você pode obter mais em seu trabalho.
Clique aqui para adquirir: Liga para Loja
Sua Marmore Serra está aqui para você!

Source: Prepared by the authors themselves (2025).

3.3 PYTHON API IMPLEMENTATION

The API was developed using the FastAPI framework, chosen for its performance and simplicity. The main endpoint (/parse) receives the link, extracts the content, and triggers the DeepSeek model to generate the final text.

The simplified deployment flow includes:

1. You submit a POST request with the product link.
2. The API uses libraries (Requests and BeautifulSoup4) for scraping and extracting relevant content.
3. The clean text is passed to Ollama, specifying the DeepSeek template for generation.
4. The response is handled and converted to a structured format (JSON).
5. The result is returned to the API client.

3.4 INTEGRATION WITH OLLAMA AND THE DEEPSEEK MODEL

Ollama acts as a local intermediary, managing the execution of the DeepSeek model. This approach eliminates dependence on cloud services, ensuring greater control over the flow of data, ensuring privacy, and reducing costs and latency. The DeepSeek model was selected for its robust performance in textual comprehension, semantic analysis, and creative content generation tasks, making it ideal for turning product descriptions into engaging campaigns.

The API is responsible for putting together a carefully structured prompt, guiding the model to analyze the content and produce a campaign that highlights the product's

differentials. The quality of the prompt is key to ensuring consistency in style and alignment with the communication proposal.

3.5 DATA FLOW AND OPERATION

The flow of SocialGen-AI is organized into five main steps:

1. Input: Receipt and validation of the link by the API.
2. Data Collection: Automatic extraction of textual content, including request, interpretation of HTML and filtering of irrelevant elements.
3. Interpretation: Sending the text to the DeepSeek model via Ollama, using a defined prompt to guide the analysis and style of the response.
4. Generation: The model produces a complete marketing campaign, highlighting differentials and aspects relevant to the target audience.
5. Output: Return of the final text formatted and ready for publication via the API.

Figure 4

Produced by the author
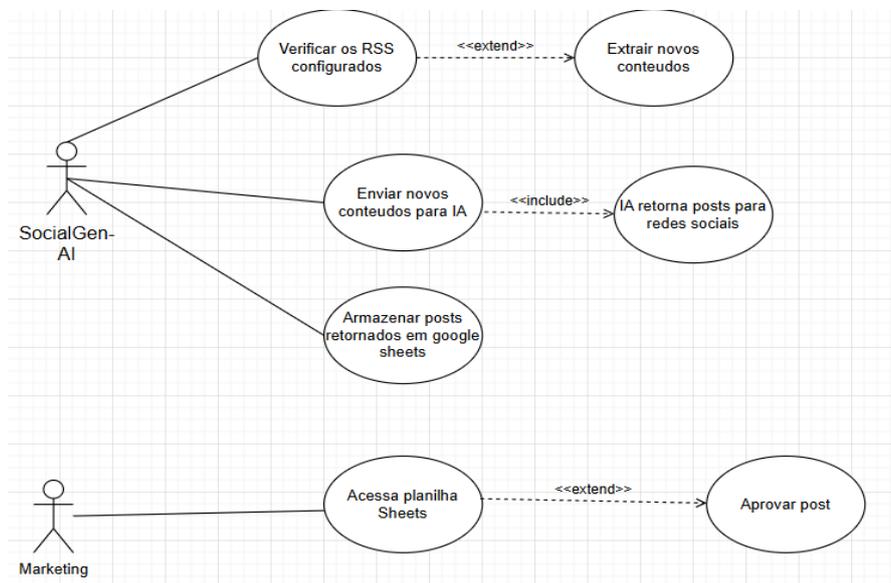
Source: Prepared by the authors themselves (2025).

4 RESULTS AND DISCUSSIONS

4.1 IMPLEMENTATION RESULTS AND CONTENT GENERATION

The results of this study focus on demonstrating the feasibility and effectiveness of SocialGen-AI as a technological solution for automating the creation of digital marketing campaigns. The implementation of the RESTful API architecture (Section 3.3) in Python and

the integration with Ollama, running the DeepSeek model, proved to be efficient in capturing and processing web information in real time.

The most significant result is the system's ability to turn a product link into a full-fledged marketing campaign draft, which includes:

- Introduction and Hook: Initial messages to capture attention.
- Dissemination Strategy: Suggestions for channels and post formats.
- Key Messages (Copy): Creative and persuasive texts, focusing on the product's differentials.
- Conclusion and Call to Action (CTA): Finalization and targeting the consumer.

The detailed output example in Figure 3 (Section 3.2) demonstrates that the system is capable of generating content with a professional and sales-oriented tone, fulfilling the requirement of producing creative ad suggestions from the interpretation of the text on the page.

4.1.1 Performance and Safety

The local execution of the DeepSeek model via Ollama showed favorable results in terms of operational efficiency. Local processing eliminates the latency associated with external API calls, resulting in faster and more consistent responses, allowing full campaigns to be generated in seconds.

In terms of security, the local approach mitigates the risk of data leakage or interception, since no sensitive information is transmitted to external servers. This is a crucial outcome for the applicability of SocialGen-AI in enterprise environments that require confidentiality and compliance.

4.2 DISCUSSION AND IMPLICATIONS OF THE STUDY

The implementation of SocialGen-AI corroborates the Generative Artificial Intelligence literature (Section 2.1), demonstrating in practice how the advancement of deep learning and LLMs allows neural models to "understand and generate text in an increasingly human-like way" (GOODFELLOW; BENGIO; COURVILLE, 2016). The system's ability to generate multiple content formats for different digital platforms (LinkedIn, Twitter/X, Facebook) from a single source supports the thesis that AI is a powerful tool for automating content creation, reducing manual effort and increasing efficiency.

4.2.1 Solving the Research Question

The main result directly addresses the research question of the study: The system is able to automate the analysis of web content and generate texts for digital marketing campaigns in a coherent and personalized way, optimizing the workflow of the teams.

- Coherence and Personalization: The generation of messages focused on differentials and with specific call-to-actions validates the model's ability to reinterpret content strategically, adopting advertising language and elements that arouse interest.
- Workflow Optimization: The proposed methodology (Section 3.5), which culminates in the storage of drafts in Google Sheets with approval status, transforms the marketing team's work from manual writing to only final review and validation. This aligns SocialGen-AI with the Software Engineering principle of reducing human effort on routine tasks, increasing productivity (SOMMERVILLE, 2019).

4.2.2 Limitations and Future Research

Despite the promising results, the study has limitations inherent to an initial development project. Hands-on validation of the system was performed in a controlled production environment (shown in Figures 1, 2, and 3). As future researches, the following stand out:

1. The practical implementation of the tool in a real production environment.
2. Direct integration with social media platforms for automated scheduling.
3. Continuous improvement of the AI model to increase accuracy and personalization, addressing more complex linguistic nuances.

5 CONCLUSION

The present study presented the design and architecture of SocialGen-AI, an Artificial Intelligence-based system designed to automate the generation of content for social media from information collected from web pages or news feeds. The analysis of the problem demonstrated that the manual production of posts consumes significant time and limits the frequency and relevance of publications, justifying the need for an automated solution.

The proposed methodology, which included stages of requirements gathering, data collection and extraction, processing with generative AI, storage, and review, evidenced the technical feasibility of the tool. The system demonstrates potential to generate content adapted to different platforms, promoting greater operational efficiency and supporting

strategic decision-making in marketing.

The development of SocialGen-AI, with its RESTful API architecture and the local execution of the DeepSeek model via Ollama, contributes significantly to the field by offering a scalable and secure model for optimizing the workflow of marketing teams.

As future perspectives, the following stand out:

• The practical implementation and testing with real users of the tool.

• Integration with multiple social platforms for scheduling.

• The continuous improvement of the AI model to increase the relevance, accuracy, and personalization of the generated content.

In this way, SocialGen-AI presents itself as a promising contribution to the automation of digital marketing and the advancement of technological solutions based on artificial intelligence.

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