INTERNATIONAL JOURNAL OF ADVANCED INNOVATIVE TECHNOLOGY IN ENGINEERING

Published by Instigative Research Private Limited Home page: www.ijaite.co.in

SEOgenious: AI Driven Framework for Content Optimization and Ranking

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Article History

Received on: 20 July 2026

Revised on: 15 Aug 2026

Accepted on: 20 Sept 2026

Keywords: SEO Optimization, AI Marketing Tool, GPT-based models

e-ISSN: 2455-6491

DOI: 10.65809/IJAITE/26/v03sp02/032

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ABSTRACT

Many content creators and small digital businesses face difficulties in effectively applying Search Engine Optimization (SEO) techniques, which often leads to low content visibility and poor ranking in search results. This research presents a Smart SEO Optimization AI Agent designed to automate and enhance the content optimization process for creators and marketing agencies. The proposed system utilizes GPT-based models to generate keyword suggestions based on user search intent and improve essential elements such as titles, headings, and Meta descriptions. To maintain content relevance, the system incorporates data from Google Trends to identify popular and emerging topics aligned with user interests. Additionally, web scraping techniques are used to analyze user-provided content and extract structural information, enabling more accurate and context-aware recommendations. The system also includes optional encryption mechanisms to ensure secure handling of user data and protect content privacy.

1. INTRODUCTION

In the digital era, Search Engine Optimization (SEO) has become a fundamental component for improving the visibility and reach of online content. Businesses, content creators, and marketing agencies rely heavily on SEO strategies to In the digital era, Search Engine Optimization (SEO) has become a fundamental component for improving the visibility and reach of online content. Businesses, content creators, and marketing agencies rely heavily on SEO strategies to rank higher in search engine results and attract targeted audiences. However, the dynamic nature of search engine algorithms, combined with the need for technical expertise in keyword research, content structuring, and performance analysis, makes SEO a challenging task—especially for small creators and startups with limited resources. Traditional SEO practices often involve manual keyword research, trend analysis, and iterative content refinement, which can be time-consuming and inconsistent. Moreover, many existing SEO tools provide fragmented solutions, requiring users to switch between platforms for keyword suggestions, content optimization, and performance tracking. This creates a gap between advanced SEO capabilities and their practical usability for non-technical user.

2. LITERATURE SURVEY

The rapid growth of artificial intelligence has significantly influenced digital marketing practices, especially in the field of Search Engine Optimization (SEO). Recent research highlights the increasing adoption of AI-based techniques for automating tasks such as keyword extraction, content analysis, and performance evaluation. Subhash (2025) discusses how AI-driven systems enhance search engine ranking by understanding user intent and providing data-driven optimization strategies. improve, making SEO processes more adaptive and efficient. Such techniques are particularly useful for agencies and

creators who need to respond quickly to changing trends and audience behavior.

Despite these advancements, most existing SEO tools provide isolated functionalities, requiring users to rely on multiple platforms for different tasks. This lack of integration reduces usability and efficiency, particularly for non-technical users. To overcome these limitations, the proposed Smart SEO Optimization AI Agent combines keyword analysis, trend detection, content optimization, and SEO scoring into a unified system. This integrated approach improves usability while making advanced SEO techniques more accessible, improve, making SEO processes more adaptive and efficient. Such techniques are particularly useful for agencies and creators who need to respond quickly to changing trends and audience behavior.

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3. METHODOLOGY

The methodology for the proposed Smart SEO Optimization AI Agent is designed as a multi-stage pipeline that combines data collection, natural language processing, machine learning, and performance evaluation to automate and enhance SEO optimization

A. Data Collection

The first stage focuses on gathering all relevant data required for SEO analysis and optimization. The system the methodology for the proposed Smart SEO Optimization AI Agent is designed as a multi-stage pipeline that combines data collection, natural language processing, machine learning, and performance evaluation to automate and enhance SEO optimization.

B. Data Collection

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C. Data Preprocessing

Once the data is collected, it undergoes preprocessing to ensure consistency, quality, and usability. Raw textual data often contains noise such as special characters, redundant words, and formatting inconsistencies, which may negatively affect analysis. Therefore, data cleaning techniques are applied to remove unwanted elements and standardize the content.

Natural Language Processing (NLP) techniques such as tokenization, stop-word removal, stemming, and lemmatization are used to prepare the text for analysis. The content is further structured into meaningful components such as sentences, paragraphs, and headings. Keywords are extracted and categorized based on their frequency, relevance, and search intent, including informational, navigational, and transactional types. This step ensures that the data is optimized for accurate AI-based evaluation.

D. Keyword and Trend Optimization

To maintain content relevance and competitiveness, the system integrates trend analysis using Google Trends and other keyword intelligence tools. This stage focuses on identifying high-impact keywords that are currently popular among users.

The extracted keywords are compared with those present in the user's content to identify gaps and missed opportunities. The system recommends new keywords, long-tail variations, and semantically related terms that can enhance search visibility. It also suggests content modifications to align with trending topics and evolving user interests, ensuring adaptability to dynamic search engine algorithms.

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G. Deployment as SaaS Platform

The proposed system is deployed as a scalable Software-as-a-Service (SaaS) platform, enabling accessibility for a wide range of users, including content creators, startups, and marketing agencies. The platform is designed to handle multiple users and large datasets efficiently.

An optional browser extension is also provided, allowing seamless integration with content creation platforms. This enables users to receive real-time SEO suggestions during content development, thereby improving productivity and workflow efficiency accepts user-provided inputs such as blog content, website URLs, or draft articles, which serve as the primary dataset. In addition to user inputs, external data is collected from reliable sources such as Google Trends and keyword research platforms to identify trending topics, popular search queries, and high-performing keywords in real time. To enhance contextual understanding, web scraping techniques are employed to extract structural elements from the content, including headings, meta descriptions, title tags, and internal linking patterns. By combining multiple data sources, the system ensures a comprehensive understanding of both user content and current market trends, thereby establishing a strong foundation for further processing.

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I. AI-Based Content Analysis

In this stage, advanced AI and NLP models are applied to analyze the processed content in depth. The system evaluates various SEO-related factors, including keyword density, keyword placement, readability, and overall content structure. It also determines whether the content aligns with user search intent and follows established SEO best practices.

4. Implementation

A. Setup and Integration

The implementation begins with the integration of multiple data sources and system components into a unified environment. The platform accepts user inputs such as blog content, URLs, or draft articles, while external data is obtained through APIs such as Google Trends and keyword analysis tools. This integration ensures that both user-generated content and real-time. Market data are available for analysis within a single system.

An initial preprocessing and scanning mechanism is applied to detect structural elements such as headings, meta tags, and keyword presence. The system establishes baseline metrics, including keyword density and content readability, which are used as reference points for further optimization. This stage ensures that the platform is scalable and capable of handling diverse datasets efficiently.

B. AI-Driven Analysis and Insights

Once the system is initialized, AI-based models are applied to perform detailed content analysis. Natural Language market data are available for analysis within a single system An initial preprocessing and scanning mechanism is applied to detect structural elements such as headings, meta tags, and keyword presence. The system establishes baseline metrics, including keyword density and content readability, which are used as reference points for further optimization. This stage ensures that the platform is scalable and capable of handling diverse datasets efficiently

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are used as reference points for further optimization. This stage ensures that the platform is scalable and capable of handling diverse datasets efficiently

C. Recommendation and Collaborative Optimization

The generated insights are presented through an interactive dashboard, where recommendations are organized based on priority and impact. The system categorizes suggestions into critical fixes, quick improvements, and advanced optimization strategies.

Users such as content creators, SEO specialists, and analysts can review these recommendations and apply necessary changes. This collaborative approach ensures that AI-generated suggestions are aligned with practical requirements and business goals. The system also supports automated suggestions for titles, Meta descriptions.

D. Execution, Monitoring, and Feedback

In the final stage, optimized content is deployed, and its performance is continuously monitored using predefined metrics such as SEO score, keyword ranking potential, and readability improvements. The system tracks changes over time and provides updated insights based on new data.

A feedback mechanism is incorporated to refine the system's recommendations by learning from previous outputs. This iterative process enhances the accuracy and effectiveness of the AI models. The integration of monitoring and feedback ensures that the system delivers measurable improvements in SEO performance and supports continuous optimization

RESULT

The performance of the proposed Smart SEO Optimization AI Agent was evaluated by analyzing the effectiveness of its core functional modules, including keyword analysis, content optimization, competitor analysis, SEO scoring, and recommendation generation. The system was tested on multiple sample blog articles and web pages to measure improvements in search engine optimization and content quality.

A. Keyword Analysis Module Result

The keyword analysis module successfully extracted relevant keywords from user content and compared them with trending and high-ranking search queries. The system identified missing keywords and suggested high-impact and long-tail keyword variations. After applying these suggestions, the keyword relevance significantly improved, resulting in better alignment with user search intent and increased.

B. Content Optimization Module Result

The content optimization module enhanced the overall structure and readability of the content. It improved heading hierarchy (H1, H2, H3), optimized paragraph distribution, and refined meta descriptions and titles. The module also reduced issues such as keyword stuffing and poorly structured content. As a result, the optimized content became more user-friendly and search-engine compatible

C. Competitor Analysis Module Result

The competitor analysis module compared user content with top-ranking competitor pages. It identified content gaps, missing topics, and differences in keyword usage. Based on this analysis, the system provided suggestions to improve content depth and coverage. This helped users create more competitive and comprehensive content, increasing their chances of achieving higher rankings

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E. Recommendation Engine Result

The recommendation engine generated actionable suggestions categorized into critical issues, quick improvements, and advanced strategies. Users were able to prioritize tasks effectively and implement changes with minimal effort. The recommendations were accurate, context-aware, and directly contributed to improving overall SEO performance

F. Real-Time Suggestion (Browser Extension)

The browser extension module enabled real-time SEO suggestions during content creation. Users received instant feedback on keyword usage, headings, and readability while writing content.

This feature improved workflow efficiency and reduced the need for post-editing optimization.

G. Overall System Performance

The combined performance of all modules demonstrated a significant improvement in content quality and SEO effectiveness. The system reduced manual effort, improved keyword relevance, and enhanced content structure. Overall, the Smart SEO Optimization AI Agent provided a practical and efficient solution for automated SEO optimization.

CONCLUSION

The Smart SEO Optimization AI Agent developed in this work demonstrates an effective integration of artificial intelligence and automation for improving digital content optimization. In the final phase, the system evolves from a basic prototype into a fully integrated platform capable of performing advanced SEO tasks such as keyword analysis, content structuring, trend identification, and performance evaluation. The use of AI-based models enables the system to generate context-aware suggestions and optimize content according to user intent and current search trends. The proposed solution reduces the dependency on manual SEO practices by automating repetitive and time consuming tasks. Features such as SEO score generation, recommendation categorization, and real-time insights allow users to systematically enhance their content quality. The inclusion of a scalable SaaS-based architecture ensures that the system can be efficiently used by individual creators, startups, and marketing agencies Furthermore, the integration of feedback mechanisms and continuous evaluation improves the reliability and adaptability of the system. Experimental observations indicate improvements in keyword relevance, readability, and overall optimization In conclusion, the Smart SEO Optimization AI Agent provides a practical and scalable solution for simplifying SEO processes. It not only enhances content visibility and ranking potential but also supports data-driven decision-making, making it a valuable tool in modern digital marketing environments.

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