

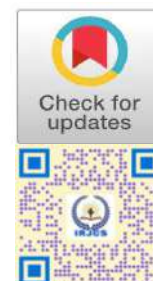
Enhancing E-commerce Content Management Systems with AI: Predictive Analytics and Personalization for Automated Content Creation

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Abstract: In the digital era of e-commerce, effective content management is crucial for engaging and retaining online consumers. Traditional manual approaches to content creation often fall short in terms of speed, scalability, and adaptability. With over 26.5 million e-commerce stores worldwide, staying competitive requires leveraging all available tools. This research paper investigates the efficiency and effectiveness of AI-driven content generation compared to traditional methods. We examine AI technologies for creating titles, subtitles, and SEO optimization against content writers. The study involves five authors and an AI tool generating content for five products, with time taken for content creation measured and compared. Additionally, a group of 15 participants will evaluate the professional quality and click ability of the generated content. Using Python, we will analyze the potential time savings for generating 100 titles and assess the overall quality improvement. The results aim to provide empirical evidence on the benefits of AI in content creation for e-commerce. Our findings reveal that AI significantly reduces the time required for content creation. Specifically, AI-generated titles are 84.17% faster and AI-generated subtitles are 77.31% faster compared to those created by content writers. The content writers worked without the aid of any tools, relying solely on provided specifications. Additionally, 81.33% of participants preferred the titles generated by AI, while 88% favoured the AI-generated subtitles. These results underscore the potential of AI to enhance efficiency and effectiveness in e-commerce content management.

Keywords: CMS, AI, E-Commerce, Software, SEO, Chat GPT

I. INTRODUCTION

The research is conducted exclusively where the content writer does not use any tools, and the purpose of the research is to assist the content writer, aiming to speed up and facilitate their job and process. In the fast-paced world of e-commerce, the ability to manage content quickly and effectively is vital for attracting and retaining consumers. Traditional content creation methods, which rely heavily on human effort, often struggle to keep pace with the dynamic demands of the market. These manual approaches are typically time-consuming, less scalable, and may lack the adaptability required for SEO optimization and engaging content creation. With over 26.5 million e-commerce stores worldwide, [7] competition has become fiercer. The exact number of products available online is vast and ever-growing. To stay ahead or become a market leader, businesses must leverage all possible tools to enhance their content creation processes. AI technologies present a promising solution to address these challenges by potentially offering faster, scalable, and more adaptable content generation. This research paper explores the titles and assess the overall improvement in content quality. This analysis will provide insights into the efficiency and effectiveness of AI tools in e-commerce content management and offer valuable information for businesses looking to enhance their digital marketing strategies. The rest of the paper is organized as follows: Section Methodology presents the methodology used in this study, detailing the participants, materials, tools, and procedures involved. This includes a comparison of content generation by human authors and an AI tool, time measurement, and content evaluation criteria.

Section Results discusses the results obtained from the data analysis, including time efficiency, quality assessment, SEO effectiveness, and predictive analysis. Finally, Section Conclusion provides the conclusion, summarizing the findings and implications of the study for e-commerce businesses.

II. METHODOLOGY

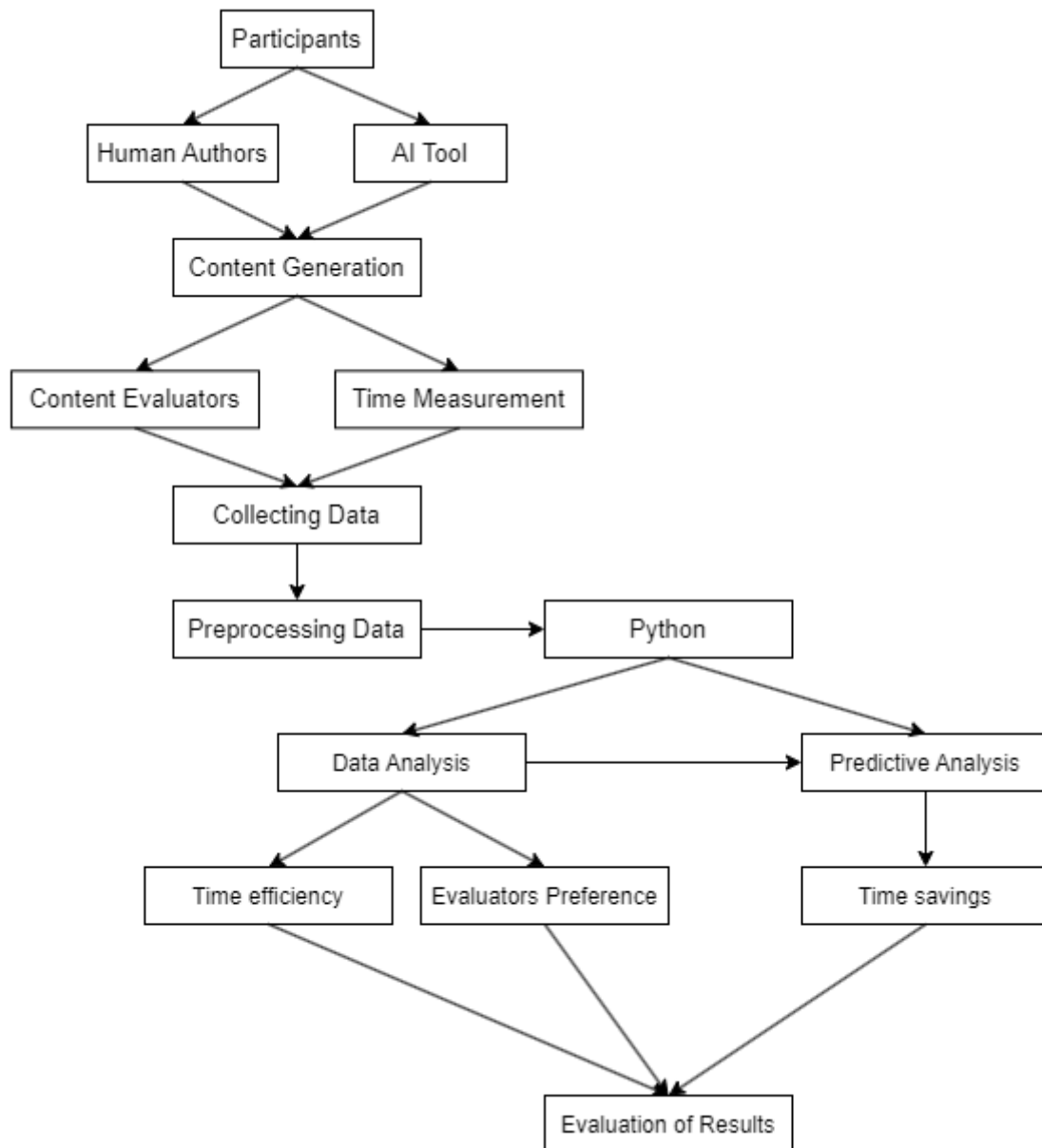


Figure 1 Methodology Steps: From Setup to Comparative Results of AI vs. Traditional Content Generation

This section details the comprehensive process undertaken in this study to compare the efficiency and effectiveness of AI-driven content generation with traditional methods. It includes the selection of participants, the materials and tools used, and the specific procedures for content creation, evaluation, and analysis. By providing a thorough explanation of the study's methodology, we aim to ensure that the findings are clear, reliable, and replicable.

A. Participants

In this study, "participants" refer to key individuals and entities directly involved in the content generation and evaluation processes. This includes the human authors responsible for creating content manually, the AI tool employed for automated content generation, and the evaluators who assess the quality and effectiveness of the content produced. By incorporating these diverse participants, the study aims to provide a comprehensive comparison of traditional and AI-driven content creation methods. Specifically:

Human Authors: Five moderately experienced content writers each assigned one product to create titles, subtitles, and SEO descriptions.

AI Tool: ChatGPT, utilized for generating the same types of content for the same products.

Evaluators: A group of 15 participants who will assess the professional quality and click ability of the generated content.

B. Materials

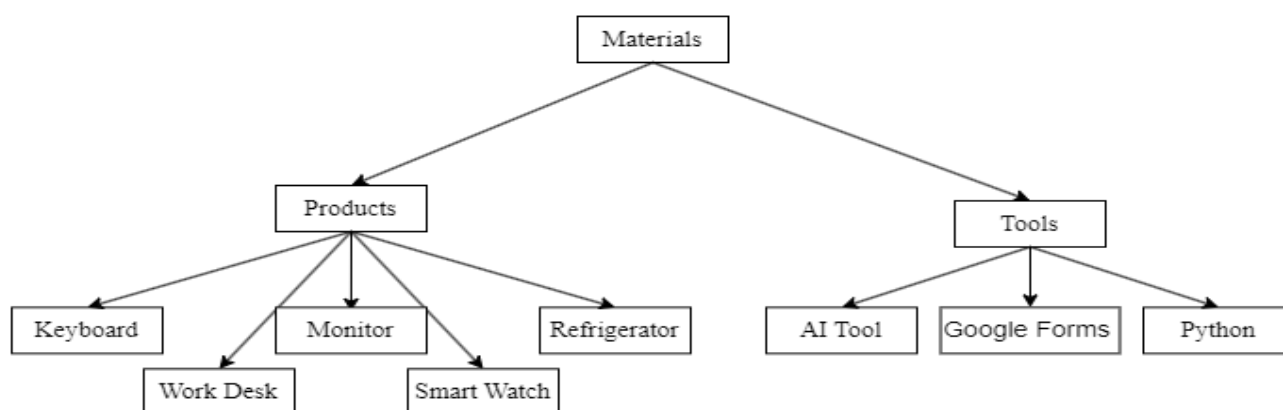


Figure 2 Key Materials: Products & Tools in Comparative Study

This section details the key components used in the study to facilitate and evaluate content creation processes. It includes a selection of five typical e-commerce products—Keyboard, Work Desk, Smart Watch, Refrigerator, and Monitor. Additionally, essential tools such as an AI tool (ChatGPT) for AI-based content generation, a Google Forms platform for participant evaluations, and Python programming language for data analysis and prediction are employed. These materials are crucial for comparing traditional and AI-driven content creation methods in e-commerce settings.

Products: Five selected products, chosen to represent a variety of typical e-commerce items:

- Keyboard
- Work Desk
- Smart Watch
- Refrigerator
- Monitor

Tools:

- **AI Tool:** ChatGPT for generating AI-based content.
- **Evaluation Platform:** Google Forms to collect evaluations from the participants.
- **Programming Language:** Python for data analysis and prediction.

C. Procedure

This section outlines the systematic approach taken to compare the efficiency of human authors and AI in content generation. It describes the steps followed for both human and AI-generated content, including independent creation of titles, subtitles, and SEO descriptions for a set of products. Time measurement methods are detailed to ensure accurate comparison of the time taken by each content creator. This structured methodology ensures a thorough and objective evaluation of the content generation process.

a) Content Generation:

- **Human Authors:** Each of the five human authors—three males and two females with 3 to 5 years of experience in content writing—will independently create titles, subtitles, and SEO descriptions for their assigned product.
- **AI Tool:** ChatGPT [8] will be used to generate titles, subtitles, and SEO descriptions for the same five products.
- **Time Measurement:** The time taken for each author and the AI tool to create the content will be recorded for comparison. The average time required for content creation by human authors will be calculated and compared to the time taken by the AI tool.

b) Content Evaluation:

- The generated content (both human and AI-generated) will be compiled and presented to a group of 15 participants using Google Forms. These participants are typical e-commerce customers who frequently visit online stores and make purchases based on product advertisements and site recommendations. Their feedback is valuable as they represent the target audience for e-commerce content, providing insights into the appeal and effectiveness of the generated titles and descriptions.
- **Evaluation Criteria:** Participants will rate the content based on two main criteria:
 - Professional Quality: How professional the titles and descriptions appear.
 - Click ability: The likelihood of clicking on the product based on the title and description.

D. SEO Testing:

- Both human authors and ChatGPT will generate SEO-optimized titles and descriptions using specified keywords for the same products.
- **SEO Evaluation:** The effectiveness of the SEO optimization will be assessed based on the appropriate use of keywords and overall optimization quality.

E. Data Analysis:

- **Time Efficiency:** Calculate the average time taken by human authors and the AI tool to generate content.

- **Quality Assessment:** Analyze the ratings from the participants to compare the quality and clickability of human-generated and AI-generated content.
- **SEO Effectiveness:** Evaluate the success of keyword integration and overall SEO quality for both human and AI-generated content.

F. Predictive Analysis Using Python:

- **Time Savings Prediction:** Using Python, predict the potential time savings if 100 titles were generated by the AI tool.
- **Quality Improvement:** Analyze the percentage of preferred AI-generated titles compared to human-generated ones, providing a statistical overview of the quality improvement.

G. Tools and Technologies

- **ChatGPT:** For generating AI-based content.
- **Google Forms:** For collecting evaluations from participants.
- **Python:** For data analysis and predictive modelling, including libraries such as pandas for data manipulation, matplotlib and seaborn for visualization, and scikit-learn for predictive analysis.

H. Data Collection and Analysis

- **Content Generation Time:** Record and compare the time taken by human authors and the AI tool.
- **Participant Ratings:** Collect and analyze ratings for professional quality and clickability using Google Forms.
- **SEO Metrics:** Evaluate the effectiveness of SEO optimization by assessing keyword usage and optimization quality.
- **Predictive Modeling:** Use Python to model the potential time savings and quality improvement on a larger scale, such as generating 100 titles.

This methodology will allow for a comprehensive comparison of the efficiency and effectiveness of AI-driven content generation versus traditional methods, providing valuable insights for e-commerce businesses.

III. RESULTS

Before embarking on the creation of titles, subtitles, and SEO descriptions, we formulated product specifications to provide guidelines to both content writers and AI. After providing the products and their specifications to content writers and AI, we will first present the results obtained regarding the product titles.

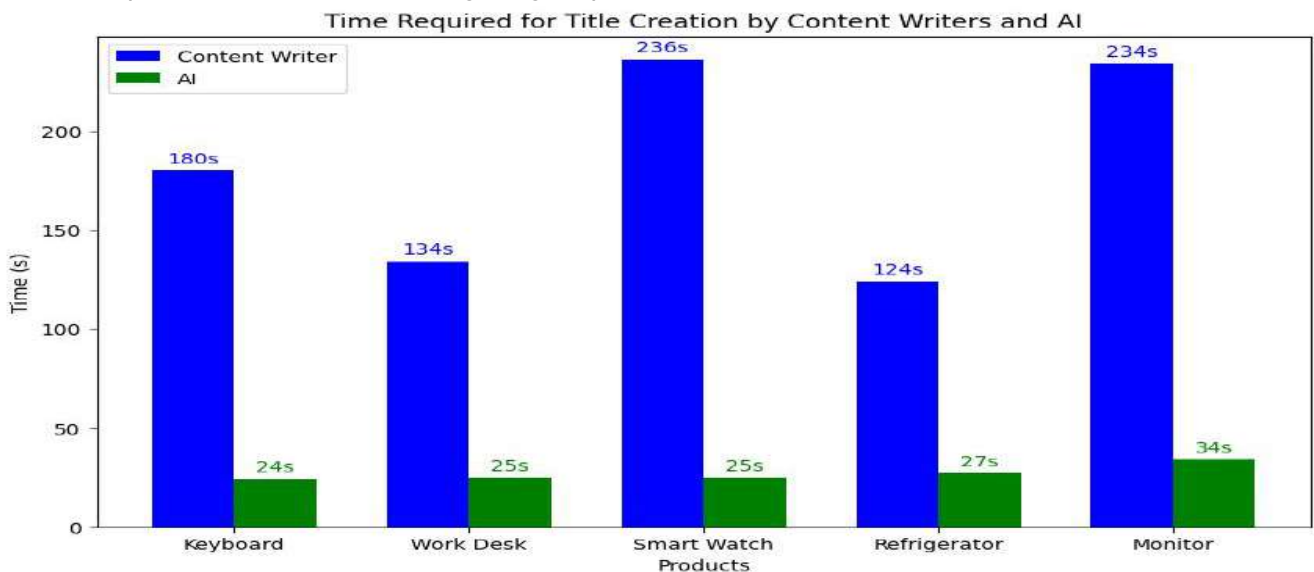


Figure 3 Times Required for Title Creation by Content Writers and AI

Underneath is the graph illustrating the percentage by which AI outperformed content writers in creating titles for the given products.

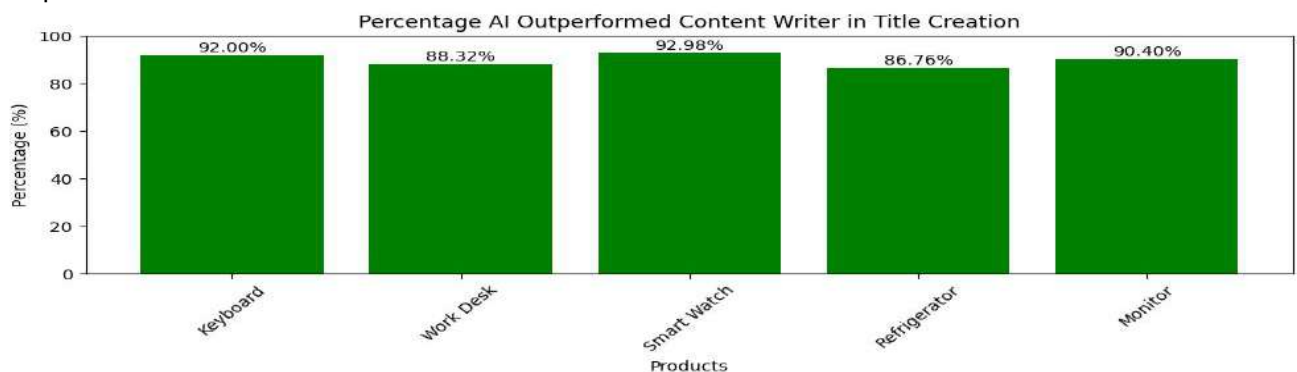


Figure 4 Percentage AI Outperformed Content Writer in Title Creation

So far, we have presented the results for each product detailing the time required by both the content writer and AI to create titles. Now, we will show the average time taken by content writers and AI to generate titles, along with the percentage by which AI was faster on average compared to the content writer.

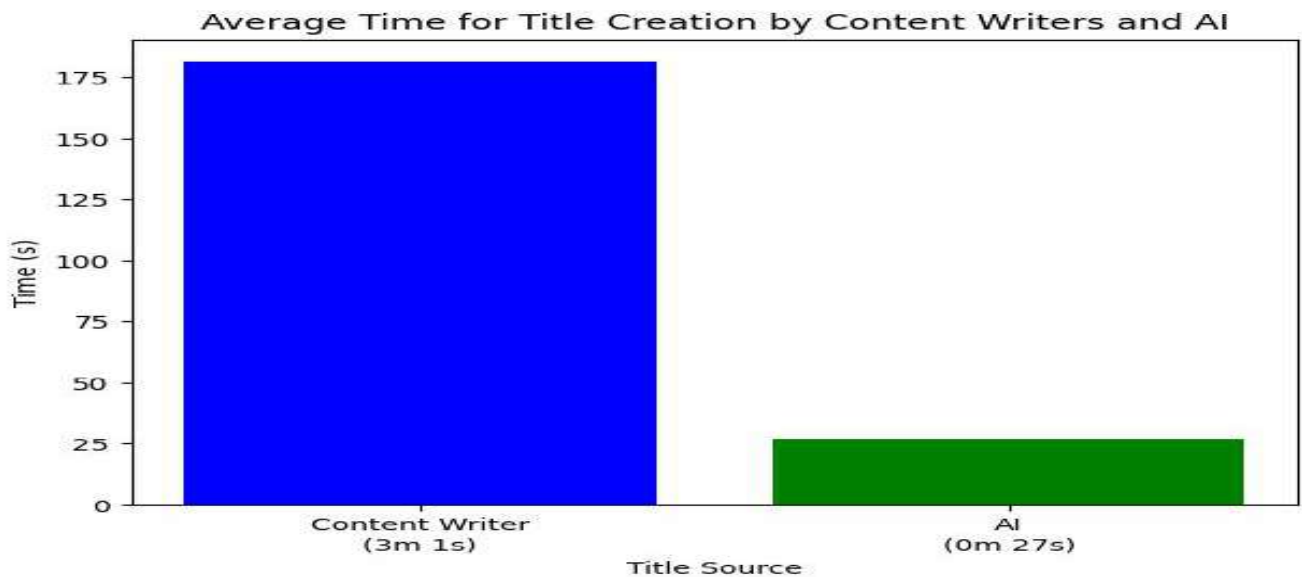


Figure 5 Average Time for Title Creation by Content Writers and AI

After analysing our data, we found that AI was on average 84.17% faster than the content writer in creating titles. The average time for the content writer was 3 minutes and 1 second, while AI took only 27 seconds. Next, we will show how the group of respondents voted on these 5 titles, indicating whether they preferred the AI or the content writer's title.

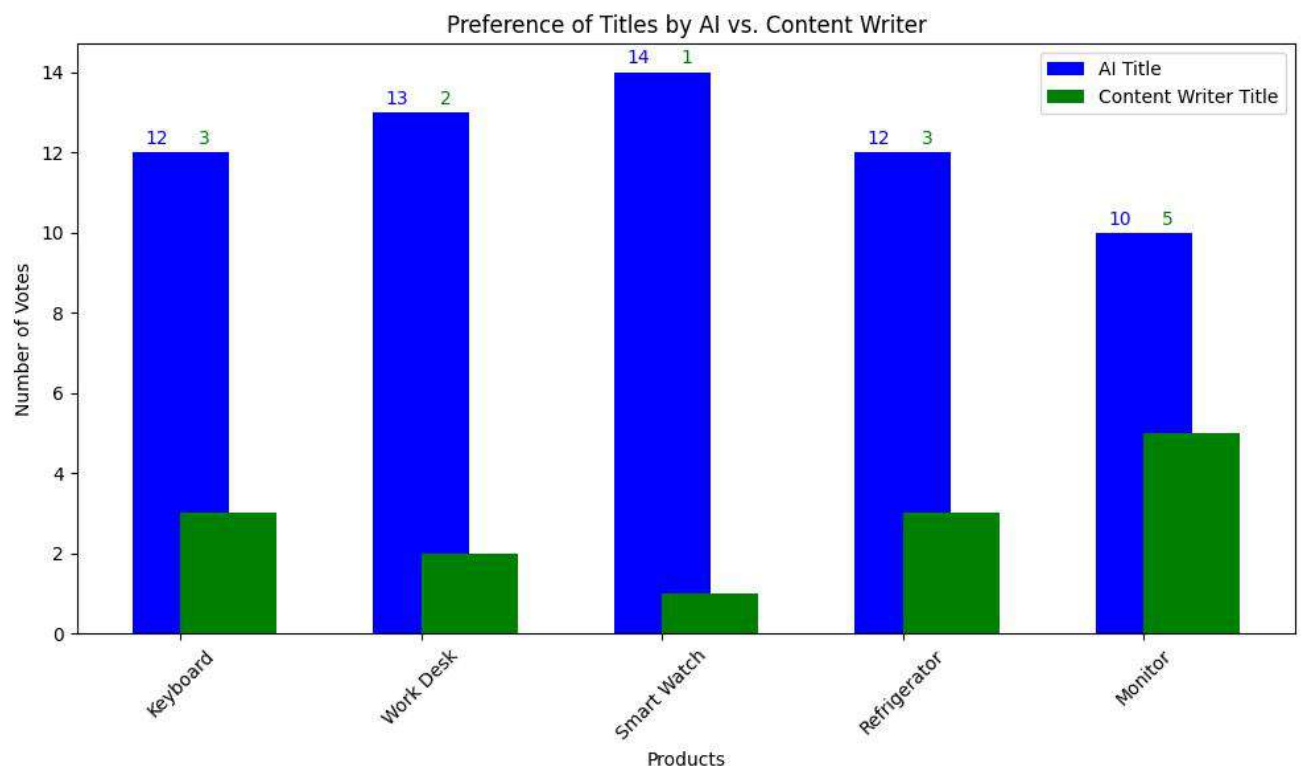


Figure 6 Preferences of Titles by AI vs. Content Writer

Based on this, we have arrived at the voting results of the group, showing that in all cases, more votes were cast for AI than for the content writer. Below, we will present the percentage breakdown of votes: how many were cast for AI titles and how many for content writer titles.

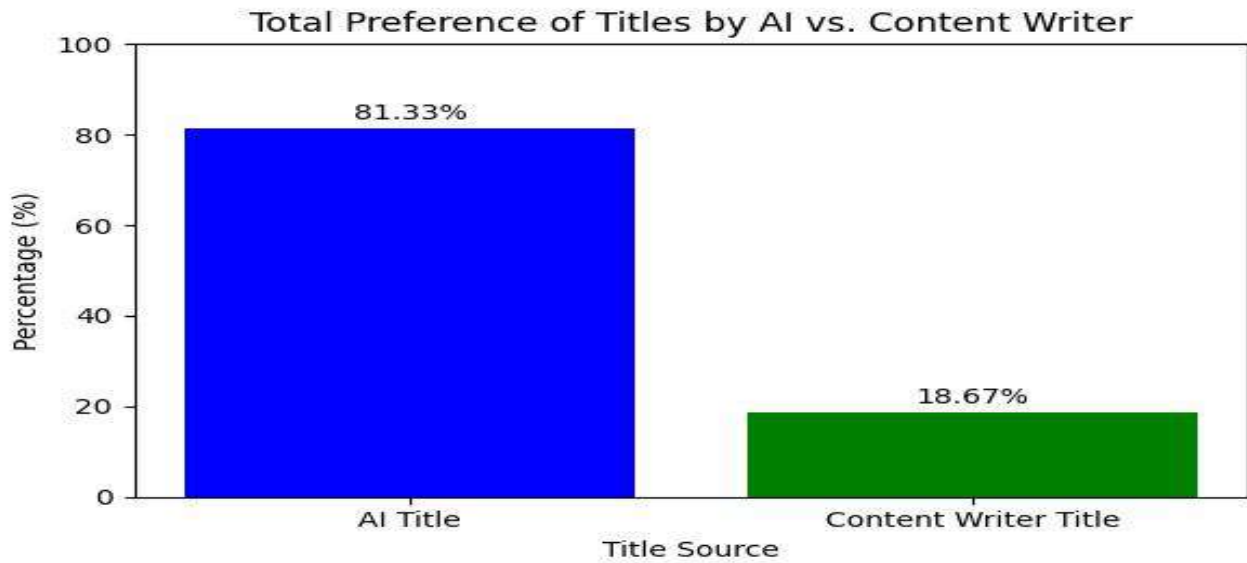


Figure 7 Total Preferences of Titles by AI vs. Content Writer

After presenting the results related to writing product titles, the next step is the subtitles. We will present the results below in the same way as for the titles. First, we will show the time required by the content writer and AI for each product.

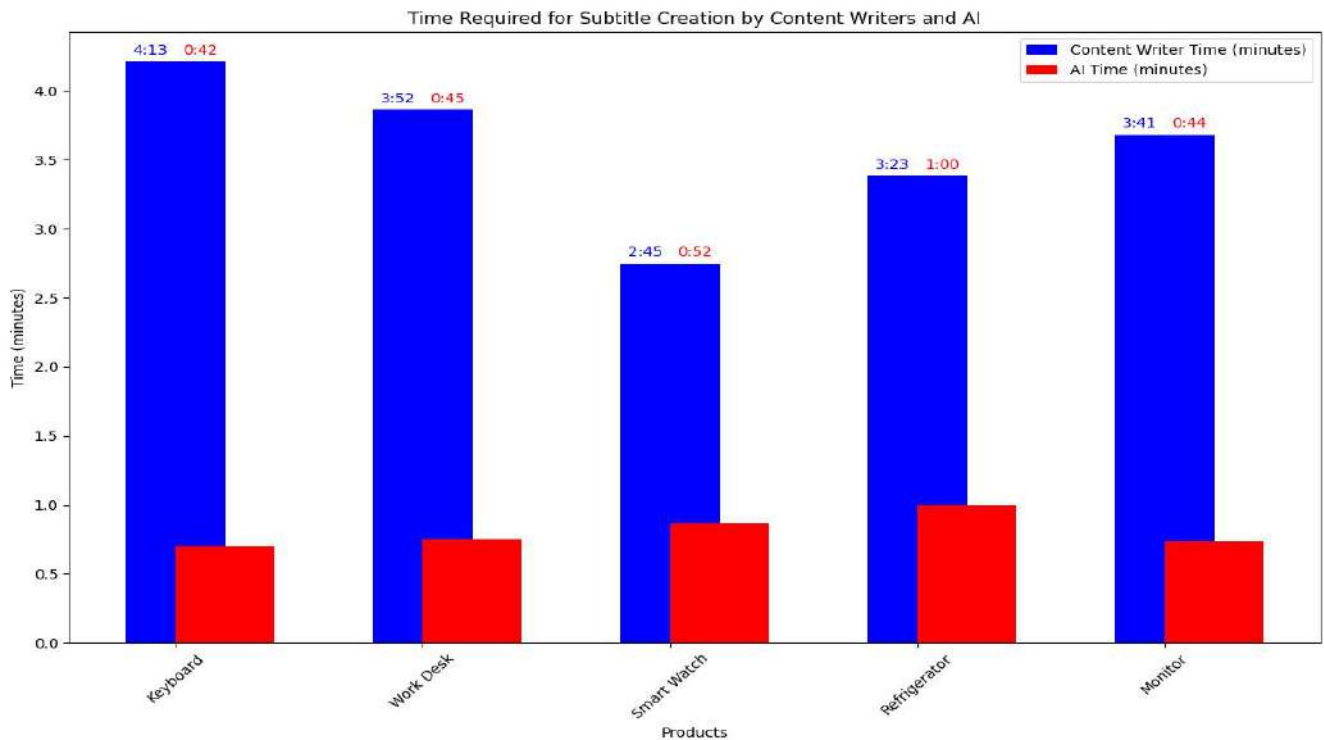


Figure 8 Time Required for Subtitle Creation by Content Writers and AI

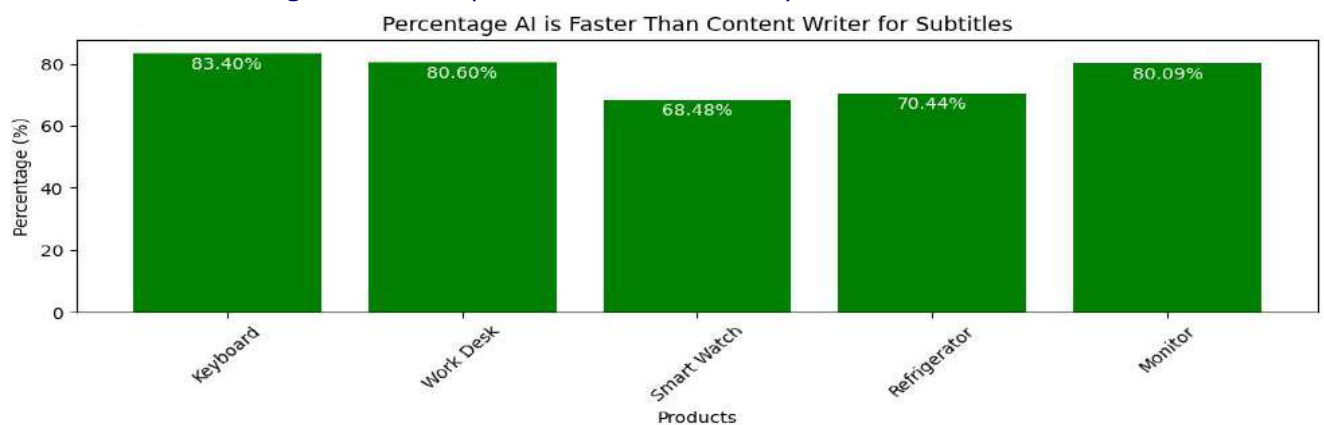


Figure 9 Percentage AI is faster than Content Writer for Subtitles

We have now shown the time taken by content writers and AI to create subtitles for each of the given products. Additionally, based on the results obtained, we have calculated the percentage by which AI was faster in creating each subtitle. Below, we will show the average time required by AI and content writers for subtitle creation.

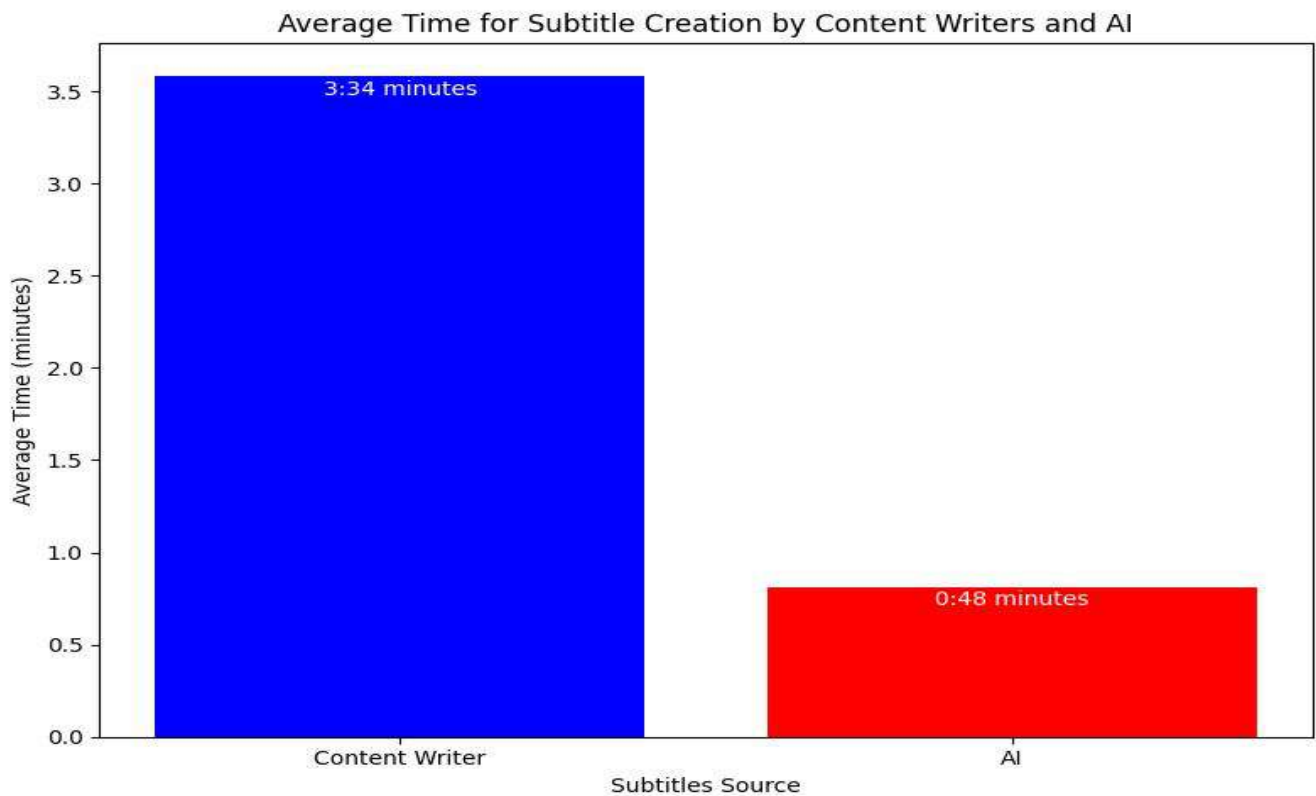


Figure 10 Average Time for Subtitle Creation by Content Writers and AI

Based on the results obtained, the average percentage by which AI is faster than content writers for subtitles is 77.31%. Now, we will show the voting results for AI and content writer subtitles individually below, and then the overall percentage of votes for AI and content writers based on the quality of the subtitles.

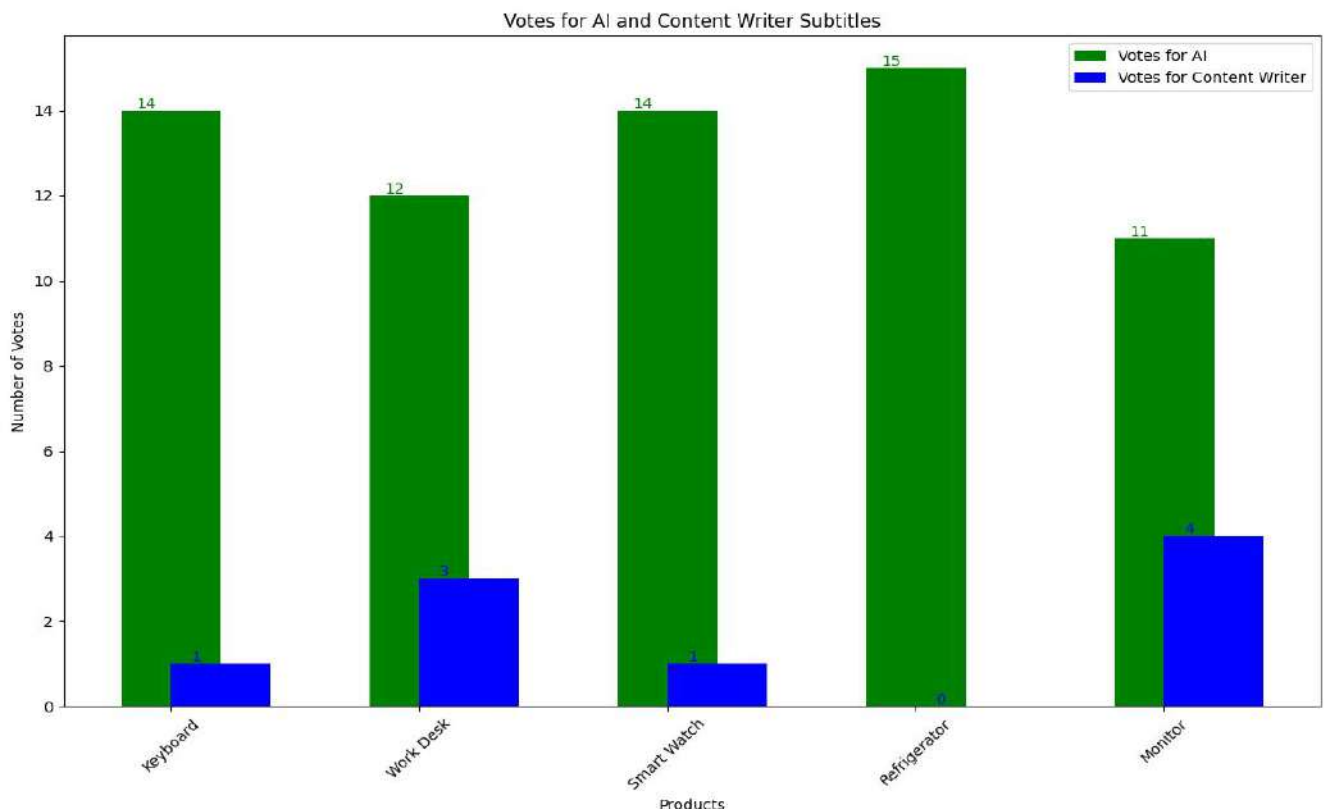


Figure 11 Votes for AI and Content Writer Subtitles

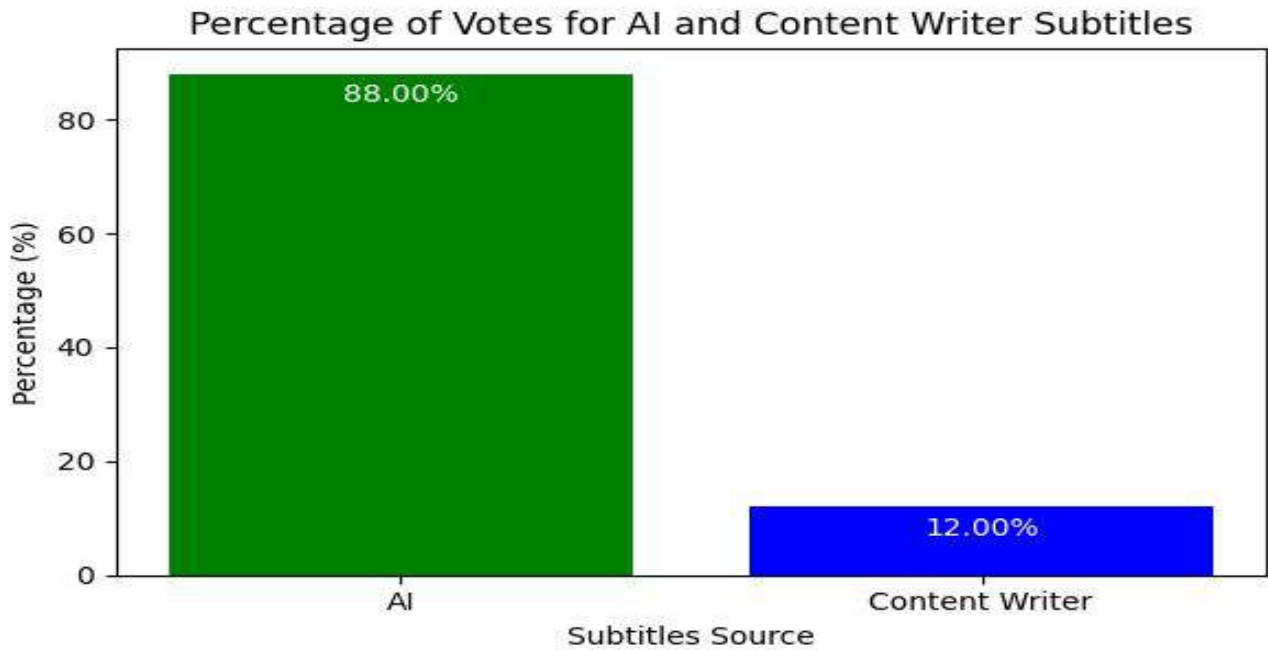


Figure 12 Percentage of Votes for AI and Content Writer Subtitles

Based on the results obtained, we see that the group of 15 people voted an average of 88% for AI subtitles, while only 12% voted for content writer subtitles. It is important to note that the content writer did not use any tools. Based on the obtained results and average times, we made a prediction on title creation, estimating how much time it would take for a content writer and AI to create 100 titles based on their average times.

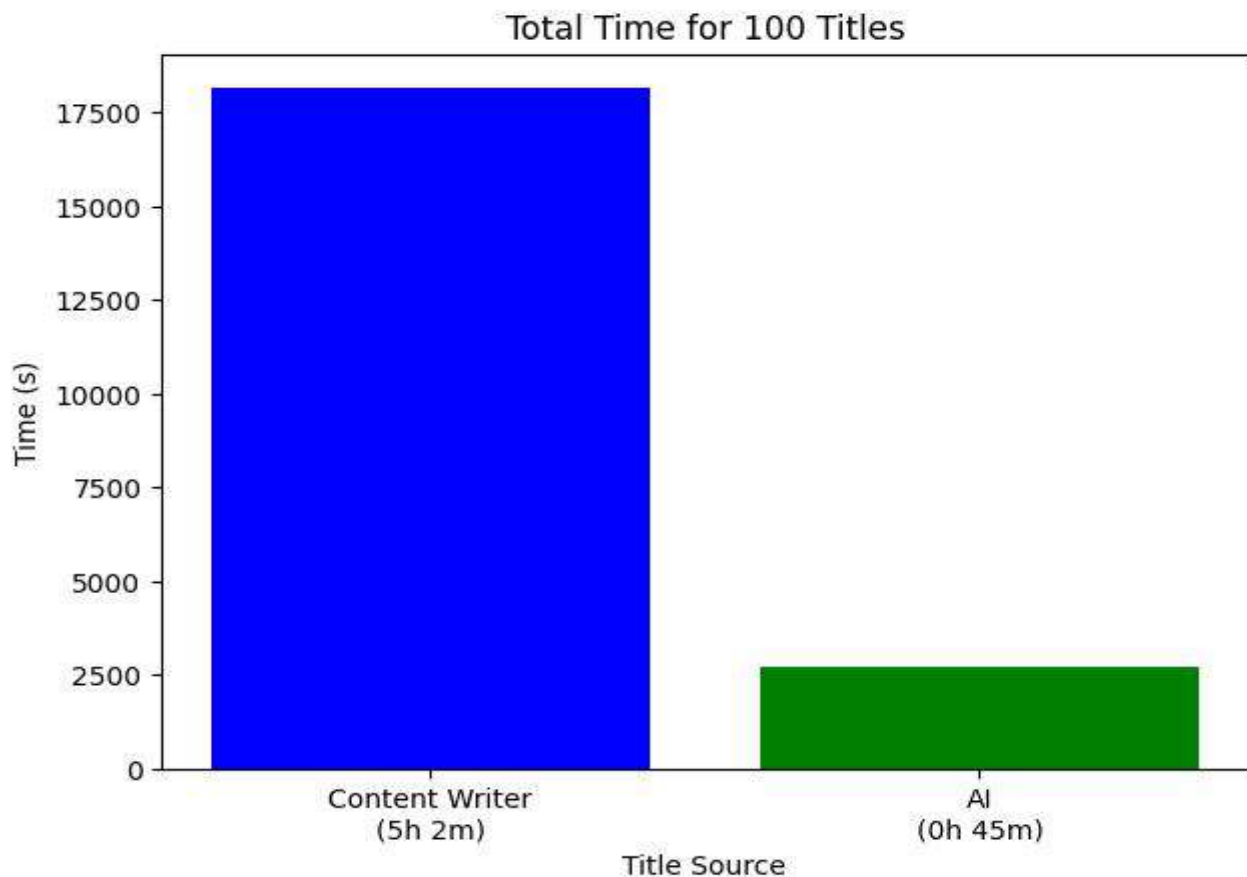


Figure 13 Total Time for 100 Titles

Our prediction showed that a content writer would need 5 hours and 2 minutes of continuous work to create 100 titles, while AI would only need 45 minutes, with each title being generated individually. Given these results, we calculated the time saved by using AI, which amounts to 4 hours and 17 minutes for 100 titles.

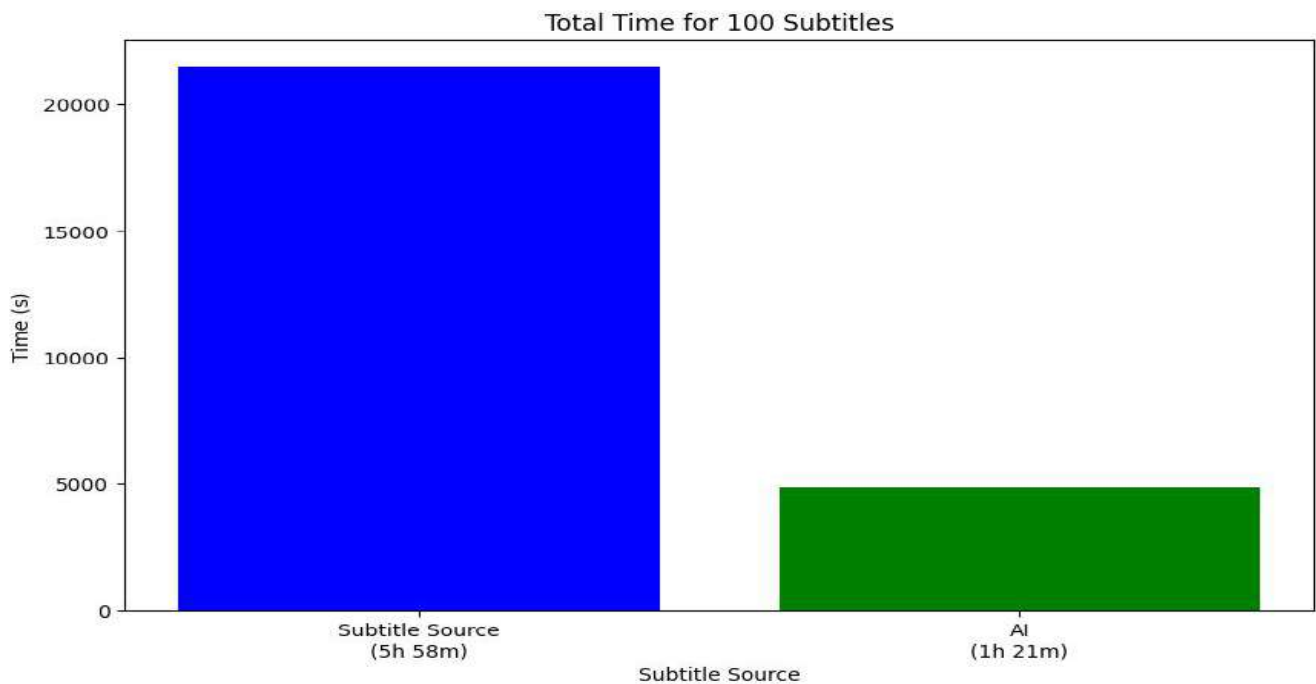


Figure 14 Total Time for 100 Subtitles

After analyzing our data, we found that AI was, on average, 77.31% faster than the content writer in creating subtitles. The average time for the content writer was 3 minutes and 34 seconds, while AI took only 48 seconds per subtitle. Our prediction showed that the content writer would need 5 hours and 58 minutes of continuous work to create 100 subtitles, whereas AI would require 1 hour and 21 minutes, with each subtitle being generated individually. Consequently, using AI saves approximately 4 hours and 37 minutes for every 100 subtitles.

IV. CONCLUSION

AI has demonstrated significant advantages over traditional content writers in terms of speed, efficiency, and time savings across various tasks such as title and subtitle creation, content generation, and more. AI technologies effectively reduce the time required for these tasks, allowing content creators to focus on strategic aspects of content development. In today's digital landscape, characterized by a vast and continually growing number of online products—estimated at 26.5 million e-commerce stores as of the latest data—speed and innovation are crucial for maintaining competitiveness. By leveraging AI, organizations can streamline their content creation processes and derive insights for crafting compelling titles, subtitles, SEO descriptions, and other content elements. Moreover, our study involved surveying a group of 15 individuals, revealing that 81.33% preferred titles generated by AI, while an overwhelming 88% favoured subtitles generated by AI. This underscores not only AI's ability to produce content efficiently but also its effectiveness in resonating with audiences. AI's capacity to swiftly generate high-quality content not only enhances operational efficiency but also fuels creativity and strategic planning within content marketing strategies. As AI technology continues to advance, its role in content creation is poised to become increasingly indispensable, offering new avenues for organizations to thrive in the digital era.

Future Steps and Improvements

User Experience Optimization: Future AI developments should focus on optimizing the user experience by creating content that not only ranks well in search engines but also provides real value and engagement for the audience.

Integration with Analytics: AI systems could be integrated with advanced analytics platforms to continuously learn from user interactions and optimize content performance in real-time.

REFERENCES

1. Age of Invisible Machines: A Practical Guide to Creating a Hyper automated Ecosystem of Intelligent Digital Workers 1st Edition, Rob Wilson, Josh Tyson, Wiley., 2022
2. Artificial Intelligence : The Future is Now - Conversing with AI (AI Guide): Chatbot Development OpenAI (BARD, ChatGPT, GPT4, CLAUDE 2 et LLAMA 2) Prompts and Deep Learning, Nicolas Marty, 2023
3. Superintelligence, Nick Bostrom, 2005
4. Convergence Of Artificial Intelligence And Blockchain Technologies, The: Challenges And Opportunities, Sam Goundar, G. Suseendran, R. Anandan, WSPC, 2022
5. The Theory and Practice of Enterprise AI: Recipes and Reference Implementations for Marketing, Supply Chain, and Production Operations 2nd ed. Edition, Grid Dynamics, 2023
6. The ultimate guide to creating content with artificial intelligence, T.J. Foster, 2023
7. <https://www.statista.com/statistics/710207/worldwide-ecommerce-platforms-market-share/>
8. <https://chat.openai.com/>
9. <https://www.irjcs.com/volumes/Vol10/iss-06/15.JLCS10094.pdf>
10. <https://www.irjcs.com/volumes/Vol7/iss-5/07.MYCS10094.pdf>