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The Change of Digital Marketing with Artificial Intelligence

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Abstract

Artificial intelligence (AI) and machine learning technologies are increasingly gaining importance for accurately analyzing consumer behavior and delivering customized advertising content within digital marketing strategies. A rapid increase has been observed in the recent research concerning machine learning and artificial intelligence in the digital marketing literature. This research aims to strategically and thematically present a scientific map of publications using digital marketing, machine learning, and artificial intelligence. For this purpose, the bibliometric analysis method, one of the quantitative research methods, has been used in the study. The data used in this study were obtained from the Scopus database, covering 2007-2023. The gathered data were analyzed and visualized using the Bibliometrix analysis program with its web interface provider, Biblioshiny. A total of 171 publications were reached in the research. There has been an increase in publications since the year 2017. The journal with the most publications is Communications in Computer and Information Science. The most frequently used words are artificial intelligence, marketing, machine learning, commerce, digital marketing, learning systems, machine learning, decision-making, e-learning, and deep learning. Moreover, a co-occurrence network exists between machine learning, marketing, artificial intelligence, digital marketing, and commerce. The highest level of publication collaboration has occurred between the United States of America (USA) and India. The involvement of numerous authors from diverse journals suggests that the topic attracts attention from multiple fields. This study offers an extensive bibliometric analysis to visualize the academic publication landscape of digital marketing, machine learning, and artificial intelligence. Subsequent research is expected to emphasize the real-world applications of these technologies in various industries. The visualization of the data obtained from the analyses in this research holds significance for guiding future studies in this area.

Keywords: Digital Marketing, Artificial Intelligence, Machine Learning

1. Introduction

Amidst the fast-paced progress of technology in the modern era, businesses are employing various tools to make their digital marketing strategies more innovative and effective. One such

tool is machine learning, a specialized area within artificial intelligence that enables algorithms to analyze data, learn from it, and make predictions (Kumbure et al., 2022).

The research on machine learning and artificial intelligence in the digital marketing literature has brought a new perspective to marketing in recent years. This highlights the growing awareness of how these technologies can redefine strategies and outcomes in the digital marketing sector (Boddu et al., 2022). Today, machine learning algorithms can more accurately predict consumer behavior than traditional methods. This allows for the creation more personalized marketing campaigns, and even artificial intelligence can improve customer service through chatbots and automated responses. Integrating machine learning and artificial intelligence into digital marketing strategies offers promising advantages but presents new challenges that researchers and practitioners must consider (Kaponis et al., 2022). The increased research in this area brings a broader perspective to the literature.

This study aims to reveal the contributions of researchers in the relevant scientific field by conducting a bibliometric analysis of publications in the Scopus databases with "digital marketing, artificial intelligence, and machine learning" as keywords in their titles, abstracts, and keywords. Additionally, the study aims to identify research trends, provide a comprehensive view of research in this area, and introduce its various aspects. It also seeks to identify focused aspects and different directions, thereby contributing to researchers in determining the areas where future studies will concentrate.

2. Developments in Digital Marketing

Digital marketing encompasses marketing activities that aim to reach target audiences, engage with them, and achieve business goals through digital technologies. Digital marketing offers advantages such as reaching wider audiences, personalized marketing approaches, real-time measurement and analysis, and higher conversion rates. Companies can secure a competitive edge and improve their success through digital marketing strategies (Behera et al., 2020).

In our era's swiftly evolving technological landscape, businesses' marketing strategies increasingly gravitate towards digitization. Digital marketing involves promoting products and services, promoting them, and engaging with consumers on online platforms. This approach has become an indispensable component of the modern business world with advantages such as reaching broader audiences compared to traditional marketing, measurability, interactivity, and cost-effectiveness. Digital marketing allows businesses to establish an online presence and enhance brand awareness. Enterprises can effectively reach their target audiences through social media platforms, websites, blogs, and other online channels. Creative content and compelling visuals embodying the brand's personality facilitate a lasting imprint in consumers' minds (Makrides et al., 2020). Digital marketing allows businesses to connect with their target

audience in a more immediate and tailored fashion than traditional methods. Through tools such as search engine optimization (SEO) and social media advertisements, tailored content can be presented based on potential customers' interests, demographic attributes, and behaviors (Olson et al., 2021). One of the prime advantages of digital marketing lies in the measurability of campaigns and strategies. Utilizing internet analytics tools, the impact of campaigns can be continuously monitored, and the efficacy of various strategies can be observed. This data-driven approach enables more efficient planning of future marketing endeavors (Melović et al., 2020). Social media platforms and other digital channels facilitate closer interaction with consumers. Swift feedback acquisition, query resolution, and initiatives to enhance customer satisfaction become feasible. These interactions foster brand loyalty and serve as a valuable source for refining products and services.

Artificial intelligence systems can provide content recommendations based on consumer behavior through machine learning algorithms. This helps marketers deliver more tailored content to their target audience, enabling users to experience customized experiences based on their interests (Khatri, 2021).

Artificial intelligence has evolved into a crucial instrument for enhancing customer experience. AI-powered applications like chatbots and virtual assistants can interact with users, providing quick and personalized responses, thereby increasing customer satisfaction. Additionally, AI can extract meaningful insights from data streams like social media and client reviews, offering strategic recommendations to marketers to enhance customer satisfaction (Nwachukwu & Affen, 2023). Besides that, artificial intelligence holds great potential for automating digital marketing processes. AI (Artificial Intelligence) based automated marketing systems can identify potential customers, offer personalized offers, and strategically increase sales conversions. This enables marketers to work more efficiently and assists in optimizing sales processes.

Machine learning helps digital marketing by enabling more effective data utilization and creating innovative, personalized, and impactful marketing strategies. However, to successfully implement machine learning in digital marketing, a solid data strategy, the selection of appropriate algorithms, and continuous optimization processes are necessary (Ullal et al., 2021).

2.1. Target Audience Determination

Target audience determination enables a business to focus its marketing activities on a specific group or segment to promote its product or service. This segment can be based on the potential customers' demographic, geographic, psychographic, or behavioral characteristics (Nirmalasari et al., 2022). Target audience identification is crucial for determining marketing strategies and tactics. A business can accurately create marketing messages and content by understanding the target audience and analyzing their needs, preferences, and behaviors. This

ensures more effective marketing efforts and delivers potential customers a personalized and engaging experience (Olson et al., 2021). Target audience identification helps optimize the effective utilization of marketing budgets. Focusing on a specific target audience allows for a more efficient allocation of marketing resources. A business can optimize ad spend and achieve higher conversion rates by directing advertising and marketing campaigns to the right segment (Dorokhova et al., 2023). Target audience identification allows a business to understand potential customers better. Factors such as demographic information, interests, shopping behaviors, and other characteristics can be utilized to understand the target audience better. This helps more effectively shape marketing strategies and product/service development (Mogaji et al., 2020). Target audience identification can provide a competitive advantage to a business. Focusing on a correctly identified target audience can differentiate a business from its competitors with a unique value proposition. Developing customized marketing strategies tailored to the target audience creates a competitive advantage and captures the attention of potential customers (Denga et al., 2022).

Target audience identification assists in improving the customer experience. As a business better understands the target audience, it can respond more effectively to their needs, problems, and expectations. This allows for personalized and tailored customer experiences (Khatri, 2021). Increased customer satisfaction can lead to higher customer loyalty and repeat sales. Target audience determination is a cornerstone of digital marketing strategies and helps businesses reach their target customers. With digital marketing strategies, businesses can better identify their target audience and direct marketing efforts toward specific segments (Chaffey & Ellis-Chadwick, 2019). Thus, digital marketing aims to reach and engage with the target audiences determined by businesses. This principle includes using appropriate channels, personalized messaging, and meeting the target audience's needs. The fundamental step of a digital marketing strategy is setting objectives and analyzing the target audience. A marketing strategy can be shaped by identifying the target audience's demographic characteristics, interests, behaviors, and needs.

2.2 Content Marketing

Content marketing aims to create brand awareness, strengthen customer relationships, and increase the conversion of potential customers by providing valuable, engaging, and informative content to the target audience. Content marketing allows businesses to tell their brand stories and provide valuable information to the target audience. Creating and sharing high-quality content enhances brand awareness and establishes the brand as an authority in the industry. This builds trust and preference for the brand among potential customers (Challa & Anute, 2021). Content marketing is a significant factor in achieving higher rankings in search engines. Well-optimized content that aligns with targeted keywords can rank higher in search results. This drives organic traffic and brings potential customers to the website (Papagiannis,

2020). Content marketing educates and engages the target audience by providing valuable information.

Businesses produce content that helps solve potential customers' problems. This increases the likelihood of potential customers choosing the brand and fosters customer loyalty (Vinerean, 2017). Content marketing aims to increase interaction and sharing on social media platforms. The target audience likes, comments on, and shares valuable content. This expands the brand's reach to a broader audience through social media (Ansari et al., 2019). Content marketing supports the conversion process of potential customers. Valuable content captures the interest of potential customers and increases the likelihood of them choosing the brand's products or services. Content can be tailored for different stages of the conversion funnel and personalized according to the needs of potential customers (Britchenko et al., 2019). Content marketing is a potent marketing approach that enables businesses to connect with the target audience, build trust, and provide value. Creating high-quality content and sharing it through the proper channels is critical for digital marketing success (Jefferson & Tanton, 2015).

Content marketing is a fundamental process of digital marketing. Brands aim to attract potential customers and enhance brand recognition by producing meaningful and captivating content (Ansari et al., 2019). Therefore, content marketing aims to establish a connection with the target audience by creating captivating and valuable content. Interaction occurs when users comment on, share, or engage with the content. Content marketing includes creating blog posts, videos, and infographics to attract user interest and increase brand awareness. Blogging aims to communicate with the target audience regularly through an updated blog. Content strategy involves creating compelling and valuable content for the target audience, determining the channels, preferred content types, and distribution methods.

2.3. Search Engine Optimization

Search Engine Optimization (SEO) is a set of techniques and optimization processes to ensure that a website ranks higher in organic search results. SEO aims to help search engines better understand the website and provide users with higher quality, relevant, and valuable content. Therefore, ranking high in natural search results is essential in driving organic traffic, attracting potential customers, identifying the keywords that potential customers use in search engines, optimizing the content with those keywords, and enhancing elements such as title tags, meta descriptions, URL structures, content optimization, and image tagging to improve the website's understanding by search engines and increasing the website's authority through links from trustworthy and authoritative websites and designing a website compatible with mobile devices ensuring fast loading times and focusing on factors such as usability, navigability, and site speed to provide users with a better experience on the website (Das, 2021).

2.4. Search Engine Marketing

Search Engine Marketing (SEM) is a promotional technique that allows marketers to showcase their advertisements on search engine platforms. SEM typically targets advertisers who pay based on cost per click (CPC) or cost per thousand impressions (CPM). Google Ads stands as one of the most widely used platforms for SEM. It displays ads for specific keywords to gain quick access to potential customers. It targets ads to the desired audience based on demographic factors, geographical locations, and other specific parameters. It is increasing click-through rates and optimizing ad costs through well-optimized ad text, monitoring ad performance, tracking conversions, and analyzing the effectiveness of the ad strategy. Combining SEO and SEM can achieve effective results in digital marketing strategies. SEO increases organic search traffic and enhances the long-term authority of the website, while SEM provides instant visibility and targeted traffic. A good marketing strategy may require a balanced use of both methods (Panchal et al., 2021).

SEO refers to optimization efforts aimed at helping websites rank higher in search engines organically. On the other hand, SEM is a strategy of advertising on search engines and appearing at the top for targeted keywords. SEO and SEM are crucial components and processes in digital marketing. Optimization efforts are made for websites to rank higher in search engines, and search engine advertising is used for advertising purposes (Kumar & Reinartz, 2016).

2.5. Social Media Marketing

Social media marketing entails leveraging social media channels to create brand awareness, engage with the target audience, drive traffic, and generate conversions. Social media enables companies to connect with prospective clients directly, establish and strengthen brand image, share content, and interact with customers. This entails devising a social media plan that is in sync with the business's goals, identifying the target audience, selecting platforms, planning content, managing interactions, producing valuable and engaging content, and sharing it on social media platforms. This content reflects the brand's values, informs the target audience, and encourages interaction. Social media channels enable companies to engage directly with potential customers. Businesses can strengthen customer relationships by responding to user comments, answering questions, and addressing customer complaints. Social media platforms serve as practical tools for advertising and promotions. Businesses can use social media advertisements to reach the target audience and organize promotional campaigns. Tools for analysis evaluate how practical social media marketing activities are. Businesses measure the performance of social media campaigns, track user engagement, and optimize their strategies (Bala & Verma, 2018).

2.6. Influencer Marketing

Influencer marketing collaborates with influential personalities or influencers for brand or product promotion. Influencers are individuals who have a large following on social media or other digital platforms and have influence in a specific field. Influencer marketing enables influential personalities to interact with their followers, directly reach the target audience, build trust, and increase brand awareness. They identify influencers that align with the target audience and reflect the brand's values. Factors such as the influencer's follower base, engagement rate, level of influence, and content quality are considered. They collaborate with influencers to create content promoting the brand or products. This content should align with the influencer's natural style and be designed to resonate with the target audience. They monitor interactions to evaluate influencer marketing effectiveness, tracking follower growth, conversion rates, and brand impact metrics. Influencer marketing may require establishing and maintaining long-term relationships. Brands can build trust and loyalty by continuously collaborating with influencers (Jin et al., 2019).

Social media and influencer marketing offer businesses a broad reach, increased brand awareness, and the potential to drive customer conversions. These strategies play a significant role in engagement and digital marketing effectiveness. Social media platforms are crucial for businesses to interact with their target audiences, increase brand awareness, share content, and evaluate customer feedback (Hajli, 2014). Social media is crucial in the realm of online marketing. Companies can connect with their desired consumers, elevate their brand image, and leverage influencer marketing on these digital platforms. Websites like Facebook, Instagram, and Twitter allow businesses to engage with their customer base, boost brand recognition, advertise their offerings, and attract prospective clients.

2.7. E-mail Marketing

E-mail marketing is an effective strategy in digital marketing. It aims to enable businesses to reach potential and existing customers directly, strengthen their relationships, and generate conversions. E-mail marketing allows businesses to reach potential and existing customers directly. Individuals can reach an e-mail list with their permission and deliver messages. E-mail marketing allows businesses to establish and strengthen relationships with potential and existing customers. Businesses can create customer loyalty and maintain customer relationships by sending valuable content, special offers, newsletters, etc., through e-mails. E-mail marketing is an effective strategy for increasing conversion rates. By promoting products or services by sending promotions, discounts, or special offers through e-mail, companies can expedite the conversion process for potential customers. E-mail marketing allows companies to segment and personalize their e-mail list. They can send customized e-mails to customers based on different demographics, interests, or purchase histories. This allows them to better respond to customers' needs and interests. Tools are available to measure and analyze the

effectiveness of e-mail marketing strategies. Companies can evaluate their campaigns using metrics such as open e-mail rates, click-through rates, conversion rates, etc., to improve and optimize their future strategies. E-mail marketing becomes more effective when integrated with automation tools. By sending automated e-mails such as welcome e-mails, auto-responses, and birthday greetings, companies can enhance the customer experience and manage timing more effectively. E-mail marketing is a channel through which companies can achieve effective results with proper strategies and segmentation. However, it is essential to be mindful of spam policies, build permission-based e-mail lists, and respect customer privacy (Lammenett, 2017).

E-mail marketing is an effective communication tool in digital marketing. Businesses use the e-mail marketing process to communicate directly with their target audience, send promotions, and manage customer relationships (Frost & Strauss, 2016). E-mail marketing involves using e-mail to send marketing messages to potential and existing customers. Automation, on the other hand, allows for the automatic sending of e-mails based on specific scenarios, which is an effective strategy in terms of personalization and timing.

2.8. Mobile Marketing

Mobile marketing is a critical element in online advertising, encompassing strategies to reach the target audience through mobile devices, increase brand awareness, encourage customer interaction, and achieve conversions. One of the initial steps to succeed in mobile marketing is to have a website compatible with mobile devices. Mobile users access companies' websites through smartphones or tablets. Therefore, a website must provide a mobile-optimized user experience, load quickly, and be user-friendly. Businesses can establish closer interaction with the target audience through mobile applications. Mobile apps can offer users special offers, personalized content, notifications, and other features that enhance the user experience. Being present in app stores and running app download campaigns are essential in mobile marketing. Short Message Service (SMS) marketing is a strategy of reaching customers through mobile devices by sending text messages. Companies can strengthen customer relationships and achieve conversions through messages such as special offers, discounts, event announcements, or customer reminders. However, paying attention to customer permissions and requirements in SMS marketing is essential. Another essential element of mobile marketing is location-based marketing. Mobile devices can track user location information, allowing them to offer location-specific content, discounts, or local events to the target audience. Location-based marketing can direct customers to physical stores or events and support local targeting strategies. Advertising plays a significant role in mobile marketing. Companies can build brand awareness and prompt customers to take action through in-app ads, mobile web ads, and mobile ads on social media platforms. Compelling visuals, textual content in mobile ads, and proper targeting of the target audience are essential factors to consider (Tong et al., 2020).

Mobile marketing is a vital strategy today, where users are constantly connected through their mobile devices. Businesses should effectively utilize mobile marketing strategies to improve the mobile user experience, increase interaction with the target audience, and achieve conversions.

Mobile marketing involves delivering marketing messages to the target audience through mobile devices. App development allows businesses to enhance the user experience and provide better customer service through mobile applications (Ström et al., 2014). Additionally, the effectiveness of mobile advertising strategies and the impact of mobile ads on consumer behavior are significant (Grewal, 2016). This marketing strategy aims to build the business's brand image and establish a positive positioning in the target audience's minds. Brand value, unique value proposition, and differentiation in the competition are essential elements.

2.9. Data-Driven Marketing

Data-driven marketing is an essential strategy in digital marketing that enables businesses to make more effective marketing decisions using data analytics and insights. Data-driven marketing offers the opportunity to develop strategies based on customer behavior, personalization, targeting, and measuring marketing performance. Here is a detailed description of data-driven marketing. The foundation of a data-driven marketing strategy is collecting and analyzing customer data. Gathering website traffic, social media interactions, e-mail open rates, click-through rates, conversion data, etc., allows businesses to better understand their customers and marketing activities. This information offers a critical understanding of consumer actions, interests, and preferences. Data-driven marketing aims to deliver personalized and customized customer content based on the collected data. Sending customized e-mails, offers, or recommendations based on data such as customer interests, purchase history, and demographic characteristics can increase customer engagement and conversion rates. Data-driven marketing is crucial in customer segmentation and targeting. The collected data enables businesses to segment customers based on specific characteristics, behaviors, or demographic factors. Developing marketing strategies tailored to each segment can achieve more effective results. Data-driven marketing provides the opportunity to measure and analyze marketing performance. The collected data allows evaluation of the impact of campaigns, conversion rates, returns, and other marketing metrics. This enables businesses to optimize their strategies and make more informed marketing decisions in the future. Data-driven marketing leverages machine learning and artificial intelligence technologies to develop more sophisticated marketing strategies. These technologies enable the analysis of large volumes of data, predicting customer behavior, creating recommendation systems, and establishing automated decision mechanisms (Grandhi et al., 2021).

Data-driven marketing offers businesses significant benefits in better understanding customer needs, more effective targeting, personalized experiences, and optimizing marketing

strategies. However, paying attention to data privacy and compliance issues is essential to ensure data security and customer privacy AI-driven chatbots and virtual assistants can also find utility in the analysis and comprehension of customer data within the realm of digital marketing.

The increasing data obtained through Digital marketing endeavors will bolster the adoption of a more data-centric marketing methodology. This involves the utilization of data analytics and the study of customer behavior.. Data analytics and customer behavior prediction will contribute to shaping marketing strategies more accurately. Digital marketing is built upon analyzing data and obtaining meaningful insights. The data-driven marketing approach allows for a better understanding of the target audience, measurement of campaign effectiveness, and continuous improvement of strategies. Analyzing data can aid in creating marketing plans and tactics that significantly impact the performance of extensive data marketing (Grandhi et al., 2021). Customer segmentation, personalization, and data analysis enable better segmentation of customers and deliver more relevant marketing messages tailored to their needs. Personalized marketing enhances customer experience and increases customer loyalty. Analyzing data through effective marketing strategies provides valuable insights into market trends and business customer behavior. These insights support developing marketing strategies and reaching the target audience more effectively. Data-driven marketing enables real-time measurement of campaigns and marketing activities, increasing conversion rates. This allows businesses to identify which strategies contribute to higher conversion rates and make improvements accordingly (Boutsouki, 2019).

3. The Usage of Artificial Intelligence in Marketing

Artificial intelligence encompasses various skills, including speech recognition, image identification, machine learning, and semantic search. AI is utilized to differentiate both sound and images (Panwar et al., 2021). Artificial intelligence profoundly influences the landscape of online marketing.. It makes digital marketing more efficient, effective, and scalable while enhancing user experience. However, ethics, privacy, and data security must be considered (Dumitriu & Popescu, 2020). Digital marketing and artificial intelligence have gained considerable momentum in recent years. The widespread use of the Internet and the popularity of digital platforms have provided companies with opportunities to reach their customers more effectively. Artificial intelligence holds great potential in complex data analytics, predictive analysis, and automated processes. Digital marketing encompasses the utilization of online platforms and instruments to promote products and services. This is achieved through various digital channels such as websites, social media, search engines, e-mail marketing, and content marketing. Artificial intelligence can be used as a component of digital marketing. AI technologies can support digital marketing strategies such as data analysis, predictability, personalization, automation, and customer experience (Jarek & Mazurek, 2019). Digital

marketing attempts to optimize marketing strategies by analyzing web analytics, social media analytics, and campaign performance. However, data analysis may be limited, and predictability can be low. Artificial intelligence is capable of processing massive amounts of information, identify trends, and predict customer behaviors. This enables the creation of more effective marketing strategies and better outcomes (Fathali et al., 2022). Digital marketing focuses on target audiences and delivers personalized messages. However, personalization can be limited, and campaigns targeting general audiences are more common. Artificial intelligence provides advanced support for personalization and targeting by analyzing collected data. AI applications such as customer segmentation, personalized recommendations, and automated decision-making mechanisms improve the customer experience and increase conversion rates (Gao & Liu, 2022). Digital marketing can enhance efficiency through specific automation processes. However, automation may be limited, and additional manual intervention may be required. Artificial intelligence provides a higher level of automation in marketing processes. Automating tasks such as data analysis, campaign management, customer interactions, and reporting enhances the efficiency of marketing teams (Rathore, 2023).

In customer service, AI-powered chatbots can provide immediate support to users and automate customer service processes. Chatbots can answer customer questions, resolve issues, and even facilitate sales. Artificial Intelligence enables faster and more efficient customer service. AI will accelerate the development of automated customer service tools like chatbots and virtual assistants. AI-supported chatbots can answer customer questions, resolve issues, and even carry out sales transactions, allowing companies to provide customer service more efficiently and increase customer satisfaction (Hsu & Lin, 2023). Artificial intelligence is poised to have a substantial impact on content creation and creative processes and automate content creation workflows. AI algorithms can generate and edit text, videos, or graphics, assisting marketers in speeding up the content production process and making it more efficient (Chan-Olmsted, 2019). In addition, digital marketing strategies can be bolstered by big data analytics and predictive analysis. AI can swiftly analyze millions of data points and shape future marketing strategies with their insights, enabling companies to understand consumer behaviors better and provide more relevant content to their target audiences (Forghani et al., 2022).

Through AI-powered automated ad management, AI can facilitate the automatic management and optimization of advertising campaigns. AI continuously monitors campaign performance and can automatically adjust advertising budgets and targeting parameters, improving advertising efficiency and reducing costs (Akter et al., 2023). AI algorithms have the capability to process massive data sets and detect patterns that indicate fraudulent activities or security breaches. Marketers can leverage AI to enhance trust and reliability, protect customer data, prevent fraud, and ensure secure transactions (Nwachukwu & Affen, 2023).

Future digital marketing trends include AI and machine learning applications, integration with voice search and smart devices, data privacy, and ethical considerations. Businesses need to adapt to these trends and stay current to remain competitive.

There are numerous benefits for businesses in integrating machine learning, AI, and digital marketing, including improved customer experience, more effective marketing strategies, increased efficiency, and competitive advantage. However, there are also challenges associated with this integration. For instance, AI algorithms must be trained correctly, and issues such as data privacy and ethics must be carefully addressed. Artificial intelligence assists in making digital marketing more efficient, effective, and personalized. These technologies contribute valuable insights to digital marketing in data analysis, predictability, personalization, automation, and customer experience.

Artificial intelligence plays a significant role in developing personalization and targeting strategies in digital marketing. Personalization refers to tailoring marketing messages based on individual user characteristics and behaviors. Artificial intelligence techniques analyze large volumes of data to deliver personalized content to users. Examples from research studies demonstrate that personalization enhances user experience and increases customer loyalty (Huang & Rust, 2021). On the other hand, targeting aims to effectively communicate marketing messages by focusing on specific audiences or segments. Artificial intelligence can be utilized to understand user behaviors, identify segments, and optimize targeting strategies using this strategy involves the utilization of big data analysis, along with machine learning and deep learning methods. The advantages of adopting this methodology encompass increased conversion rates, effective use of advertising budgets, and increased customer loyalty (Choi & Kim, 2020). AI-powered personalization and targeting strategies enable better understanding and more accurate prediction of user needs and preferences, enhancing customer satisfaction and strengthening brand loyalty (Khatri, 2021).

Furthermore, the continuous analysis of user data by AI-based systems allows for implementing more accurate and effective personalization and targeting strategies (Syam & Sharma, 2018). This way, digital marketing efforts become more effective and provide a competitive advantage. Artificial intelligence can analyze user behavior and predict preferences through big data, creating more personalized and targeted marketing campaigns. AI can offer individual users tailored offers by analyzing past shopping experiences, social 3edia interactions, and search queries. AI enables marketers to deliver personalized experiences by analyzing customer data and creating highly targeted segments, leveraging AI algorithms to tailor content, offers, and recommendations to individual customers, increasing interaction and conversion rates (Chandra et al., 2022). Personalization also encourages customer loyalty and fosters long-term relationships.

4. Machine Learning and Digital Marketing

Machine learning can offer personalized content and product recommendations based on users' past behaviors, preferences, and demographic characteristics. This enhances user experience and helps create a more effective marketing strategy. Furthermore, machine learning can help better understand potential customers and target specific segments more accurately. This ensures that advertisements are more relevant, allowing to use budget more efficiently (Wang et al, 2020). In addition, machine learning can analyze user behaviors to understand which strategies are more effective. So, the system can evaluate data to determine which ads perform better, at what times, and on which platforms (Ullal et al., 2021). Moreover, machine learning can scan content on social media and other platforms to perform sentiment analysis. This allows for tracking positive or negative opinions about the brand, enhancing customer satisfaction, and effectively managing reputation (Dhaoui et al., 2017). For e-commerce businesses, dynamic pricing strategies are crucial in a competitive market. Machine learning can automatically analyze competitive situations and demand trends to adjust prices. On the other hand, machine learning can analyze the user experience of a website or application to identify areas for improvement. This can help increase conversion rates (Colleoni & Corsaro, 2022). In financial terms, fraud detection in online payments and transactions is a significant challenge. Machine learning can identify signs of fraud and prevent such situations in advance (Aljabri & Mohammad, 2023). Finally, machine learning can be used in developing automation tools like chatbots and virtual assistants. These tools can answer customer queries, resolve issues, and improve customer service (Miklosik et al., 2019).

4.1 Personalized Content and Recommendations

Machine learning algorithms can analyze a user's past interactions with a website or platform. The system can predict what content or products might interest them by considering their browsing history, purchase behavior, and preferences. This leads to highly personalized recommendations, enhancing user engagement and potentially driving more conversions (Gorgoglione et al., 2011).

4.2 Segmentation and Targeting

Machine learning can analyze vast amounts of customer data to identify distinct segments within the audience. These segments could be based on demographics, behaviors, or other criteria. Understanding these segments can tailor marketing messages to resonate more effectively with each group, leading to higher response rates (Wang, 2020).

4.3 Sentiment Analysis and Reputation Management

Sentiment analysis involves processing textual data (like social media posts or reviews) to determine the sentiment behind them – whether they are positive, negative, or neutral. Machine learning algorithms can automatically classify these sentiments, helping gauge how the public

perceives a brand. This insight is invaluable for managing reputation and addressing customer concerns promptly (Hossain & Rahman, 2022).

4.4 Search Engine Optimization with Machine Learning

Machine learning algorithms can analyze search engine algorithms and identify patterns related to high-ranking content. Understanding these patterns can optimize a website's content, meta tags, and other elements to improve search engine rankings and increase organic traffic (Boddu et al., 2022).

4.5 Automation and Chatbots

Chatbots powered by machine learning can engage with customers in real time, answering their queries and providing assistance. These bots can use natural language processing to understand and respond to customer questions. They operate 24/7, enhancing customer support availability and saving valuable time for customers and the team (Suhel et al., 2020).

4.6 Advertisement Optimization

Machine learning algorithms can analyze the performance of advertisements across various channels and platforms. Considering audience demographics, ad placement, and content, these algorithms can suggest adjustments to optimize ad campaigns for better reach, engagement, and conversion rates (Singh et al., 2022).

4.7 Analyzing Market Trends

Machine learning can process large datasets to identify patterns and trends in consumer behavior. Recognizing these trends early can adjust marketing strategies to align with emerging preferences, thus gaining a competitive advantage (Khan et al., 2020).

4.8 Customer Churn Analysis

Machine learning can predict which customers are at risk of churning (leaving business). By analyzing their past behaviors and comparing them to churned customers' behaviors, they can take proactive measures to retain these customers, such as targeted offers or personalized engagement efforts (Ahmad et al., 2019).

4.9 Product Pricing and Inventory Management

Machine learning can analyze market conditions, competitor pricing, and customer behavior to help determine optimal product prices. It can also predict demand patterns, allowing the management of inventory more efficiently and preventing stockouts or overstocking (De Mauro et al., 2022).

4.10 Competitive Analysis

Machine learning can crawl and analyze competitor websites, social media accounts, and marketing strategies. This analysis can provide insights into their strengths and weaknesses, helping them adjust their marketing efforts and gain a competitive edge. In essence, machine learning offers a data-driven marketing approach, enabling one to make more informed

decisions, provide better user experiences, and allocate resources more effectively. By harnessing the power of machine learning, businesses can stay ahead in the dynamic world of digital marketing (Mahalakshmi et al., 2022).

5. Methodolgy

This study aims to explain the trends and developments in the international literature concerning "Machine Learning" supported by artificial intelligence within digital marketing. The research employs bibliometric analysis, a quantitative research method, to accomplish this aim. Bibliometric analysis quantitatively evaluates publications produced by individuals or institutions within a specific field, time frame, and geographical area, examining the relationships among these publications. It can be considered a quantitative research methodology for content analysis and numerical analysis of documents (Donthu et al., 2021). From this perspective, the data for the research was obtained by scanning articles published between the years 2007-2023 and indexed in the Scopus database as of June 12, 2023. During the scanning, the TITLE-ABS-KEY (digital AND marketing AND + AND artificial AND intelligence AND + AND machine AND learning) parameter was used, thus filtering articles that include "digital marketing, artificial intelligence, and machine learning" in their titles, abstracts, or keywords. A total of 171 articles were reached. Descriptive data analyses were applied to the obtained data, sources, cited documents, co-occurrence network, and collaboration network. In the implementation of the mentioned analyses, the Bibliometrix R-package (RStudio software), the Bibliometrix library, and a web interface provider for Bibliometrix, an open-source software design called Biblioshiny (Dönbak, 2020) were used. The Scopus database was used in this study.

In line with the aim of the research, answers to the following questions have been sought:

RQ1. What is the distribution of publication numbers of articles published on machine learning supported by artificial intelligence in the field of digital marketing by year?

RQ2. What is the distribution of journals where the most publications have been made on machine learning supported by artificial intelligence in digital marketing?

RQ3. How has the development been over the years for journals that guide publications related to machine learning supported by artificial intelligence in digital marketing?

RQ4. What is the distribution of the most-cited articles on machine learning supported by artificial intelligence in digital marketing?

RQ5. What is the frequency of using keywords in articles on machine learning supported by artificial intelligence in digital marketing?

RQ6. What is the distribution and relationship of the most frequently occurring words in the articles on machine learning supported by artificial intelligence in digital marketing?

RQ7. Who are the most productive authors related to machine learning supported by artificial intelligence in the field of digital marketing, and what is the distribution of their publications by year?

RQ8. What are the countries that are most cited in articles prepared on machine learning supported by artificial intelligence in the field of digital marketing?

6. Findings

This section of the study presents the analyses conducted on the research data and the findings obtained as a result of these analyses. There is a table of primary data obtained by running biblioshiny through R-Studio. The table provides statistical information about the main data of the research (such as the time range of the relevant research, number of sources, number of documents, average citation count, references, keywords, number of authors, collaboration index, etc.).

Table 1 shows that over 26 years (2007-2020) in the Scopus database, the relevant studies have been published by 505 authors in 171 publications across 133 different journals. The average number of citations per article is 17.93, and the annual average citation count is 2.44. The average number of authors per article is 3.1, while the average number of papers per author is 0.471, and it is observed that there are 26 single-authored articles.

Table 1: Main Information on Publications

Description	**Results**
MAIN INFORMATION ABOUT DATA	
Timespan	2007:2023
Sources (Journals, Books, etc)	133
Documents	171
Annual Growth Rate %	17.93
Document Average Age	2.44
Average citations per doc	12.3
References	1
DOCUMENT CONTENTS	
Keywords Plus (ID)	952
Author's Keywords (DE)	534
AUTHORS	
Authors	505
Authors of single-authored docs	26

AUTHORS COLLABORATION	
Single-authored docs	38
Co-Authors per doc	3.1
International co-authorships %	22.81
DOCUMENT TYPES	
Article	65
Book	7
Book Chapter	19
Conference Paper	55
Conference Paper Conference Paper	1
Conference Review	13
Note	1
Review	10

Figure 1 shows the distribution of scientific publications in the relevant subject area over the years. In the given field, it is possible to see how many publications are made yearly or how these numbers have changed over time. The first publication related to the selected keywords in the Scopus database was published in 2007. The second publication was released six years later, in 2013. Subsequently, between 2014 and 2018, the number of publications ranged from 1 to 6. In 2019, this number reached double digits with 17 publications. Between 2020 and 2023, the number of publications varied between 22 and 47. The highest number of publications was in 2022, with 47.

Figure 1: Annual Scientific Production

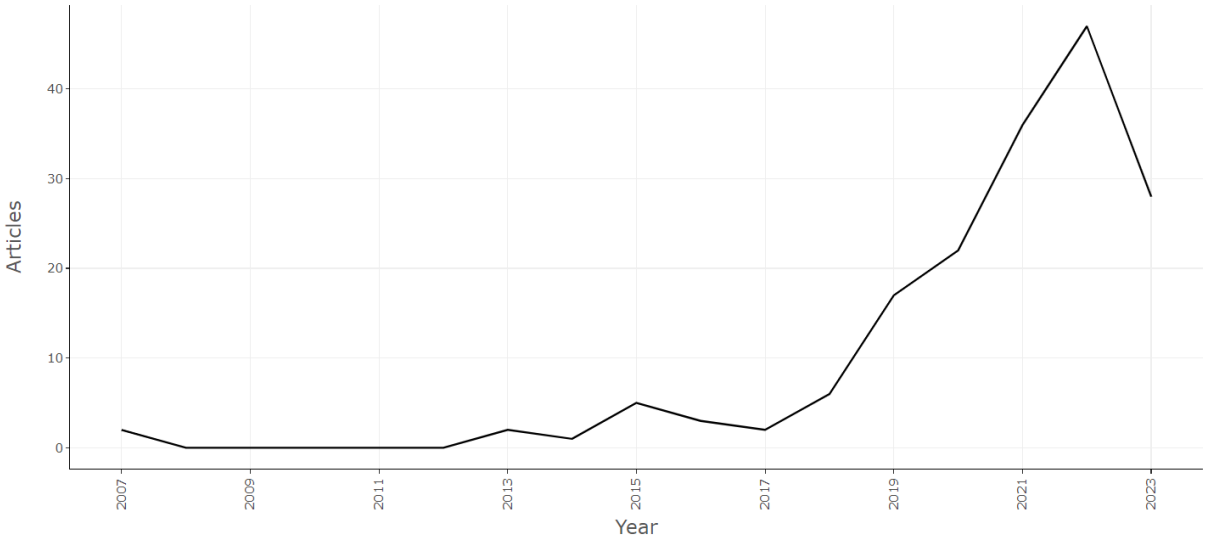


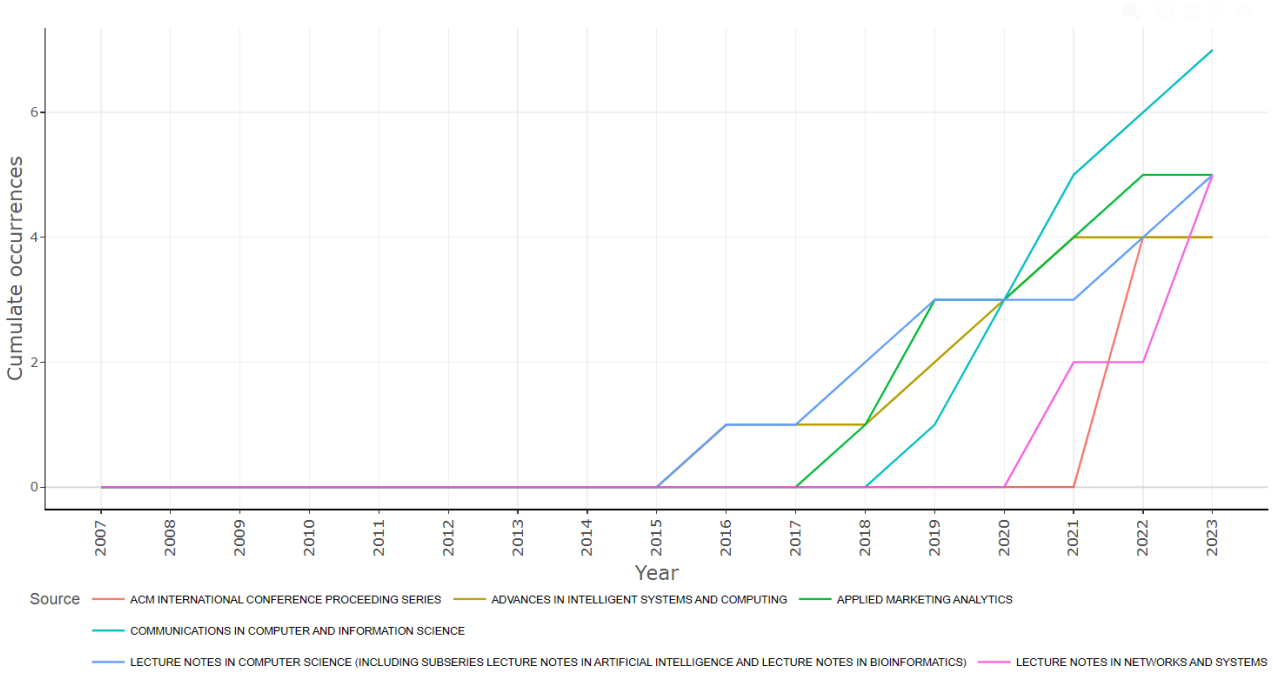
Table 2 displays each source contributing to the relevant field and the contribution made by these sources. The data is presented as an ordered list of the names of the top sources contributing to the appropriate area, along with the number of documents published by each source. Table 2 shows the top 10 journals with the most publications on the relevant subjects in the Scopus database. The journal COMMUNICATIONS IN COMPUTER AND INFORMATION SCIENCE has the most publications in this area, with seven articles. In second place, with five articles each, are the journals APPLIED MARKETING ANALYTICS, LECTURE NOTES IN COMPUTER SCIENCE, and LECTURE NOTES IN NETWORKS AND SYSTEMS. Following them in third place, with four publications each, are the ACM INTERNATIONAL CONFERENCE PROCEEDING SERIES conference and the journal ADVANCES IN INTELLIGENT SYSTEMS AND COMPUTING.

Table 2: Most Relevant Sources

Sources	**Articles**
COMMUNICATIONS IN COMPUTER AND INFORMATION SCIENCE	7
APPLIED MARKETING ANALYTICS	5
LECTURE NOTES IN COMPUTER SCIENCE	5
LECTURE NOTES IN NETWORKS AND SYSTEMS	5
ACM INTERNATIONAL CONFERENCE PROCEEDING SERIES	4
ADVANCES IN INTELLIGENT SYSTEMS AND COMPUTING	4
2022 2ND INTERNATIONAL CONFERENCE ON ADVANCE COMPUTING AND INNOVATIVE TECHNOLOGIES IN ENGINEERING, ICACITE 2022	3
SMART INNOVATION, SYSTEMS AND TECHNOLOGIES	3
SPRINGER PROCEEDINGS IN BUSINESS AND ECONOMICS	3
AI-DRIVEN INTELLIGENT MODELS FOR BUSINESS EXCELLENCE	2

In Figure 3, six journals that have been influential in the relevant field are shown. The journal LECTURE NOTES IN NETWORKS AND SYSTEMS published its first article in 2007. No publications were made in the subsequent 8-year period (between 2007 and 2015), but there has been an increase in the number of publications since 2015. Among the journals that have been influential in the field, 2023 marks the peak, with 30 articles published.

Figure 2: Sources' Production over Time



Global citations refer to the number of times any document is cited by documents found in all databases. Global citations measure the impact of any document across all bibliographic databases. Table 3 provides the publications that have received the most citations on the relevant subject. The article that has received the most citations in this area is Youyou (2015), 'Computer-based personality judgments are more accurate than those made by humans,' with 584 citations. It is followed by Leng (2015) and Ma (2020), each with 166 citations.

Table 3: Most Global Cited Documents

Paper	DOI	Total Citations
YOUYOU W, 2015, PROC NATL ACAD SCI U S A	10.1073/pnas.1418680112	584
LENG S, 2015, BIOMED ENG ONLINE	10.1186/s12938-015-0056-y	166
MA L, 2020, INT J RES MARK	10.1016/j.ijresmar.2020.04.005	166
COGLIANESE C, 2017, GEORGET LAW J	NA	134
MUSTAK M, 2021, J BUS RES	10.1016/j.jbusres.2020.10.044	118
CRITTENDEN WF, 2019, J MARK EDUC	10.1177/0273475318820895	68
MIKLOSIK A, 2019, IEEE ACCESS	10.1109/ACCESS.2019.2924425	57
RADESKY J, 2020, PEDIATRICS	10.1542/peds.2020-1681	53
CAPATINA A, 2020, TECHNOL FORECAST SOC CHANGE	10.1016/j.techfore.2019.119794	50
KUMAR S, 2020, ELECTRONICS (SWITZERLAND)	10.3390/electronics9020374	46

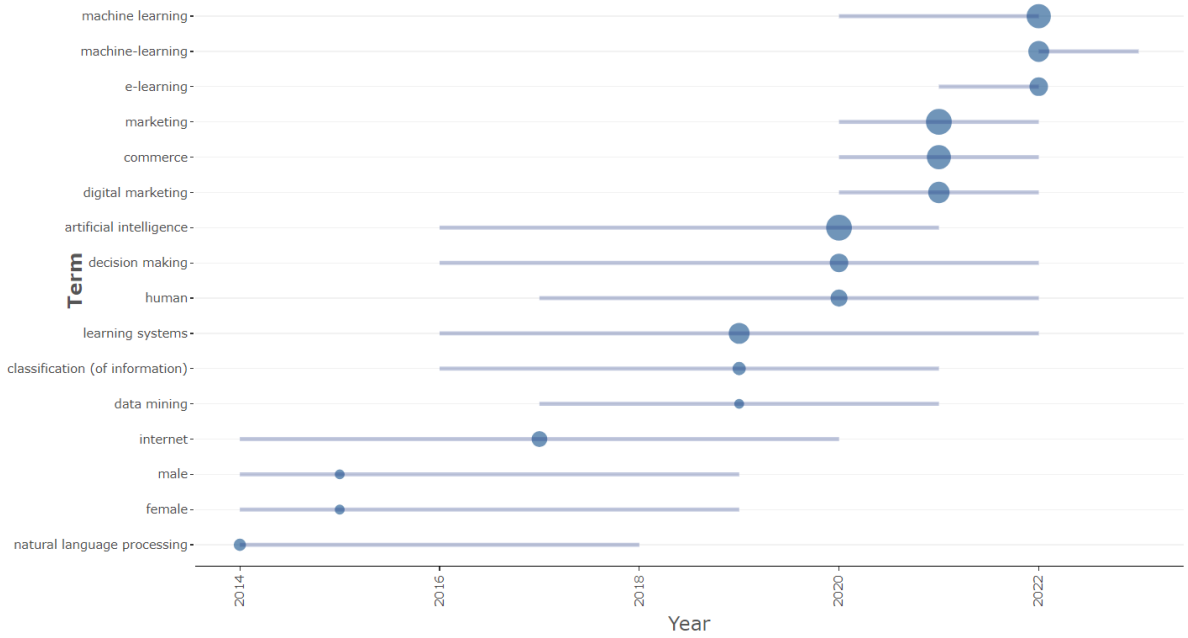
Word clouds are one of the methods used in text mining. With word clouds, the field section in a text or paragraph can be selected according to the purpose of the research, including keyword plus, author keywords, title, and abstract sections. The relationship among the most frequently used words in the selected area can be investigated. Typically, it serves as a visual representation of text data used to modify keyword metadata on websites or to visualize the text independently. In the resulting shape, words relevant to the subject area are displayed, and the size, color, and proximity to each word's center indicate the word's importance (Aria & Cuccurullo, 2017). In Figure 3, the results of the cloud analysis of the articles are provided. Examples of frequently used words include artificial intelligence (50), marketing (50), machine learning (42), commerce (41), digital marketing (29), learning systems (27), machine-learning (27), decision making (19), e-learning (19), and deep learning (15).

Figure 3: Word Cloud

The trend topics graph displays the frequency of terms provided separately in keyword plus, author keywords, title, and abstract sections over the years. Biblioshiny parameters also exist that allow for adjusting the time range, minimum word frequency, and annual word count. The time range parameter determines which time range will be examined when creating the graph, while the minimum word frequency parameter sets the minimum number of times a word must be used to be included in the graph according to the research area. The annual word count

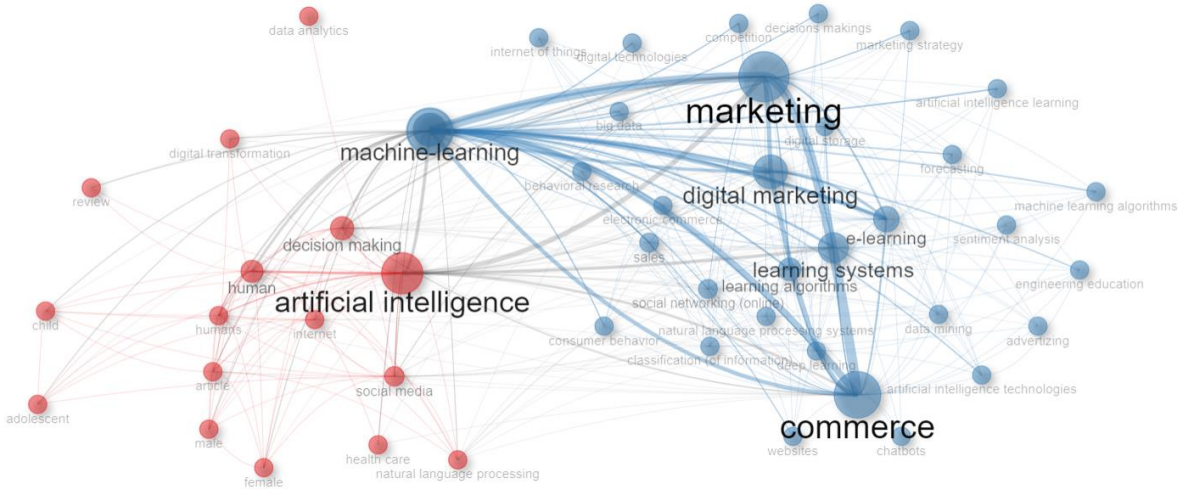
parameter determines how many different words should be present for each year. In the resulting graph, the balloons aligned with the relevant word indicate how many times that word was used in that particular year. Therefore, there is a proportionality between the size or diameter of the balloon and the frequency of word usage. Moreover, it is visible which topics have been used for longer periods, which have been used for shorter periods, and which topics are currently in use. The farther to the right a word is, the more recent its usage is (Marlina et al., 2021). In Figure 4, the trend topics of the publications are also provided.

Figure 4: Trend Topic



Creating a co-occurrence graph of keywords is an informative tool about the relevant research field, revealing apparent relationships and showing co-occurrences between words. The co-occurrence network emphasizes the relationship between keywords by forming a network map and maps out the conceptual structure based on these matches (Aria & Cuccurullo, 2017).In the studies conducted, 2 clusters and 49 keywords have been used, as shown in Figure 2. The size of the circles indicates the frequency of use of the keywords, the colors of the circles indicate which keywords are used together, and the lines between the circles show the relationship between the keywords. The top 5 prominent words on the visual map are marketing, digital marketing, machine learning, commerce, and artificial intelligence.

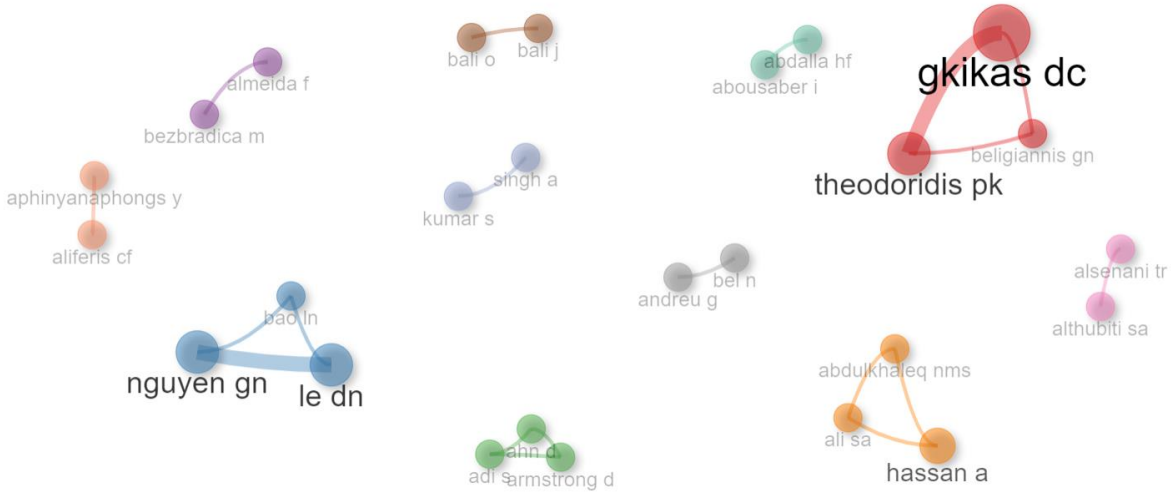
Figure 5: Co-occurrence Network



Collaboration analysis describes the relationship status between contributors to any given field. Identifying those who contribute to the relevant field reveals the research collaboration between them. The collaboration network consists of collaboration clusters, each of which is in different colors. The colored circles in the network represent authors, institutions, or countries, depending on the purpose of the research. The size of the circles represents the number of collaborations. This means that the larger any circle is, the more collaborative partners it has. The links connecting the circles indicate their relationship, and the thickness of these links shows the closeness of collaboration between the relevant circles (Aria & Cuccurullo, 2017).

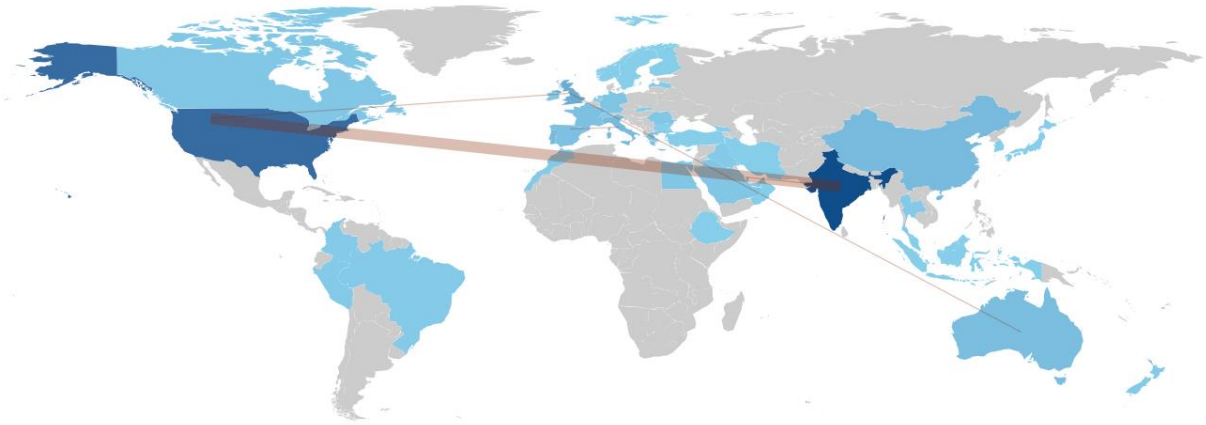
Upon examining the network structure, it is observed that 11 different clusters have formed, and these clusters only collaborate within themselves; there is no inter-cluster collaboration. Gkikas D.C. has the most extensive collaboration network and is the center of the largest cluster. The second largest cluster is Nguyen G.N., with a strong collaboration network. Adi, Ahn D., Armstrong D., Hassan A., Abdulkhaleq N., Ali S., Almeida F., Bezbradica M., Bali J., Bali O., Alsenani T., and Althubiti S. are other authors who are part of collaborative clusters.

Figure 6: Collaboration Network



The country collaboration map defines how countries or regions are related at a geographical level and is used to measure the intensity of international collaboration. While the number of collaborations between countries is displayed, areas dominated by different shades of blue and gray are also present. This color intensity is directly proportional to the number of collaborations; as the color intensity decreases, meaning the color moves from dark blue to light blue, it implies a decrease in the number of collaborations per country. Areas dominated by the color gray represent countries that are not contributing to the collaboration (Singh et al., 2022). In the network of international collaboration, five clusters are observed. The line thickness between the United States of America (USA) and INDIA indicates that the collaboration between these countries is powerful. In addition, good collaboration is observed between INDIA- BAHRAIN, ITALY - FRANCE, UNITED KINGDOM - AUSTRALIA, USA - UNITED KINGDOM..

Figure 7: Countries' Collaboration World Map



7. Conclusion and Discussion

Machine learning can more accurately analyze consumer behavior when used in digital marketing, making marketing strategies far more effective. Additionally, it can deeply examine user data to create personalized advertising campaigns, leading to higher conversion rates and increased customer satisfaction. Machine learning algorithms can automate customer service processes by creating chatbots that instantly answer questions and resolve issues. Lastly, machine learning can measure the effectiveness of marketing campaigns in real time and provide instant feedback for continuous improvement.

This study aims to construct a scholarly representation that focuses on publications incorporating the phrases digital marketing, machine learning, and artificial intelligence. To achieve this, we employed bibliometric analysis, a quantitative research technique. The information for this investigation was sourced from the Scopus database and spans the period from 2007 to 2023. We utilized the Bibliometrix software and its web-based user interface, Biblioshiny, to process and visually represent the collected data. The Scopus database reveals that between 2007 and 2020, 505 authors contributed to 171 publications spanning 133 unique journals. The average citation count per article is nearly 18, with an annual average of about 2.44 citations. On average, each article involves 3.1 authors, and each author contributes to around 0.471 articles. Additionally, there are 26 articles written by a single author. The leading ten journals featuring the most work in the relevant fields are displayed, with the journal called "Communications in Computer and Information Science" standing out as the leader, housing

seven articles on the subject matter. The most frequently cited works in the area of Youyou's (2015) article on computer-based personality judgments topped the list with 584 citations, followed by works from Leng (2015) and Ma & Sun (2020), each garnering 166 citations. Word cloud analytics reveal that terms like 'artificial intelligence,' 'marketing,' and 'machine learning' are among the most commonly used. The five most notable terms on a visual map are marketing, digital marketing, machine learning, commerce, and artificial intelligence. Regarding the network dynamics, 11 separate clusters are apparent, and they work in isolation, with no inter-cluster collaborations. Gkikas D.C. has the broadest collaboration network and anchors the most significant cluster. Nguyen G.N. is at the heart of the second-largest cluster. Various other authors are also noted for their collaborative contributions. On an international scale, five clusters are visible, with powerful collaborations between the USA and India, as indicated by the line thickness. Additional noteworthy collaborations include those between India and Bahrain, Italy and France, the United Kingdom and Australia, and the USA and the United Kingdom.

This research presents a comprehensive bibliometric analysis aiming to map the landscape of academic publications focused on digital marketing, machine learning, and artificial intelligence. Over the past 26 years, the participation of numerous authors (505) across various journals (133) indicates that the subject matter garners multidisciplinary interest. The average number of citations per article and the annual average suggests that the field has a moderate academic impact. The frequent usage of terms like 'digital marketing,' 'AI,' and 'machine learning' implies that future research will increasingly focus on the practical applications of these technologies across various sectors. However, the lack of inter-cluster collaborations indicates an area that needs improvement for more comprehensive studies.

When examining the methodological foundations of the studies, it has been determined that the majority consist of empirical research but lack a research model and are quantitative. Because empirical studies allow for a deeper understanding of the topics addressed, the number of empirical works in this field is anticipated to increase. However, designing these studies within a framework that presents a research model will enhance their contributions to the literature and facilitate the development of new models. Looking at the overall body of work, there is space for advancing qualitative and mixed-method studies.

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