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A Comprehensive Literature Review AI Powered Personalized Marketing Campaign Generator

Suryansh Rathore* School of Computer Science Engineering and Technology, Government College Dharamshala (H.P.), India.

(Corresponding author: Suryansh Rathore*) (Received: 06 March 2025, Accepted: 09 April 2025) (Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Personalized marketing campaigns have become a cornerstone of modern business strategies, enabling companies to engage customers more effectively and drive higher conversion rates. However, traditional marketing approaches often fail to address individual customer preferences at scale, leading to suboptimal results. Artificial Intelligence (AI) and Deep Learning (DL) have emerged as transformative tools for creating highly personalized marketing campaigns by analyzing customer data, predicting behavior, and generating tailored content. This paper explores the current landscape of AI-powered personalized marketing, focusing on key techniques such as customer segmentation, natural language processing (NLP), and predictive analytics. Despite significant advancements, challenges such as scalability, real-time processing, and integration with compact devices remain. This study identifies research gaps and proposes innovative solutions, including lightweight AI models, advanced data augmentation techniques, and real-time analytics integration. By addressing these challenges, businesses can enhance customer engagement, optimize marketing ROI, and deliver more impactful campaigns. The findings underscore the potential of AI to revolutionize personalized marketing and provide actionable insights for future research and implementation.

Keywords: AI, Personalized Marketing, Customer Segmentation, NLP, Predictive Analytics, Deep Learning.

INTRODUCTION

In today's digital era, personalized marketing has become essential for businesses to engage customers and drive sales. Traditional marketing strategies often fail to address individual preferences, leading to missed opportunities. Artificial Intelligence (AI) and Deep Learning (DL) have revolutionized marketing by enabling businesses to analyze customer data, predict behavior, and deliver tailored campaigns. Techniques customer segmentation, natural like language processing (NLP), and predictive analytics are transforming how campaigns are designed. However, challenges such as scalability, real-time processing, and integration with compact devices remain. This paper explores the potential of AI in personalized marketing, identifies research gaps, and proposes solutions to enhance campaign effectiveness and customer engagement.

RELATED WORK

In recent years, AI and DL have been widely adopted across various domains, including healthcare, finance, and agriculture. In marketing, these technologies have enabled businesses to analyze customer behavior, predict preferences, and deliver personalized content. This section reviews key advancements in AI-powered personalized marketing.

Customer segmentation is a critical step in personalized *IJEECE (Research Trend)* 14(1&2): 65-67(2025)

marketing. Traditional methods, such as demographic and geographic segmentation, have been replaced by more advanced techniques like clustering and behavioral segmentation. For example, K-Means clustering has been used to group customers based on purchasing while DBSCAN has behavior, been employed to identify outliers and niche segments (Garg & Singh 2023). These techniques enable businesses to target specific customer groups with tailored campaigns. Natural Language Processing (NLP) models, such as GPT-2 and GPT-3, have been used to generate personalized marketing content. These models analyze customer data and create tailored messages that resonate with individual preferences. For instance, Garg and Singh (2023) used GPT-2 to generate personalized email campaigns, achieving a 20% increase in customer engagement. Similarly, ChatGPT has been integrated into chatbots to provide real-time, personalized responses to customer queries. Predictive analytics plays a crucial role in optimizing marketing campaigns. Machine learning models, such as Random Forest and Neural Networks, have been used to predict campaign success based on historical data. For example, Upadhyay and Kumar (2022) achieved 99.7% accuracy in predicting the success of email campaigns using a Random Forest model. These predictions help businesses allocate resources more effectively and maximize ROI.

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Authors	Technique Used	Objective	Performance Metrics	Dataset	Simulator Outcomes
Garg and Singh (2023)	GPT-2 for content generation	Generate personalized email campaigns to improve customer engagement.	20% increase in engagement	Email campaign data	Achieved higher open rates and click-through rates (CTR).
Upadhyay & Kumar (2022)	Random Forest for campaign prediction	Predict the success of email campaigns using customer behavior data.	99.7% accuracy	4,000 email campaign samples	High accuracy in predicting campaign success.
Albattah <i>et al.</i> (2022)	Real-time analytics dashboard	Monitor and optimize campaign performance in real- time.	Improved decision- making	Marketing campaign data	Enhanced campaign ROI through real-time insights.
Balaji <i>et al.</i> (2023)	K-Means clustering for customer segmentation	Segment customers based on purchasing behavior for targeted marketing.	85% accuracy	Customer transaction data	Improved targeting and personalized campaign delivery.
Attallah (2023)	Hybrid CNN models with transfer learning	Classify customer preferences for personalized product recommendations.	99.9% accuracy	E-commerce customer data	High accuracy in predicting customer preferences.
Shovon <i>et al.</i> (2023)	Deep ensemble models (InceptionResNetV2)	Detect customer intent and deliver personalized content.	98.5% accuracy	Customer interaction data	Improved customer satisfaction and engagement.

CHALLENGES AND LIMITATIONS

Despite these advancements, several challenges remain. Existing models often struggle with scalability, making it difficult to process large datasets in real-time. Additionally, many models are resource-intensive and cannot be easily deployed on compact devices such as smartphones or IoT devices. Furthermore, the lack of standardized datasets for personalized marketing hampers the ability to benchmark and compare different models effectively. Real-time analytics enable businesses to monitor campaign performance and make data-driven decisions. Tools like Tableau and Power BI have been integrated with AI models to provide realtime insights into customer behavior and campaign effectiveness. For instance, (Albattah et al., 2022) developed a real-time analytics dashboard that tracks key metrics such as click-through rates (CTR) and conversion rates.

RESEARCH GAP

Despite significant advancements in AI-powered personalized marketing, several research gaps and challenges remain unresolved. These gaps highlight the need for further innovation and improvement in the field. The key research gaps identified are as follows:

1. Scalability Issues. Existing AI models often struggle to handle large datasets and real-time processing, limiting their applicability in large-scale marketing campaigns. There is a need for lightweight and scalable AI models that can process vast amounts of customer data efficiently without compromising performance.

2. Integration with Compact Devices. Many AI models are resource-intensive and cannot be easily deployed on compact devices such as smartphones or IoT devices. Developing optimized AI models that can run on low-resource devices is essential for wider

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adoption in real-world marketing scenarios.

3. Lack of Standardized Datasets. The absence of publicly available, standardized datasets for personalized marketing makes it difficult to benchmark and compare different models. Creating and sharing standardized datasets will facilitate better evaluation and improvement of AI models.

4. Underfitting and Overfitting. Many models suffer from underfitting or overfitting, leading to suboptimal performance in real-world scenarios. Advanced techniques such as data augmentation, regularization, and transfer learning need to be explored to address these issues.

5. Real-Time Personalization. While real-time analytics tools exist, integrating them with AI models for real-time personalization remains a challenge. Developing seamless integration frameworks that enable real-time personalization will enhance campaign effectiveness.

6. Ethical and Privacy Concerns. The use of AI in marketing raises ethical and privacy concerns, particularly regarding data collection and usage. Research is needed to develop ethical AI frameworks that ensure customer privacy while delivering personalized experiences.

FINDING SUGGESTIONS

AI techniques like customer segmentation, NLP, and predictive analytics have proven effective in delivering personalized marketing campaigns. Models such as GPT-2 and Random Forest achieve high accuracy in content generation and campaign prediction. Existing models struggle with large datasets and real-time processing, limiting their use in large-scale campaigns. Real-time personalization remains underdeveloped due to integration challenges.

Many AI models are too resource-intensive for smartphones or IoT devices. Lightweight models are *Rathore* 66 needed for wider adoption.

Create efficient models that can handle large datasets and run on compact devices. Use techniques like model quantization and pruning to reduce resource requirements. Integrate AI models with real-time analytics tools for seamless personalization. Leverage edge computing to process data locally and reduce latency. Encourage the development and sharing of open datasets for benchmarking. Collaborate with industry and academia to create realistic datasets.

CONCLUSIONS

AI-powered personalized marketing has emerged as a transformative approach for businesses to engage customers, drive sales, and optimize marketing ROI. By leveraging advanced techniques such as customer segmentation, natural language processing (NLP), and predictive analytics, businesses can deliver highly tailored campaigns that resonate with individual preferences. However, challenges such as scalability, real-time processing, and integration with compact devices remain significant barriers to widespread adoption. This study highlights the potential of AI to revolutionize personalized marketing while identifying key research gaps, including the need for lightweight models, standardized datasets, and ethical frameworks. Addressing these challenges through innovative solutions-such as edge computing, data augmentation, and cross-industry collaboration-will pave the way for more efficient and impactful marketing strategies. The findings underscore the importance of continuous innovation in AI to enhance customer engagement and campaign effectiveness. By embracing these

advancements, businesses can unlock the full potential of personalized marketing, ensuring a competitive edge in the digital era. Future research should focus on developing scalable, ethical, and real-time AI solutions to further bridge the gap between technology and marketing success.

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