

Artificial Intelligence in Marketing

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Abstract. This thesis explores the application of artificial intelligence in marketing and the trends, challenges and opportunities of digital transformation. Firstly, it introduces the definition, development history and main technology and application areas of artificial intelligence. Then, it analyses the overview of the application of AI in the business field, including personalised recommendation, intelligent customer service and other aspects. Subsequently, how AI has changed marketing strategies and practices is explored and compared with traditional approaches. In terms of specific applications, the role and benefits of personalised recommendation systems, intelligent customer service systems, etc. are highlighted. In addition, the application of data-driven market trend analyses, intelligent predictive models, etc. in marketing is examined. Finally, the impact of AI and digital transformation on marketing is summarised, highlighting the need for companies to strengthen data security and management, and to grasp the opportunities of technological development to achieve sustainable development and competitive advantage.

Keywords: artificial intelligence; marketing; digital transformation.

1. Introduction

With the rapid development and popularity of digital technology, digital transformation has become an inevitable trend in various industries, and the marketing field is no exception. The combination of marketing and digital transformation not only changes the traditional marketing model, but also brings new opportunities and challenges. This thesis aims to explore the impact of digital transformation on marketing, and analyse its trends, challenges and opportunities, which not only helps enterprises better grasp the pulse of market development, but also provides new perspectives and ideas for academic research in this field[1]. Through a systematic review and analysis, this thesis aims to provide effective reference guidance for practitioners and theoretical support for academics to further explore the field.

2. Overview of Artificial Intelligence

2.1. Definition and Development of Artificial Intelligence

Artificial Intelligence (AI) is a discipline that refers to the theory, methods, techniques and application systems that simulate, extend and expand human intelligence. Its development can be traced back to the 1950s, and early AI research focused on areas such as symbolic logic reasoning and expert systems[2]. With the improvement of computer performance and the continuous development of algorithms, especially the rise of technologies such as deep learning, AI has entered a new phase of rapid development. In the 1980s, with the emergence of expert systems, AI began to be applied to the commercial field, such as predictive analysis, recommender systems, etc. Since the 21st century, with the development of technologies such as big data, cloud computing, and the Internet of Things (IoT), AI has entered an explosive growth period, covering a variety of fields such as natural language processing, computer vision, machine learning, etc., and has been widely used in various industries such as finance, healthcare and retail. Artificial Intelligence has become one of the core engines driving digital transformation and innovation, and its impact on marketing has become more and more far-reaching and extensive.

2.2. Overview of major technologies and application areas

Artificial Intelligence can't be widely used without the support of a variety of technologies, including but not limited to Machine Learning, Deep Learning, Natural Language Processing (NLP), Computer Vision (CV), and so on. Machine learning, as one of the core technologies of AI, enables computers to learn from data and make predictions or decisions by training algorithmic models. Deep learning, on the other hand, is a branch of machine learning that simulates the workings of the human brain by building deep neural network models to achieve more complex pattern recognition and data processing tasks[3]. In terms of application areas, the application of artificial intelligence has penetrated into various industries and fields. In marketing, the application of technologies such as personalised recommendation systems, intelligent advertising, sentiment analysis, and customer service robots is becoming increasingly popular. In addition, AI technology is also widely used in areas such as market trend analysis, product pricing optimisation, and sales forecasting, providing data support and intelligent solutions for corporate decision-making. As technology continues to progress and application scenarios continue to expand, the role of AI in marketing will become more important and widespread.

2.3. Overview of Artificial Intelligence Applications in Business

The application of artificial intelligence technology in the business field presents diversity and breadth, covering a wide range of aspects such as sales, marketing, customer service, supply chain management, and so on. Personalised recommendation system is one of the most prominent applications. By analysing users' historical behaviours and preferences, it achieves accurate recommendation of goods, content, etc., and improves user satisfaction and purchase conversion rate. Intelligent advertisement placement uses machine learning and big data analysis technology to accurately locate the target audience and improve the effect and ROI of advertisement placement[4]. In terms of customer service, the application of intelligent customer service robots has become a common trend in the industry, which is capable of realising 24/7 round-the-clock customer service and improving service efficiency and satisfaction. Meanwhile, AI also plays an important role in market trend analysis, sales forecasting, supply chain optimisation and other areas, helping enterprises better understand market demand, adjust production plans and optimise supply chain management. As technology continues to advance and business scenarios continue to be enriched, the application of AI in the commercial field has a broader prospect and will bring more efficient and intelligent means of operation and management to enterprises.

3. The Convergence of Artificial Intelligence and Marketing

3.1. The Role and Advantages of Artificial Intelligence in Marketing

Improvement of personalised marketing capabilities. By analysing massive user data, AI is able to accurately identify user preferences and behavioural habits and achieve personalised marketing recommendations, thus increasing user satisfaction and purchase conversion rates. Intelligent advertising strategy. With the help of machine learning and data mining technology, AI can accurately identify target audiences, optimise advertising channels and timing, and improve advertising effectiveness and ROI. The application of intelligent customer service system also brings convenience to marketing. Intelligent customer service robots can realise 24/7 all-weather customer service, improve service efficiency and user experience, and at the same time reduce the operating costs of enterprises.

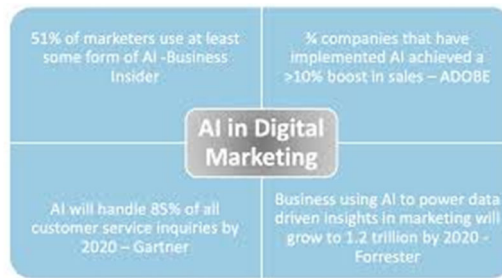


Figure 1. The Role and Advantages of Artificial Intelligence in Marketing

3.2. How Artificial Intelligence Technology Has Changed Marketing Strategies and Practices

Marketing strategies are more personalised and precise. While traditional marketing relies on manual analysis and inference, AI is able to achieve deeper mining of user behaviour through big data analysis and machine learning, thus enabling more personalised and precise marketing strategy formulation. Marketing practices are more intelligent and automated[5]. Artificial intelligence technologies such as smart recommendation systems and smart ad delivery platforms can automate data analysis, optimise strategies and adjust marketing programmes in real time, improving the efficiency and flexibility of marketing practices.

3.3. Comparison and contrast between AI and traditional marketing approaches

In terms of market analysis and user insights, traditional marketing methods focus on manual research and statistical analysis, while AI technology is able to provide more comprehensive and accurate user insights and market trend predictions through big data analysis and machine learning to achieve rapid processing and deep mining of massive data. In terms of marketing strategy development and implementation, traditional marketing methods rely more on manual experience and intuition, while AI technology is able to automate the analysis of data, optimise strategies and adjust marketing plans in real time, improving marketing efficiency and accuracy.

4. Specific Applications of Artificial Intelligence in Marketing

4.1. Personalised marketing

(1) Personalised Recommendation System

Personalised recommendation system is based on the user's historical behaviour and preferences, using artificial intelligence technology to analyse data and recommend personalised products, content or services for the user. Its core idea is to achieve accurate prediction of user interests through algorithmic models, so as to improve user satisfaction and purchase conversion rate. Collaborative filtering algorithms are based on user behaviour data and recommend items with similar interests to the user by calculating the similarity between the user and other users or items[6]. The content filtering algorithm, on the other hand, based on the attributes and features of the items, matches the items with the user's preferences and recommends relevant content.



Figure 2. Personalised Recommendation System

(2) Personalised pricing and promotional strategies

In terms of personalised pricing, companies can differentiate pricing by analysing information such as users' consumption history, purchase preferences and geographic location, and using pricing optimisation algorithms to personalise pricing for different users or groups of users. For example, differentiated pricing strategies can be formulated based on users' purchase frequency or loyalty, or pricing levels can be adjusted based on users' geographic location, purchase time, and other factors. In terms of personalised promotional strategies, companies can analyse users' behavioural data and consumption habits through AI technology to customise personalised promotional programmes for users, such as targeted coupons, discount codes and gift rewards. These personalised promotional strategies can increase users' desire to buy and loyalty, and promote sales growth and customer satisfaction.

(3) Personalised advertising and content recommendation

In terms of personalised advertising, enterprises can analyse users' browsing history, search records, social interactions and other data, use intelligent advertising delivery systems to precisely locate the target audience, and customise the display of advertising content according to users' interests, preferences and behavioural characteristics. Such personalised advertising not only improves the click rate and conversion rate of advertisements, but also reduces the cost of advertising and improves the return on advertising investment. In terms of personalised content recommendation, enterprises can analyse users' reading preferences, viewing history, purchasing behaviour and other data, and use the recommendation system to recommend relevant content for users in a personalised way, including articles, videos, music and so on. Such personalised content recommendation can improve users' reading experience and satisfaction, increase users' stay time and stickiness, and promote content consumption and user interaction.



Figure 3. Personalised advertising and content recommendation

4.2. Intelligent Customer Service and Relationship Management

(1) Chatbots and virtual assistants

Through natural language processing technology, chatbots are able to understand the semantics and intentions of users and automatically respond to their questions, achieving intelligent dialogue. This intelligent dialogue system can be applied to online customer service, pre-sales consultation, order tracking and other scenarios, improving customer service efficiency and satisfaction. The virtual assistant is a more intelligent chat robot with richer functions and stronger interaction capabilities. Virtual assistants are not only able to answer users' questions, but also to perform tasks, provide advice and complete operations. For example, intelligent voice assistants such as Siri and Alexa are able to achieve mobile phone operation, home control, scheduling and other functions through voice commands, which greatly enhances the user's convenience and experience.

(2) Intelligent customer service system

Intelligent customer service system is able to understand the questions or needs raised by users through natural language processing technology, and convert users' voice or text information into structured data, so as to achieve accurate recognition and understanding of users' needs. Intelligent customer service system can be based on machine learning technology, constantly accumulating and

learning user feedback and experience, optimising the intelligent algorithm model, and improving the accuracy and efficiency of problem solving. Through continuous training and optimisation, the system can better adapt to the customer service needs of different industries and enterprises. The intelligent customer service system also has the ability of automated processing and multi-channel access, and is able to automatically perform a series of operations, such as auto-response, auto-referral, and autoprocessing, etc. It also supports a variety of communication channels, including text, voice, and image, to achieve all-round and diversified customer service support.

(3) Intelligent upgrade of customer relationship management system

Intelligent upgrading combines traditional data management functions with artificial intelligence technology to achieve real-time analysis and mining of big data, helping enterprises better understand customer needs and behavioural characteristics. Through machine learning algorithms, the system is able to automatically identify customer behavioural patterns and trends, and predict customer purchase intentions and churn risks, thus providing data support for enterprises to formulate more accurate marketing strategies and service solutions. Intelligent upgrading also integrates the CRM system with intelligent tools such as intelligent customer service systems and personalised recommendation systems to achieve all-round customer service support and diversification of communication channels. Through the intelligent customer service system, enterprises can respond to customers' problems and needs in a timely manner to improve customer satisfaction and loyalty; through the personalised recommendation system, enterprises can provide customers with personalised product and service recommendations to enhance customer stickiness and purchase conversion rate.

4.3. Market forecasts and trend analyses

(1) Data-driven market trend analysis

Data-driven market trend analysis uses big data technology to collect, clean and integrate relevant data from the market to build a comprehensive, multi-dimensional data analysis model. By analysing historical and real-time data, the system is able to accurately identify market development trends and potential opportunities, helping enterprises grasp market dynamics and adjust marketing and product strategies in a timely manner. Data-driven market trend analyses leverage machine learning and data mining technologies to mine hidden patterns from massive amounts of data. Through the analysis and modelling of market data, the system is able to predict the development trend and direction of market changes, providing a scientific basis for future development planning and strategic decision-making.

(2) Intelligent Predictive Modelling and Market Forecasting Applications

Intelligent prediction models use technologies such as machine learning and deep learning to train and model massive amounts of market data, extracting the laws and patterns in the data. Through continuous learning and optimisation, the model is able to automatically discover correlations and trends between data to achieve accurate predictions of the future direction of the market. Intelligent forecasting models can be applied to multiple market sectors, such as sales forecasting, demand forecasting, price forecasting, and so on. By analysing and forecasting market data, companies can adjust their marketing and product strategies in a timely manner, improve their market response speed and competitiveness, and thus achieve sales growth and market share enhancement.

(3) The role of artificial intelligence in competitive market analysis

Artificial Intelligence enables data mining and analysis of competitors, and by monitoring competitors' price changes, product characteristics, advertising activities and other information, it helps enterprises understand competitors' market positioning and competitive strategies, adjust their own strategies in a timely manner, and enhance competitiveness. Artificial Intelligence can analyse consumers' purchasing behaviour and preferences, predict market demand and trends, help enterprises grasp market opportunities, adjust product structure and promotion strategies, meet consumer demand and increase market share.

4.4. Content Creation and Marketing

(1) Intelligent content generation and creative assistance

Intelligent content generation technology is capable of automatically generating various types of textual content, such as advertisement copy, press releases, social media posts, etc., through natural language processing and generative modelling. This intelligent content generation technology can greatly improve the efficiency and quality of content output, reduce manual input, and meet the growing content needs of enterprises. Intelligent creative assistance tools can provide creative teams with creative inspiration and design suggestions through machine learning and image recognition technologies. These tools can automatically generate design drafts, images and video clips, assisting creative teams to quickly conceptualise and realise ideas, and improve the efficiency and quality of creative output.

(2) Intelligent marketing content distribution and management

Intelligent marketing content distribution uses intelligent algorithms and data analysis technology to achieve precise positioning and personalised push for target users. By analysing information such as users' behavioural data, interest preferences and social relationships, the system is able to accurately identify potential customers and push relevant content for them, improving the exposure and dissemination of the content. Intelligent marketing content management uses artificial intelligence technology to achieve automated management and optimisation of marketing content. The system can automatically monitor and analyse the dissemination effect and user feedback of the content, adjust the content strategy and distribution channels in a timely manner, and improve the quality and influence of the content.

(3) Data-driven content marketing strategy

Data-driven content marketing strategy improves the attractiveness and conversion rate of content by analysing users' historical behavioural data and consumption behaviour to gain an in-depth understanding of users' interests, purchasing preferences and needs, so as to push relevant content in a targeted manner. Data-driven content marketing strategy improves the effectiveness and competitiveness of marketing campaigns by monitoring market trends and competitive dynamics, adjusting marketing strategies and content direction in a timely manner, and keeping up-to-date with the market.

5. Reach a Verdict

The integration of digital transformation and AI technology in the field of marketing brings great opportunities and challenges for enterprises. Through the overview of this thesis, the wide range of applications of AI in marketing can be clearly seen, including personalised recommendation, intelligent customer service, market trend analysis and other aspects. These applications not only improve the operational efficiency and marketing effectiveness of enterprises, but also bring consumers a more personalised and intelligent product and service experience. However, digital transformation also brings some new challenges, including data privacy protection, algorithmic fairness and other issues. Enterprises need to strengthen the protection of data security and user rights and interests in the process of applying AI technology to ensure its reasonable and sustainable development.

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