Proceedings of CONF-MLA 2026 Symposium: Intelligent Systems and Automation: AI Models, IoT, and Robotic Algorithms
DOI: 10.54254/2755-2721/2026.LD39248

AI and Digital Media Interaction Design: Technology, Experience, and Future Prospects

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Abstract. With the rapid development of digital media, artificial intelligence has become a core driving force of industrial innovation, while traditional interactive design relying on manual experience cannot meet users' personalized and immersive demands.This paper takes the integration of artificial intelligence and digital media interaction design as the research theme.It sorts out core AI technologies... analyzes their practical applications... discusses prominent challenges in practice, such as user privacy leakage, algorithm bias, insufficient designer creativityThe research concludes that AI can intelligently upgrade the whole design workflow... yet ethical and collaborative obstacles remain unsolved. In the future, human-AI collaboration will become the mainstream design paradigm... provide theoretical guidance for digital media design practice.

Keywords: Artificial Intelligence, digital media, interaction design, human-AI collaboration, algorithm ethics

1. Introduction

With the rapid development of digital technology, artificial intelligence is progressively permeating all industries, becoming the core driving force for technological innovation and industrial upgrading [1]. Through algorithmic computing and mass data processing, AI realizes high-level cognitive capabilities including learning, logical reasoning, autonomous decision-making and environmental perception. Such functions allow computing systems to adapt dynamically to diverse scenarios and streamline task execution pipelines [2]. In the field of digital media, AI is applied particularly extensively, transforming not only the approaches to content production and distribution but also profoundly influencing the interactive experience between users and digital products.

Digital media interaction design is a core component of digital media products. By designing interface layouts, information delivery, and user operation logic, it builds a communication bridge between users and products, thereby enhancing the user experience and value of the product. With increasingly personalized, intelligent, and immersive user demands, traditional interaction design methods can no longer meet the high standards of modern digital products.

The integration of artificial intelligence has elevated digital media interaction design from singular tool support to a full-process, multi-dimensional intelligent design paradigm. AI enables the construction of precise user profiles through user behavior data analysis, facilitating personalized content recommendation, interface adaptation, and interaction path optimization [3]; it enhances

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design efficiency and creative quality by automatically generating interfaces, prototypes, and usability tests; and by incorporating natural language processing, computer vision, AR/VR, and other technologies, it realizes multimodal interaction—including voice, gesture, and image—breaking the boundaries of traditional screen-based interaction and providing immersive experiences. This paper aims to systematically analyze the application of artificial intelligence in digital media interaction design, examining the practical effects of AI technologies in interface design, user experience optimization, multimodal interaction, and immersive experiences. It reviews the role of AI in enhancing efficiency and creativity within the design process and examines current challenges and issues through case studies. Finally, this paper looks ahead to future trends in the integration of AI and interaction design,delivering both theoretical frameworks and actionable guidance for frontline design practitioners.

2. The relationship between artificial intelligence and digital media interaction design

Digital media interaction design is an interdisciplinary field that integrates knowledge from design, computer science, psychology, and other disciplines. Its core objective is to meet user needs and enhance experience through rational interface layout, information transmission logic, and operational feedback [4]. Interaction design primarily encompasses three dimensions: user interface (UI) design, user experience (UX) design, and interaction logic design.UI design focuses on the visual presentation of a product, covering interface layout, color schemes, icon design, and typography choices, and serves as the primary touchpoint. through which users intuitively perceive a product [5]; UX design emphasizes the overall feelings users have during the usage process, including ease of use, convenience, and enjoyment, with the core purpose of satisfying users' emotional and functional needs; interaction logic design is responsible for establishing effective connections between user operations and system feedback, ensuring operational fluidity and efficiency.

Against the backdrop of rapid digital media development, the importance of interaction design has become increasingly prominent. As homogenization competition among digital products intensifies, user requirements have shifted from "usable" to "pleasurable" and "delight", making high-quality interaction design the key to differentiating digital products [6]. For example, the interface layout and ease of operation of short-video applications directly affect user retention rates; the interaction logic design of educational applications determines learning efficiency.At the same time, effective interaction design can also convey brand philosophy and strengthen users' sense of belonging and loyalty, constituting a vital component of a product's core competitiveness.

Artificial intelligence technology provides robust technical support for interaction design, encompassing multiple core technologies that jointly empower the realization of design.Machine learning uses algorithms to enable computers to autonomously identify underlying patterns in massive datasets, allowing for accurate prediction of user behavior. Deep learning (DL), a subset of machine learning, processes data by simulating the neural network structure of the human brain, substantially enhancing the system's capacity for data analysis and autonomous decision-making. It is now widely adopted in fields such as image recognition, speech synthesis, and automated design. Natural language processing (NLP) establishes a bidirectional communication pathway between computers and human natural language, enabling users to interact seamlessly with digital products through everyday spoken and written words. Computer vision and speech recognition technologies expand the modalities of human-computer interaction, driving the shift from single touch-based operations to multimodal interaction forms that synchronously integrate gestures, facial expressions, speech, and images [7]. Artificial intelligence and digital media interaction design exhibit a mutually

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reinforcing and symbiotic relationship.AI provides technological empowerment for design, breaking through reliance on experience and the problem of homogenization by automating certain design tasks through data analysis; interaction design offers application scenarios for AI, driving algorithm optimization and iterative upgrades so that AI better aligns with user needs [8]. For instance, machine learning techniques can analyze user behavior data to help designers optimize interaction logic; natural language processing enables chatbots and voice assistants; and computer vision technology supports image recognition and facial unlock, enhancing convenience and security.The combination of the two not only improves efficiency and quality but also propels innovation in digital media, achieving the unification of technological value and user value [9].

Digital media interaction design is the core link connecting users with digital products, while artificial intelligence provides comprehensive technical support. The deep integration of the two enables the bidirectional advancement of technological empowerment and experience optimization, laying a foundation for subsequent applications.

3. Applications of AI in digital media interaction design

3.1. AI-driven interface design

Interface design forms the foundation of digital media interaction design [10]. Traditional interface design has long relied on the empirical judgment of designers, covering a series of repetitive labor-intensive tasks such as layout iteration, color scheme calibration, and prototype fine-tuning. This workflow is inherently inefficient and makes cross-version design consistency extremely difficult to maintain [11]. The introduction of AI has enabled automation and intelligence in interface design, helping designers quickly generate solutions, refine details, and improve both efficiency and quality.

Automated generation of UI layouts and visual elements is a core application of AI in interface design. For example, the Figma AI plugin can generate the homepage layout of an e-commerce app based on keywords, along with recommending color schemes and typography styles; Adobe Sensei can automatically adjust element alignment and spacing, generating stylistically consistent design elements. Tools such as Vercel and Locofy.ai can automatically convert design drafts into responsive code, compressing the "design-to-development" cycle from weeks to hours and significantly boosting team efficiency.

3.2. Personalized user experience

Personalized experiences represent a key objective in modern interaction design.Traditional one-size-fits-all approaches struggle to meet the diverse needs of users, whereas AI leverages data analysis and machine learning to uncover user behaviors, interests, and needs, achieving tailored customization [12].

The core process involves collecting user data (clicks, time on page, searches, favorites, etc.), building user profiles, recommending content, adjusting interfaces, and optimizing interaction methods.Platforms such as Netflix and YouTube use recommendation systems that, based on data including users' viewing histories, ratings, and preferences, suggest videos aligned with their interests, boosting retention and satisfaction.Chatbots employ natural language processing to interpret user commands and enable real-time interaction, such as recommending products on e-commerce platforms and creating customized learning plans in educational apps, significantly improving both efficiency and satisfaction.

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3.3. Application of voice and image recognition in interaction

Voice recognition and image recognition have expanded forms of interaction, enabling natural human-computer interaction [13]. Voice assistants (e.g., Siri and Alexa) can understand user commands and perform operations such as sending text messages, running queries, and controlling smart home devices. Image recognition technology enables automatic background removal, image restoration, and style transfer in design tools, and supports face recognition login, special effect generation, and content retrieval in social applications [14]. OpenAI's GPT-4o multimodal model integrates text, vision, and audio to achieve cross-modal interaction, providing a technical foundation for multimodal experiences.Voice recognition and image recognition have expanded forms of interaction, enabling natural human-computer interaction [13]. Voice assistants (e.g., Siri and Alexa) can understand user commands and perform operations such as sending text messages, running queries, and controlling smart home devices. Image recognition technology enables automatic background removal, image restoration, and style transfer in design tools, and supports face recognition login, special effect generation, and content retrieval in social applications [14]. OpenAI's GPT-4o multimodal model integrates text, vision, and audio to achieve cross-modal interaction, providing a technical foundation for multimodal experiences.

3.4. The integration of AI with AR/VR

Augmented reality (AR) and virtual reality (VR) provide immersive experiences, and the incorporation of AI optimizes interaction logic, enhances scene realism, and enables personalized immersive experiences. In VR, AI can simulate the movements and language of virtual characters and adjust scene perspectives in real time, thereby heightening immersion. Half-Life: Alyx leverages AI to perceive the player's position and actions for intelligent responses; High on Life utilizes AI to generate art assets, saving time on manual drawing. In AR, AI can precisely overlay virtual elements onto real-world scenes—examples include AR navigation, virtual try-ons, and AR educational interactions—improving both convenience and engagement.

3.5. AI in multi-platform and cross-scenario applications

AI is not limited to a single platform; its applications span apps, websites, games, AR/VR devices, and smart terminals. Cross-platform AI interaction can automatically adjust interface layout, brightness, color scheme, and difficulty of operation based on the user's usage scenario, delivering a personalized experience that is unique for each individual [15]. Educational apps use AI to analyze learning behavior and progress, enabling personalized instruction and interactive learning. In smart homes, AI can adjust lighting and temperature based on user behavior patterns, achieving environmental adaptation.

4. Challenges and issues of artificial intelligence in digital media interaction design

4.1. Technological and ethical issues

AI applications require the collection of large amounts of user data, including personal information, behavioral trajectories, interests, and preferences, making privacy protection a core ethical concern [16]. If data management is inadequate, it may lead to leaks or misuse. Algorithmic bias presents another challenge, as biases in training data may give rise to gender, regional, or racial discrimination. For instance, recruitment or recommendation algorithms may favor specific groups.

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The uninterpretability of AI algorithms increases technical risks, as it becomes difficult to quickly pinpoint issues when errors occur [17].

4.2. Collaboration issues between designers and AI

AI should assist designers, not replace creativity. In practice, however, over-reliance on AI may lead to a lack of creativity and the homogenization of design outputs. AI often fails to align with designers' needs. While AI performs efficiently on standardized repetitive tasks, it fails to fully grasp abstract creative intentions, which forces designers into repeated revisions and adds extra labor burden [18]. Furthermore, ambiguity in the division of responsibility may dampen designers' willingness to use AI.

4.3. Technical limitations

Existing AI systems struggle to process intricate user demands, perceive nuanced emotional cues, and generate authentically original design outputs. For instance, AI can identify explicit needs but has trouble perceiving implicit needs or emotional shifts. AI-generated designs are largely integrations of historical data and lack originality, while details such as color, spacing, and typography still require manual refinement.

5. Future development trends and outlook

AI is reshaping the design field across three dimensions: technological innovation, industry application, and human-machine collaboration. In terms of technological innovation, AI will continue to achieve breakthroughs in reinforcement learning, adaptive algorithms, and multimodal fusion, optimizing strategies through user feedback, automatically adjusting layouts based on behavioral scenarios, and enabling natural interactions such as voice and gesture [19]. In terms of industry application, AI will further penetrate fields such as gaming, film and television, advertising, and education, driving immersive and personalized experiences. Examples include simulating virtual characters in games, enabling interactive storylines and automated special effects in film and television [20], and providing personalized recommendations in advertising and education. Ultimately, human-machine collaboration will become the dominant model [21], with AI handling data processing and routine tasks so that designers can focus on creativity and emotional expression. By improving norms and strengthening training, it will be possible to achieve bidirectional enhancement of technological empowerment and creative expression.

6. Conclusion

This paper has systematically analyzed the application status, core technologies, and case studies of artificial intelligence in the interaction design of digital media, explored its role in interface design, personalized experiences, speech and image recognition, and AR/VR integration, and examined the issues of ethics, collaboration, and technological limitations. The research shows that artificial intelligence can significantly improve design efficiency, optimize user experience, and enrich interactive forms, injecting momentum into innovation in the digital media industry.

However, the application of AI still requires attention to issues of privacy protection, algorithmic bias, and creative integrity [17], which should be addressed through the optimization of human-machine collaboration and technological innovation. In the future, as technology continues to evolve and industry standards are refined, artificial intelligence will achieve higher levels of intelligence,

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personalization, and humanization in digital media interaction design, driving the high-quality development of the industry and delivering better user experiences.

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