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Innovative Applications of AIGC Technology in Game Narratives

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Abstract

With the rapid advancement of Artificial Intelligence Generated Content (AIGC) technology, the field of game narratives is undergoing a revolutionary transformation. This paper explores how AIGC technology is innovatively applied to game narratives, offering players unprecedented immersive experiences. It begins by outlining the fundamental principles of AIGC and its potential in narrative creation. Subsequently, it delves into key innovative applications of AIGC in game narratives, including automated script generation, interactive character development, dynamic environment construction, and personalized narrative experiences. Despite the immense potential of AIGC in game narratives, this paper also highlights challenges such as technological maturity, narrative coherence, ethical and privacy concerns, and audience acceptance. Finally, it proposes solutions and future research directions to promote the further development and application of AIGC in game narratives.

Keywords

Artificial Intelligence Generated Content (AIGC); Game Narratives; Immersive Experience; Interactive Narratives

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Introduction

The rapid advancement of Artificial Intelligence Generated Content (AIGC) technology is revolutionizing game narratives in the entertainment industry by enabling automated, intelligent, and personalized content creation. This transformation enhances traditional game production and narrative methods, offering developers unprecedentedcreative freedom and delivering immersive, dynamic experiences to players. AIGC pushes the artistic and technical limits of gaming (Liu et al.,2025) while redefining the player-virtual world relationship, creating a collaborative narrative ecosystem between creators and players. Artificial Intelligence Generated Content (AIGC) automates the creation of diverse content—text, images, audio, video, 3D models (Foo et al., 2025), and virtual environments—using advanced machine learning models like GANs (Pan et al., 2019), Diffusion Models (Yang et al.,2023), and LLMs (Kumar, 2024). Trained on vast datasets, these models generate high-quality, original outputs,offering efficiency, scalability, and personalization overtraditional manual methods. Integrated with real-time rendering engines like Unreal Engine or Unity, AIGC enables rapid development of stunning game scenes, lifelike characters, and dynamic storylines, reducing costs and enhancing visual and narrative depth (Kumaran et al., 2023). AIGC technology brings revolutionary possibilities to game narratives, equipping developers with new tools for narrative design and player interaction (Lou, 2023). As shown in Figure 5. Specifically, AIGC demonstrates its potential in the following key areas:

Dynamic Narrative Generation

AIGC enables personalized storylines by analyzing player behaviors, preferences, and real-time choices (Hu et al., 2023). It adapts story branches, dialogues, and character responses, positioning players as co-authors. In role-playing games, AIGC tailors quests and worldbuilding to player backgrounds, enhancing immersion.

Immersive World Building

Integrated with real-time rendering, AIGC generates diverse terrains, architecture, and dynamic environments, improving efficiency in open-world game development. Procedural

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generation creates unique ecosystems and cultural settings, enriching player exploration.

Intelligent NPCs

Using natural language processing and reinforcement learning, AIGC-powered non-player characters (NPCs) exhibit realistic emotions, context-aware responses, and memory of player interactions (Li et al., 2023). This enables open-ended conversations, deepening narrative engagement.

Multimodal Content Creation

AIGC produces synchronized text, images, and audio, generating adaptive music, sound effects, and voiceovers (Inbavalli et al., 2024). It also accelerates character and asset design, ensuring artistic consistency and reducing development cycles.

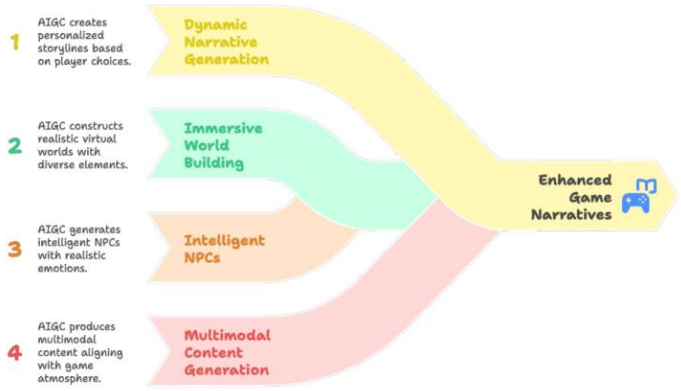

Figure 1: Bright Memory: Infinite

Reshaping Immersive Experiences: Making Virtual Worlds Tangible

Personalized Narrative Experiences

Amid the wave of AIGC technology, gaming experiences are breaking the boundaries between reality and virtuality in unprecedented ways, elevating immersion to new heights (Xiang et al., 2024). This technology not only redefines the possibilities of game narratives but also delivers dynamic, personalized content, crafting unique journeys filled with freshness, exploration, and emotional resonance for players. AIGC leverages deep learning, generative adversarial networks (GANs), and natural language processing (NLP) to dynamically generate game environments, character interactions, and storylines based on players' behaviors, preferences, and real-time choices. This highly personalized experience makes each player's adventure unique, freeing them from the constraints of fixed plots in traditional games and infusing every playthrough with exploration and unexpected surprises.

The core of AIGC lies in its dynamic generation capabilities (Xu et al., 2024). By analyzing player behavior data—such as decision paths, interaction habits, or emotional tendencies—AIGC can adjust narrative content and environmental settings in real time. For instance, in open-world games, AIGC can generate unique quests, NPC dialogues, or scene details tailored to a player's exploration style, ensuring a distinct experience for each individual. This personalized narrative design enhances immersion and significantly boosts replay value. Unlike traditional games, which rely on pre-set branching plots, AIGC enables more flexible, responsive narratives, even generating entirely new story content based on real-time player inputs (Wang et al., 2024). This transforms players from passive "story re-cipients" to active "story co-creators," greatly enriching interactivity and immersion. For example, Detroit: Become Human, though released before AIGC's widespread adoption, set a benchmark for personalized experiences with its highly branching narrative. Player choices drive the story, impacting character fates and outcomes, offering dozens of possible narrative paths. AIGC could elevate such branching narratives by generating dynamic dialogue or adjusting NPC responses based on player behavior, making each storyline more nuanced and unique.

The recently released AAA Chinese title Black Myth: Wukong provides a new exemplar of AIGC's application in game narratives. According to the development team and trailer content, Black Myth: Wukong employs AIGC to enhance the intelligence of character behaviors and the dynamism of narratives. NPCs in the game exhibit more natural, personalized reactions based on players' combat styles, exploration habits, or quest choices. For instance, when facing key characters, AIGC can generate unique dialogue or temporarily adjust quest objectives or scene atmospheres based on player behavior, ensuring fresh interactions. Additionally, AIGC is used to create dynamic environmental details, such as changing landscapes or randomized enemy behavior patterns, further enhancing immersion and playability. This application not only makes the game world more vibrant but also establishes a benchmark for technological innovation in Chinese games on the global stage.

Detailed Physical Simulation and Environmental Interaction

Driven by AIGC, physical effects and environmental interactions in games have reached unprecedented levels of detail, delivering an exceptionally immersive experience. AIGC can simulate subtle natural phenomena, such as grass swaying in the wind, leaves rustling, water ripples, or intricate weather changes like rainbows, thunderstorms, fog, or snowfall. These lifelike environmental effects make players feel as though they are in a vibrant, living virtual world, significantly enhancing immersion. By combining real-time rendering engines with AIGC, developers can achieve highly dynamic physical simulations and

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environmental interactions in complex virtual scenes, creating breathtaking digital worlds (Chen et al., n.d.).

Unreal Engine 5 (UE5) supports AI-driven 3D model generation, primarily through the application of Stable Diffusion models (Song & Xiong, 2025). Stable Diffusion, a deep learning model, generates 3D models from textual descriptions. This process typically involves setting up Stable Diffusion on GPU cloud servers, integrating frameworks like ModelScope and HRN face reconstruction models to convert text into 3D models. For example, a developer can input a description like "a male character in a blue shirt," and the AI system will generate a corresponding 3D model. Zeng Xiancheng (Feiyan Islands), the creator of Bright Memory: Infinite, noted that Stable Diffusion was used to generate character concept art as reference material during early development.As shown in Figure 2 AIGC's breakthroughs in 3D model generation have further enhanced the efficiency and diversity of environment and character design. With UE5, developers can input descriptions like "a male warrior in a blue shirt facing a sunset," and the AI will rapidly produce a 3D model with detailed facial features, clothing textures, and dynamic poses. This reduces the cost and time of 3D modeling, enabling rapid generation of diverse characters or environmental assets for early design or prototyping.

Figure 2: Bright Memory: Infinite

Intelligent NPCs: A New Chapter in AI Character Interaction

Dynamic Story Generation

AIGC's powerful generation and real-time computing capabilities have revolutionized game narratives by enabling dynamic story generation, offering each player a personalized "thousand faces" journey. Traditional game narratives rely on pre-set branching plots, limiting player choices to developer-designed paths. In contrast, AIGC, leveraging large language models (LLMs) and deep learning algorithms, dynamically generates story content based on players' behaviors, preferences, and real-time interactions. This allows NPCs to adjust storylines in real time based on players' decisions, emotional expressions, or linguistic styles, driving narratives in diverse directions. For example, if a player chooses to help an NPC during exploration, AIGC can generate new quest lines, dialogues, or world events, even altering the game world's state, creating a unique narrative experience. This dynamism enhances replay value and makes players feel like true drivers of the story, not passive observers.

The upcoming Steam game Origins exemplifies AIGC's potential in dynamic story generation. In this role-playing puzzle game, players act as a lead detective, interacting with AI-driven NPCs via voice to uncover clues. The game uses the AIAMS model to generate NPC behaviors and dialogues (Lim et al., 2012), allowing players to influence story development through free-form linguistic inputs. For instance, players can inquire about an NPC's backstory, motives, or hidden clues, and the AI generates responses consistent with the game world's logic, even creating new story branches on the fly. This dynamic storytelling ensures fresh experiences and deepens immersion.

Elevating Interaction Quality

AIGC technology, leveraging Natural Language Processing (NLP) and deep learning algorithms, significantly enhances the interaction quality between NPCs and players, rendering dialogues and behavioral responses more natural and authentic. This technology empowers NPCs to comprehend player inputs and generate contextually appropriate responses, revolutionizing the traditional interaction model based on fixed dialogue trees. Unlike conventional NPCs, which are confined to pre-set options and limit player choices, AIGC-driven NPCs can interpret free-text or voice inputs, producing responses aligned with the character's personality and the game's context (Cao & Duan, 2024). For instance, players can naturally inquire about an NPC's backstory, quest details, or world lore, receiving coherent and personalized replies. This high degree of interaction freedom not only fosters a sense of communicating with real characters but also amplifies immersion through nuanced emotional expressions and dynamic responses.

Taking the mobile game Ni Shui Han as an example, the project team, building on NetEase Fuxi's long-term expertise in AI-assisted game development, innovatively employs AIGC to implement an intelligent terrain generation feature based on player-drawn line inputs, as shown in Figure 3. This dynamic narrative capability enriches the world of Ni Shui Han, enabling players to act as "creators," designing their own envisioned "martial world." The upcoming game Origins further showcases AIGC's breakthroughs in interaction quality. As detectives, players can engage in open-ended conversations with NPCs driven by the AIAMS model, probing for case clues or motives. The AI not only understands complex linguistic inputs but also generates varied responses based on the player's tone and questions, even simulating emotional shifts such as tension, hesitation, or anger, thereby enhancing the vividness of interactions.

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Figure 3: the world of Ni Shui Han

Intelligent NPCs: A New Chapter in AI Character Interaction

Dynamic Story Generation Cross-Modal Interaction

AIGC's cross-modal interaction capabilities elevate NPC interactions to a new dimension, transcending text-based dialogues to integrate images, audio, and video for a richer, more immersive experience. Traditional game interactions rely on text or pre-recorded audio, but AIGC, by combining NLP, text-to-speech (TTS), speech recognition (ASR), and image generation, allows players to engage with NPCs through multiple modalities—voice commands, text, or visual cues (e.g., uploaded images). The AI processes these inputs to generate dynamic responses, including dialogues, facial animations, or environmental changes. This multimodal approach makes game worlds feel authentic, enabling players to connect deeply with virtual characters in intuitive ways.

Cyber Manufacture Co.'s Quantum Engine exemplifies cross-modal AIGC interaction. This engine supports real-time NPC interactions via natural language, generating story content and supporting multilingual voice inputs. For example, players can converse with NPCs in English or Chinese, with the AI generating responses matching the character's personality and context, while rendering facial expressions and gestures in real time for enhanced realism. Similarly, Yandere AI Girlfriend Simulator, integrating ChatGPT API and multimodal tech, allows players to respond to text, voice, or image inputs (e.g., virtual gift images).As shown in Figure 4. For instance, uploading a gift image prompts the NPC to express surprise or gratitude via voice and text. The Mount & Blade mod community, using ChatGPT API, enhances NPCs with realistic dialogue capabilities, enabling discussions on tasks, trade, or strategy, with dynamic visual responses like facial expressions. Cross-modal interaction's strength lies in its diversity and immersion, though real-time processing demands high computational resources, and challenges like content quality control and cross-cultural adaptability (e.g., multilingual voice naturalness) remain. Future advancements may integrate AIGC with VR/AR, enabling fully sensory virtual worlds with voice and gesture-based NPC interactions.

Figure 4: Yandere AI Girlfriend Simulator

AI-Assisted Game Development: New Creative Pathways

Enhancing Production Efficiency

AI technologies significantly boost game production efficiency by automating tools and algorithms across design, development, and testing phases. AI can generate game assets like 3D models, textures, and animations, reducing manual creation time.

Plot Generation

AIGC automates tedious tasks like texture mapping, character animations, and sound effect generation, accelerating development. For example, StoryGames AI enables creators to input basic story outlines or character traits to generate interactive visual novels or games in minutes. On storygames.buildbox.space, users describe protagonists and plot directions, and the AI produces a complete 10-chapter visual novel with engaging stories, interactive choices, and stunning visuals.

Character Design

Using AI, development teams can create more refined and diverse character designs tailored to personality, scene atmosphere, or narrative needs. AI models suggest multiple styling options and fine-tune designs for consistency across various game contexts and emotional expressions. For instance, Shanhai Luren's Wei Xinyu noted using ChatGPT and Stable Diffusion, integrating APIs to extract environmental data for NPCs and generate simple character portraits. Similarly, Taigu Zhi Huo's Gao Yue described using AIGC for character illustrations and icons, streamlining early art production despite basic applications

*Reducing Creation Costs *

In game art design, AIGC lowers human resource costs by rapidly generating design proposals. For example, in a casual game project, AI-assisted icon creation reduced the workload from over a month for 1,000+ icons to one to two

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weeks, cutting costs from 600,000–700,000 RMB to 20,000–30,000 RMB. In programming, AI-generated code saves development time. Bright Memory: Infinite's creator used Stable Diffusion for character design drafts and GPT-4's Q&A to optimize scripts, saving tens of thousands in RMB on outsourcing for server communication, database storage, and HTTPS updates

Optimizing Game Experiences

AIGC's data analysis and machine learning capabilities provide developers with deep insights into player behavior, enabling personalized and optimized experiences. AIGC collects and analyzes real-time player data, identifying behavior patterns, decision paths, and preferences. For instance, AI can detect frequent strategies, visited areas, or preferred character types, clustering players into groups like "explorers," "competitors," or "socializers." Developers can then tailor content, such groups—e.g., richer side quests for explorers or competitive modes for PvP players. AIGC also identifies retention risks by analyzing activity, progress, or purchase data, enabling adjustments like difficulty tweaks or rewards. For example, Honor of Kings uses similar analytics to optimize matchmaking and rewards, boosting player retention.

Challenges of AIGC Application

Loss of Creative Control

AIGC's use in game development, particularly content generation, may reduce developers' direct control over creative output, posing challenges in balancing technology and artistry. AI systems, reliant on algorithms and data patterns, may struggle to capture human emotional subtleties or cultural complexities, resulting in narratives, characters, or environments lacking depth or uniqueness. To preserve creative authenticity, developers must balance AI assistance with human oversight. Zeng Xiancheng noted that while AI speeds up low-demand art designs, it introduces copyright risks.

Quality Control Issues

AI-generated content often requires manual review to ensure quality, as images, music, or scripts may lack logical consistency or alignment with the game's world. This increases labor costs and development time (Begemann & Hutson, 2025). Developers like Yang Yang (Pascal's Wager), Chen Hongqu (Luo Ye Cheng), and Zhang Shuyang (Deep Fire) noted that immature AI tools have prevented deep integration due to quality concerns.

Ethical and Privacy Concerns

With AIGC's rapid rise, its interplay with intellectual property (IP) becomes complex.As shown in Figure 5. AIGC models trained on copyrighted data (e.g., books, music) risk infringing on IP rights, even if outputs are original. Key issues include:

1. Copyright Ownership Disputes

When AIGC generates original works, debates arise over whether copyrights belong to AI developers or users. Developers argue their investment in AI models justifies ownership, while users emphasize their creative inputs. Both perspectives have merit, requiring future legal clarification.

2. **Data Usage and Privacy Protection**

AIGC training often involves sensitive user data, risking privacy breaches if mishandled. Unauthorized use of voice, facial expressions, or behaviors can lead to legal and ethical disputes.

3. Impact on Traditional Copyright

AIGC's algorithm-driven outputs challenge copyright laws built for human creations. Defining AI-generated works as "works" or excluding them risks legal disputes or stifling innovation. Training datasets with copyrighted materials may also trigger infringement if not addressed.

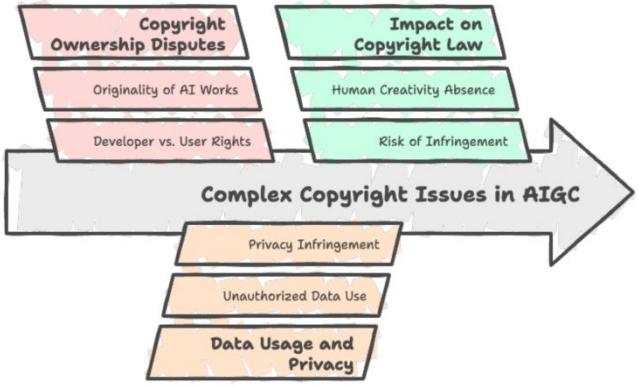

Figure 5: Ethical and Privacy Concerns

Conclusion

As artificial intelligence advances, AIGC technology has demonstrated unique innovative potential in game narratives. By exploring its applications, this paper reveals how AIGC equips developers with tools to create richer, dynamic, and personalized experiences. AIGC enhances interactivity and immersion through dynamic content generation, character behavior modeling, and natural language interaction, revolutionizing storytelling. Players engage with responsive, evolving worlds where narratives adapt to their actions. Despite its promise, challenges include narrative coherence, managing player expectations, and ensuring fairness. Developers must continually update skills to leverage AIGC. Looking ahead, AIGC will likely further expand narrative boundaries, fostering customized, player-driven stories. As technology matures, players may become story co-creators, marking a new era in game design. AIGC's innovative applications herald opportunities and challenges, demanding enhanced creativity and technical expertise from designers.

Statements and Declarations

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Author Contributions

This project was conducted jointly by the authors. The authors reviewed and agreed to the final manuscript. All authors read and approved the final manuscript.

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