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AI-Powered Short Video Creation & Generation

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Abstract: AI short video generation has become a fundamental content tool throughout the creators economy in social, marketing and education applications. This paper surveys the recent work on AI technologies dedicated to thegeneration of short video contents and describes the approaches, applications, challenges and future work. ArtificialIntelligence (AI) has changed how creative industries operate, allowing for the automation of complicated tasks andthe generation of content to be formed in ways that weren't necessarily even a thought before. The next domain ofinterest that this paper blurs into is AI-powered short video creation and generation; a field that implements computer vision, natural language processing, and machine learning to generate engaging, contextually relevant, and visually stimulating video content. Our proposed system harnesses the power of state-of-the-art AI into a method for automating several vital processes of video production, such as, but not limited to, assembling the script, the scene, including video cuts, as well as audio synchronisation. The system has streamlined video creation — a historically labor-intensive process — by harnessing generative AI technologies, including deep learning models for image and video synthesis and large language models for text generation. The framework also integrates user configuration and context responsiveness to offer users greater creative flexibility and contextual relevance. These results suggest a potential for AI-powered video generation to cut content development time, LEVEL THE PLAYING FIELD FOR quality media production tools at lower cost and change the marketing, entertainment.

Keywords: AI Video Generation; AI text-to-video generation ; Generative Adversarial Networks (GANs)

I. INTRODUCTION

Short-form video content, in the form of sites such as TikTok, Instagram, and YouTube Shorts, has risen to prominence as a means for communication, marketing, and education. Yet conventional video production is expensive and lengthy, whereas AI Video generation provides a way to create dynamic, attractive videos, directly from automated solutions.highlight important recent works in AI-driven short-form video generation from breakthrough GAN, RNN, and Transformer-based models and applications.

The proliferation of artificial intelligence (AI) technologies has revolutionised creative industries, enabling novel methods for generating multimedia content. Among these advancements, AI-powered short video generators have emerged as a transformative tool, offering rapid and efficient ways to create engaging, customised video content for diverse applications such as social media, marketing, education,and entertainment.

These systems leverage state-of-the-art algorithms in deep learning, computer vision, and natural language processing to synthesise visually appealing and contextually relevant videos from minimal user input. The demand for automated video generation has been furled by the growing need for scalable content creation in the digital age. Traditional video production processes are often time-consuming, resource-intensive, and require specialised skills. In contrast, AI-based solutions can reduce costs, shorten production times, and democratise access to high- quality video creation. Despite their immense potential, these systems face significant challenges, including ensuring realism, maintaining contextual coherence, and enabling user-friendly interfaces for diverse audiences.

II. LITERATURE REVIEW

A. Generative Adversarial Networks (GAN)

Because of their capacity to produce highly realistic content, Generative Adversarial Networks (GANs) have played an essential role in AI-based video generation. A well-cited feature is their use of spatiotemporal modelling which enables them to generate coherent frames for VideoGAN [1] and TGAN. MoCoGAN took a step closer to mixing motion and content separately and improved the content and motion synthesis based on GAN image-generation [2]. These new developments in GANs have resulted in increasingly higher-quality, temporally consistent video outputs.

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B. Text-to-video Generations

Text-to-video generation has gained traction with systems like CogVideo and VideoGPT, which leverage transformer models to map natural language descriptions to corresponding video sequences These methods large data sets and pre-training to capture various video semantics There are many there based on the above.

C. Real-Time and Adaptive Generation

Real-time video generation systems aim to reduce latency, making them suitable for applications like live streaming or on-the-fly content customisation. Research on lightweight architectures, such as MobileNet-based GANs and efficient attention mechanisms, has been pivotal in achieving these goals. Adaptive systems that adjust video output based on user feedback or environmental context also represent an emerging area of focus.

D. Ethical and Societal Implications

Ethical considerations are a critical aspect of AI-generated video research. Concerns about misuse for misinformation, copyright infringement, and cultural bias in training datasets have been widely discussed. Researchers emphasise the need for robust regulatory frameworks and transparency to mitigate these risks.

E. Application and Use Case

AI short video generators have been used in many domains.immediately:
- Social Media and Marketing: Tools like Lumen5 and Run-wayML enable video promotions.
- Education and Training: AI-generated instructional videosare being used to enhance e-learning platforms.
- Health and Accessibility: Customisable video content helpsin telemedicine and patient education.

F. Recurent Neural Network(RNNs)

Video sequences exhibit strong temporal dependencies, which have been captured by recurrent neural networks (RNNs), particularly Long Short-Term Memory (LSTM) networks [3]. At the same time, Vid2Vid et. al take heed of this by using RNNs to keep the frames temporally coherent with each other over at least 5-10 frames typically resulting in much smoother colour/grayscale transitions and overall video coherence [4]. Nevertheless, RNNs are quitecomputationally intensive and have hardly been scaled for real-time processing.

G. Transformers

Transformers have recently been applied for video generation, with improvements over utilising RNNs, where self-attention mechanisms could better handle long-range dependencies. For example, VideoBERT has shown good performance in video generation and understanding by learning high level representations [5]. Thus, from RNNs to transformers is one step forward in the move towards scalable, high-quality
video generation.

H. Diffusion Models

Diffusion models have proposed a different process for generative modelling and utilised iterative refinement strategyto improve the quality of video synthesis [19, 20]. Previous works have demonstrated the ability of these models to generate convincing video from incrementally denoised image frames [6]. However diffusion models are compute- intensive and generating in real-time is non-trivial.

III. AI-BASED VIDEO GENERATION FOR SHORT VIDEO CREATION

A. Content Generation for Personalisation

Artificially generated short videos are prevalent in personalised content creation for marketing—algorithms tailor content to individual users in real time [7]. This allows brands to target select groups while also serving personalisedvideo content to drive higher levels of engagement.

B. Social media and influencer marketing

Today, social media is more dependent than ever on artificial intelligence to deliver personalised and trend-relevant video entertainment content based on the users covered earlier. Through AI-generated content, influencers can easilycreate videos according to the latest standards/platform specifications and audience expectations [8].

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C. Education and Training

Education is using interactive short video generation to present complex concepts in simplified forms. Educationalvideos embedded with AI make for a useful learning tool, customising how content is delivered to each student.

IV. EMERGING TRENDS AND FUTURE WORKS

A. Content Generation for Personalisation

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V. CONCLUSION

There have been tremendous advancements in AI-driven short video generation that are providing scalable andautomated solutions for various industries. As researchers overcome hurdles in quality, ethics, and computational cost, the capacity of AI to make dynamic, personalised video heuristics will keep growing. This survey reinforces the paramount need for continued innovation and regulation in this rapid space.

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