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AI Advertisement Generator

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Abstract: The use of artificial intelligence has drastically revolutionized the way we do different things. Marketing, advertising, and entertainment that people have been doing can be quickly transformed with AI interaction. A major drawback of the current marketing environment is that the space for creation and problem-solving has mostly been captured by the traditional and ready-made content formats with them as the main channels for advertisement, such as the social media and search engines. Even though, it can be said that these methods solely bring desired results but more often than not, they do not possess the creative and unique features that can stand them out in a fiercely competitive market. To tackle this issue, we are introducing a system to automatically create product and UGC videos through an AI. It creates a script through GPT 40, moreover, in the presence of product points, it merges them with the AI avatars, adds words in the multilingual voices, and is finally subjected to the video editing powered by AI. The resulting videos are easily shared and downloaded thus enabling fast, scalable and personalized content creation among other benefits. This survey delves into the present capabilities, benefits, and limitations of AI-driven ad generators in the context of contemporary digital marketing.

Keywords: *AI Advertisement Generator, Digital Marketing, Ad Automation, Content-Creation, Social Media, UGC Videos.*

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I. INTRODUCTION

Artificial Intelligence (AI) is playing a transformative role in revolutionizing the advertising landscape by automating content creation, enhancing targeting precision, and improving customer engagement. AI technologies such as machine learning and neural networks are being widely adopted to analyze consumer behavior and optimize advertisement performance [1]. With the ability to process vast amounts of data and detect patterns, AI algorithms have enabled the automation of ad creation and distribution, ensuring more personalized and effective campaigns [2].

The integration of AI in advertising is not limited to data processing; it also extends to creative tasks. Various systems now leverage AI to generate ad content dynamically, reducing the time and cost associated with manual efforts [3]. Generative AI frameworks are gaining attention for their ability to produce marketing content that aligns with consumer interests and behavioral data [4]. These advancements are supported by adoption models that explore user acceptance of AI tools, particularly in image generation and design [5].

Techniques like PIL (Python Imaging Library) are being used to create customized advertisement designs that are visually appealing and optimized for quality and performance [6]. AI-driven enhancements in web design have also proven effective in improving user engagement and advertising outcomes [7]. Product-based advertisement generation tools using AI help in tailoring content to specific markets and user groups, making marketing more precise and data-driven [8].

The use of generative AI in immersive platforms such as AR/VR has opened new possibilities for creating personalized advertisements that respond in real time to user interactions [9]. Deep learning models are enhancing media and advertising strategies by supporting real-time analytics and creative automation [10]. Techniques like GANs (Generative Adversarial Networks) are now used in automated ad generation, especially for digital television platforms, helping marketers reach audiences through adaptive content [11].

AI-based personalization engines are also being integrated to modify ad content dynamically based on viewer responses, making advertisements more interactive and engaging [12]. Multi-modal AI systems are utilized in

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creative environments like virtual galleries, combining visual and audio data for enhanced advertisement experiences [13]. The push toward sustainability in marketing is also influenced by AI, as new frameworks integrate environmental considerations with creative outputs [14]. Finally, survey-based analyses show that generative AI is now central to content creation in digital marketing, covering everything from campaign design to performance tracking [15]. This article proposes a survey of modern-day AI-based ad systems that address such limitations with a newly proposed integrated multimedia ad generation system.

➢ *The Organization of this Paper is as Follows:*

Section II reviews related works on AI-driven advertisement generation. Section III explains the key AI technologies and system architectures used in ad creation. Section IV describes the proposed AI advertisement generator system and its workflow. Section V presents the system's performance analysis. Section VI discusses future research directions, and Section VII concludes the paper.

II. LITERATURE REVIEW

Artificial Intelligence has emerged as a revolutionary force in the field of digital marketing, particularly in the automation and personalization of advertisements. Early works in AI-generated advertising primarily focused on using natural language processing to produce simple ad copy. However, with the evolution of deep learning, transformer models, and multimodal generative AI, the field has rapidly advanced toward end-to-end automated ad generation pipelines. This section reviews recent studies and technologies in AI advertisement generation and highlights their methods, capabilities, and limitations.

➢ *Ad Content Automation with NLP and ML*

It has been shown by various investigations how AI-powered ad generators founded on machine learning and neural networks can greatly improve targeting and personalizing ad copy through some degree of automation [1]. Early discourse centered around AI text-generating platforms for the generation of marketing copy [3], while subsequent research stressed how automation tends to ease the repetitive creative work, warning against loss of originality that comes with overdependence on AI content [2]. In support of this, other studies indicated that such AI-based software modifies advertisement copy dynamically according to user-interaction metrics and context information in real-time to synergize higher levels of personalization and saliency [12].

➢ *Generative AI for Multimedia Ads*

The other side of ad generation witnessed significant progress with generative AI techniques. Frameworks for scalable multimedia ad creation using LLMs and generative image tools have been introduced in [4].

Other articles went further into how GANs can be used to display dynamic video ads on digital TV platforms [11], while still others use AI-assisted web ad design techniques for greater engagement [7].

Filling this gap further are multimodal AI systems for virtual gallery advertisements [13], which combine text, image, sound, and video components for an immersive and interactive advertising experience. This multimodal integration is a testament to the rise of AI in designing AR/VR-capable and experiential digital campaigns [9].

➢ *Personalization and Predictive Performance*

With the aim of enhanced ad performance, AI platforms had traditionally given more significance to personalization algorithms and predictive analytics. In [8], authors suggested product-specific ad-generation tools that dynamically adjust based on consumer behavior and product attributes. AI avatars and immersive media-based storytelling AR/VR advertising strategies were also studied [9]. The authors demonstrated how adaptive content algorithms modify ads in real-time, changing tone, language, and visual assets depending on the user profile and interaction history [12]. Such prediction models are of utmost importance to any state-of-the-art ad-generator designed to promote user engagement while respecting user privacy [1], [4], [8].

➢ *Ethical, Sustainability, and Practical Challenges*

Numerous authors recognized several risks in AI-generated advertising, such as AI bias, misinformation, content authenticity, and privacy violations [2],[4],[5]. This discourse was further advanced by those who examined how generative AI frameworks can be incorporated into sustainable digital marketing strategies, with the aim of fostering environmentally friendly, culturally aware, and socially responsible AI-powered marketing campaigns [14]. Ethical advertisement generation using AI requires methods to identify and balance AI-generated content-based demographic, cultural, and emotional biases of language text, images, and video ads. Incorporation of explainable AI (XAI) modules will be instrumental in offering transparency, interpretability, and accountability in AI-driven ad content decisions.

➢ *Research Gap and Contribution:*

Though abundant studies have been obtained on AI-created static image, visuals or text-based advertisements, few systems integrate GPT-driven scripting, multilingual voice synthesis, AI avatar animations, and automated video editing into a single, scalable pipeline. Surveys such as [15] noted these limitations in existing content creation systems. The proposed system in this paper addresses this gap by combining these components into a modular AI advertisement generator capable of producing multilingual platform-optimized video advertisements in real time [4], [9].

III. KEY CONCEPTS AND ARCHITECTURES

Current AI ad generators are based on a range of sophisticated technologies. NLP systems like GPT-4o create compelling, multilingual ad scripts adjusted to product descriptions and target audience profiles [4]. Generative AI models like GANs and diffusion networks are used to create product images and interactive video scenes [11]. Multi-modal generative AI techniques further extend capabilities by

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combining text, video, audio, and imagery into immersive ads [13].

AI avatars are animated with First-Order Motion Models to facilitate realistic facial animations and lip-syncing to personalize video ads [9]. System architecture is modular and microservices-based to align with scalable AI deployment recommendations [8],[12], supporting cloud-based deployment, real-time A/B testing, and dynamic content customization. Sustainability aspects are also prioritized to minimize the environmental impact of massive-scale AI ad generation [14].

IV. PROPOSED SYSTEM DESIGN

The architecture of the modular system which drives this ad generator is depicted in Fig. 1, which shows the interfaced AI modules that handle different phases of the ad generation process. These modules are the script generation unit which is tasked with translating product information and marketing goals into effective, multilingual ad scripts utilizing transformer-based NLP models.

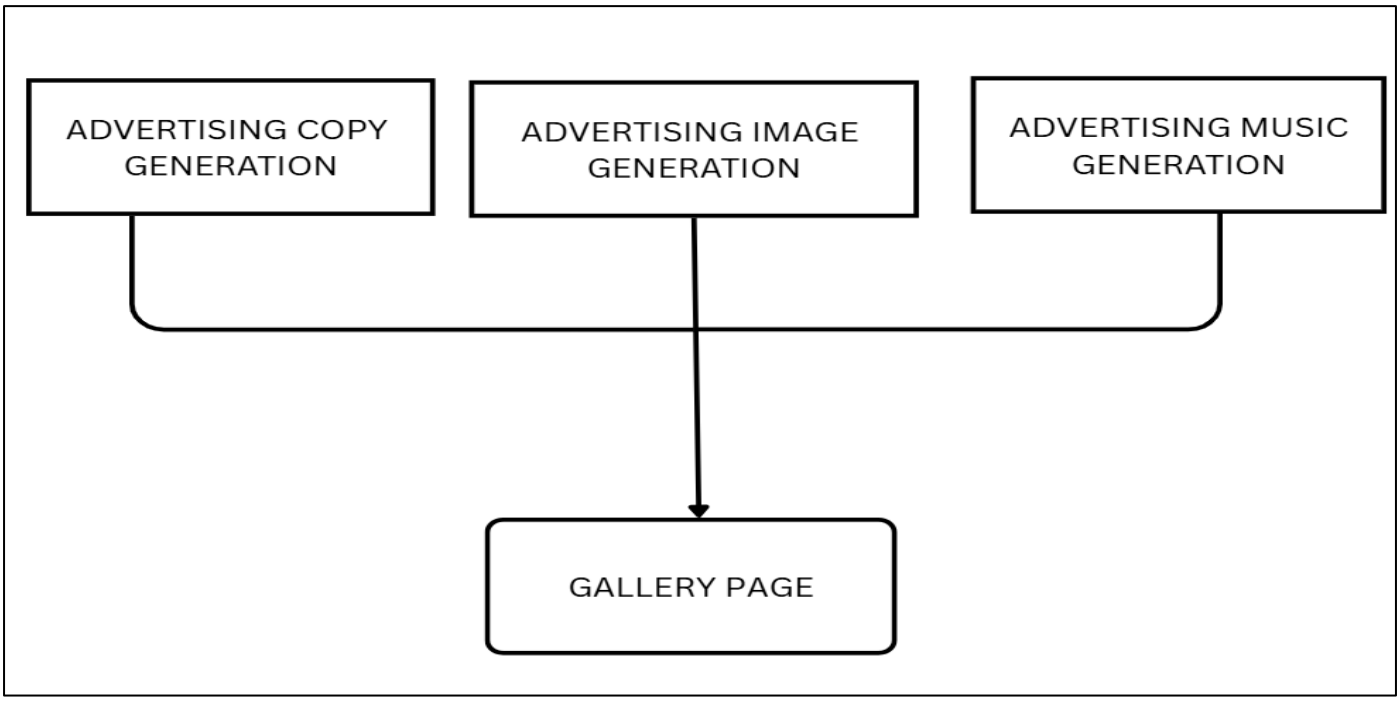

Fig 1 Modular Architecture for AI Advertisement Generation.

The voice synthesis module transforms the generated scripts into realistic, human-like voiceovers using neural TTS models like FastSpeech2 and Tacotron2. The avatar animation unit generates AI-driven avatars capable of mimicking human expressions and lip-syncing in synchronization with the voiceovers using first-order motion models. Additionally, the video editing module assembles all multimedia components avatars, visuals, and audio into a seamless video advertisement. The performance optimization module then evaluates and refines generated content based on predictive engagement metrics like click-through rates (CTR) and conversion rates (CR), ensuring maximum effectiveness before delivery.

- *System Overview*

A graphical overview of the high-level system workflow is illustrated in Fig. 2, presenting an explicit graphical abstract describing how ad videos are being built from input to output. The figure depicts sequential progression beginning with product input, then AI-powered ad script generation, voiceover production, avatar creation, and video composition. It also points to parallel processing opportunities in the system, where different language versions or ad creatives can be created in parallel. The diagram illustrates how each AI module interacts with the others in the workflow, indicating data flow channels and dependencies between modules that facilitate efficient, scalable video ad generation specific to target audiences.

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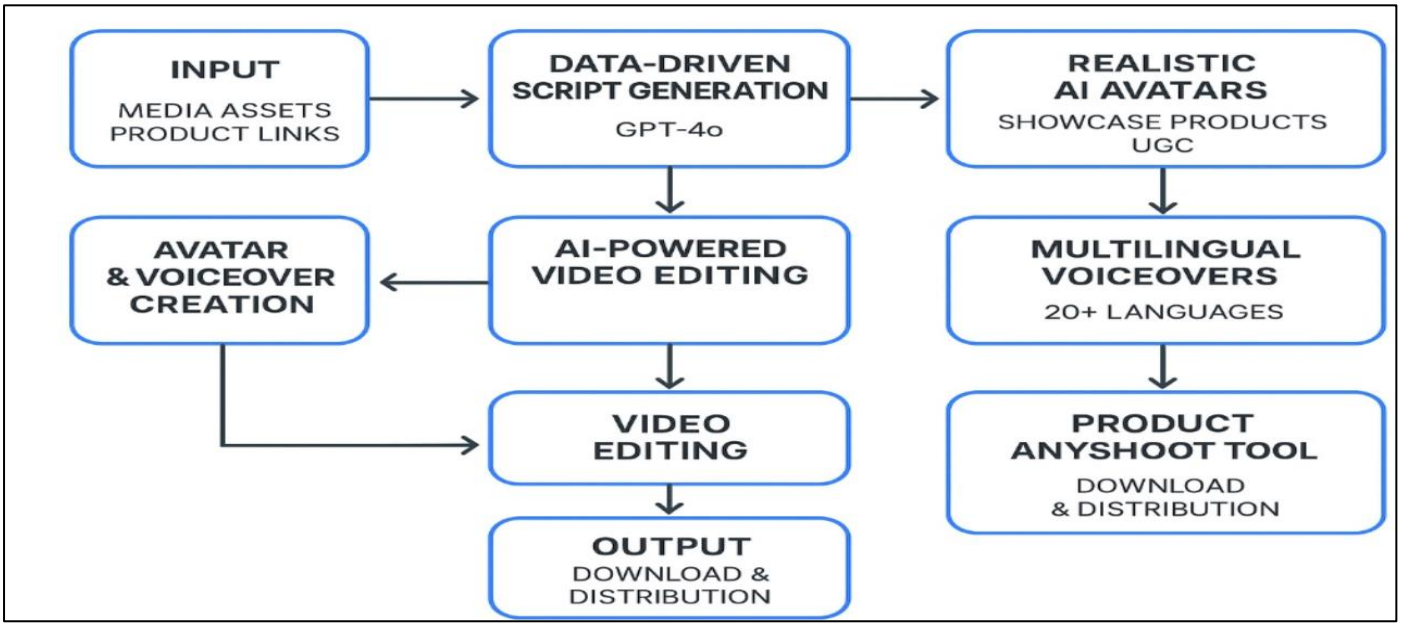

Fig 2 Graphical Abstract

➢ *Workflow Pipeline*

The **image synthesis process**, where AI-generated product visuals are created and refined, is illustrated in Fig. 3. This module uses product details and branding elements as input to generate dynamic and aesthetically consistent images using GANs and diffusion-based generative models. These visuals serve as dynamic overlays or feature shots within the advertisement videos, ensuring visual appeal and brand coherence.

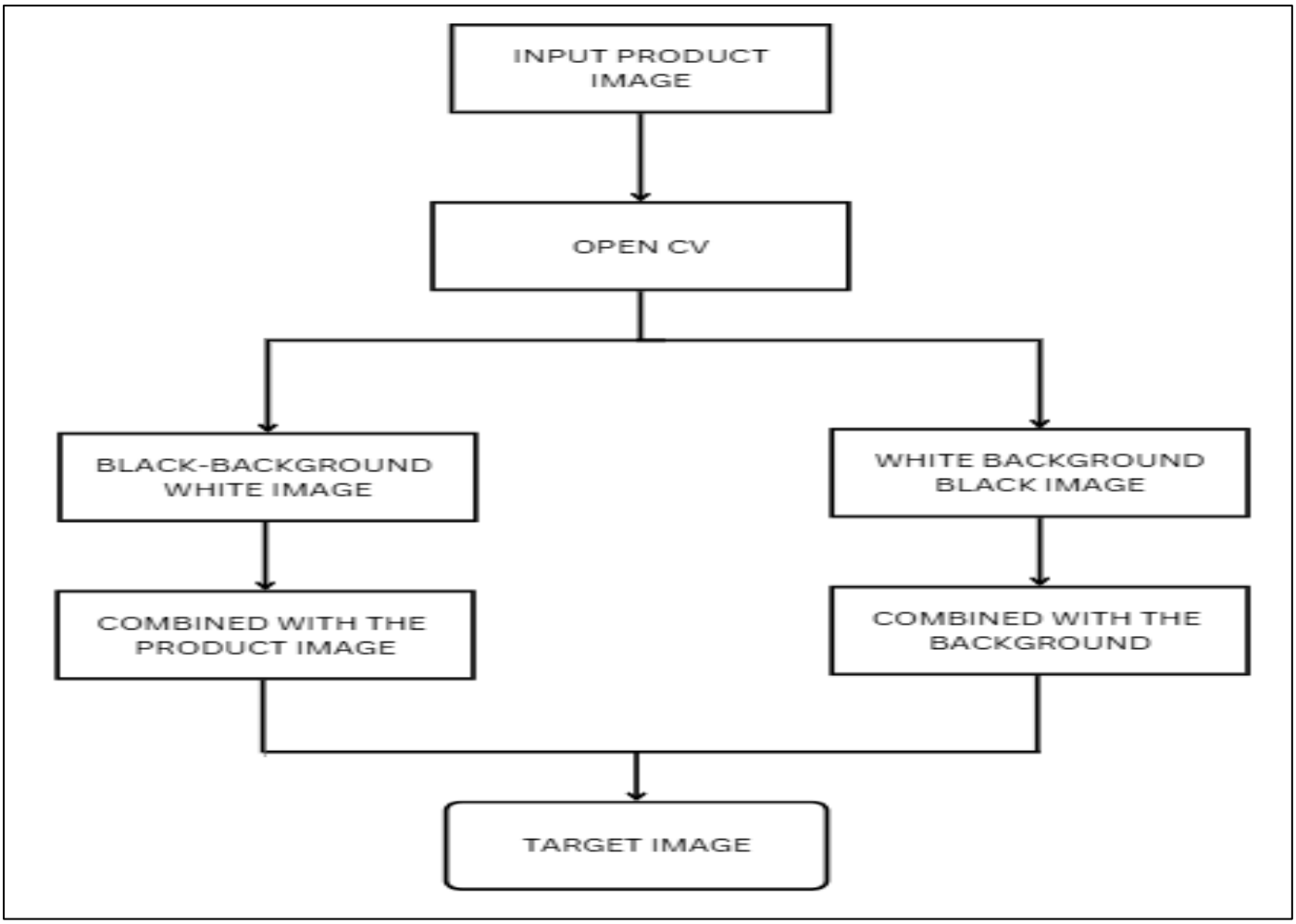

Fig 3 Image Synthesis

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Subsequently, the **video composition module** integrates voiceovers, avatar animations, product images, text overlays, and background elements using AI-enhanced video editing tools. The entire process of combining these diverse multimedia elements into a cohesive and engaging video is demonstrated in Fig. 4. This figure visually represents how different media components are synchronized on a timeline, with AI ensuring proper alignment of lip-sync animations, background music, transitions, and subtitles

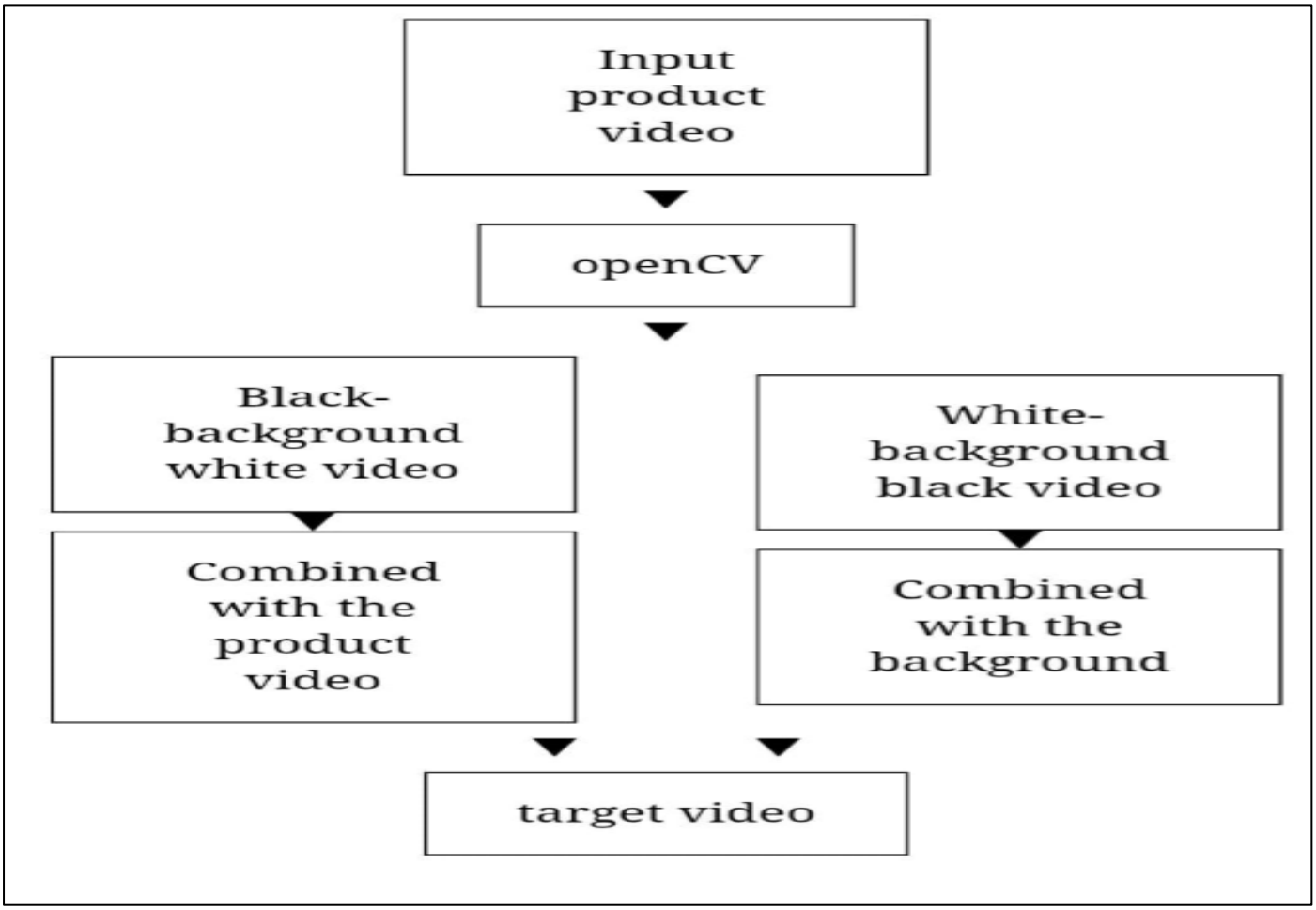

Fig 4 Video Synthesis

➢ *Benefits of the Proposed System*

One of the most notable aspects of this system is its avatar animation function driven by AI, depicted in Fig. 5. This function guarantees accurately lip-synced AI-generated avatars with generated voiceovers to produce natural facial movements and mouth actions for multilingual scripts. This function adds audience connectivity by offering presenters that are relatable, human-like, and used for product promotion.

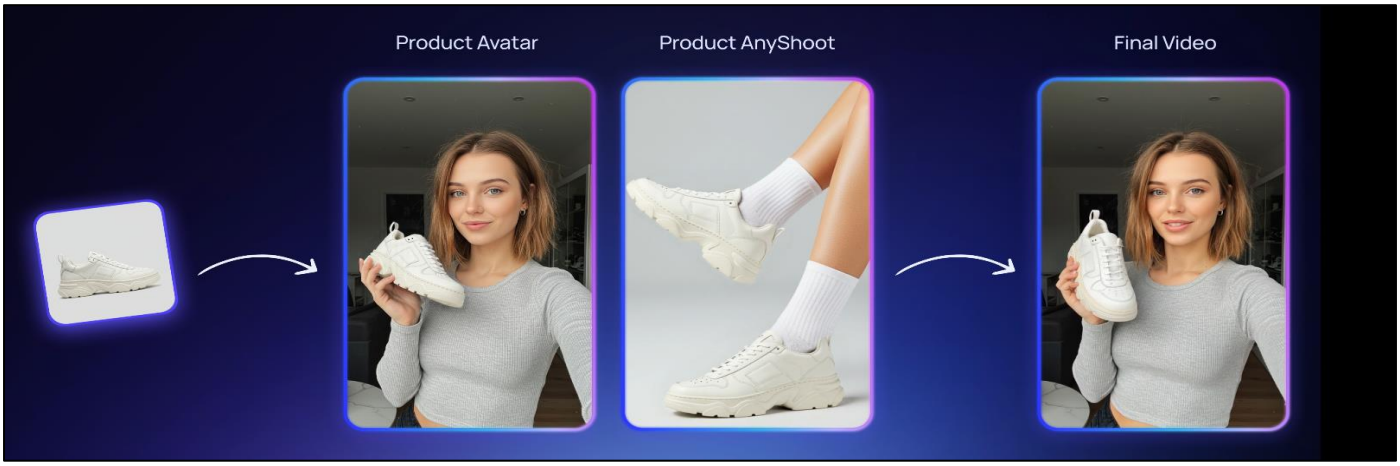

Fig 5 Avatar Animation

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The process of voiceover creation in multiple languages is depicted in Fig. 6, explaining how AI transforms the created ad scripts into well-articulated, natural-sounding voiceovers in more than 20 languages through neural TTS models. The TTS models allow for variation in tone, speech rate, and emotion, facilitating personalization according to target audience likes and dislikes as well as regional customs.

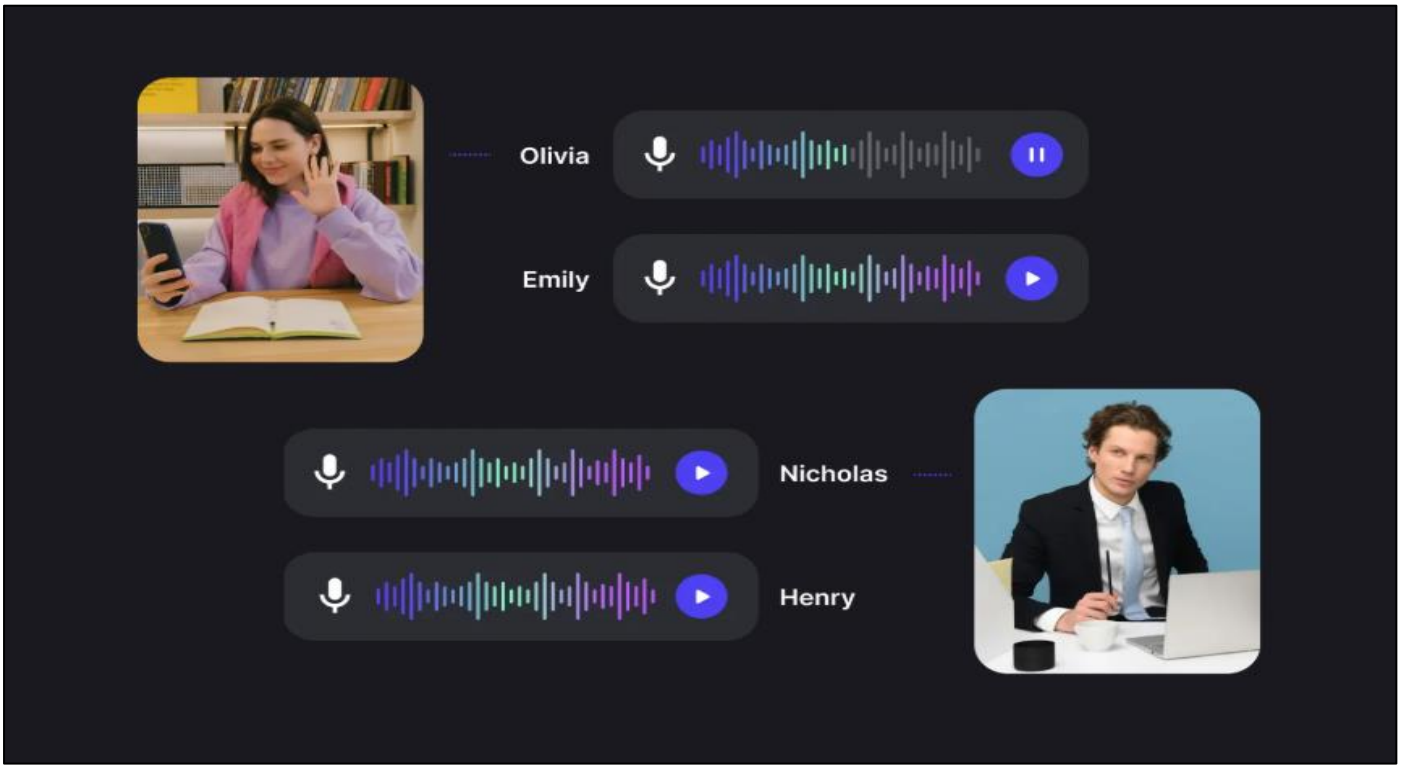

Fig 6 Voiceover Creation

Lastly, the AI-driven video editing process is illustrated in Fig. 7, in which all elements created such as avatars, voice-overs, product images, and subtitles are used to create a full advertisement. The figure shows how AI handles visual effects, transitions, music selection, and final video rendering in formats tailored for such platforms as Instagram, YouTube, and Meta Ads. It emphasizes the efficiency of the system in producing high-quality, customized video ads in large quantities, lowering manual labor and production time while enhancing consistency of content.

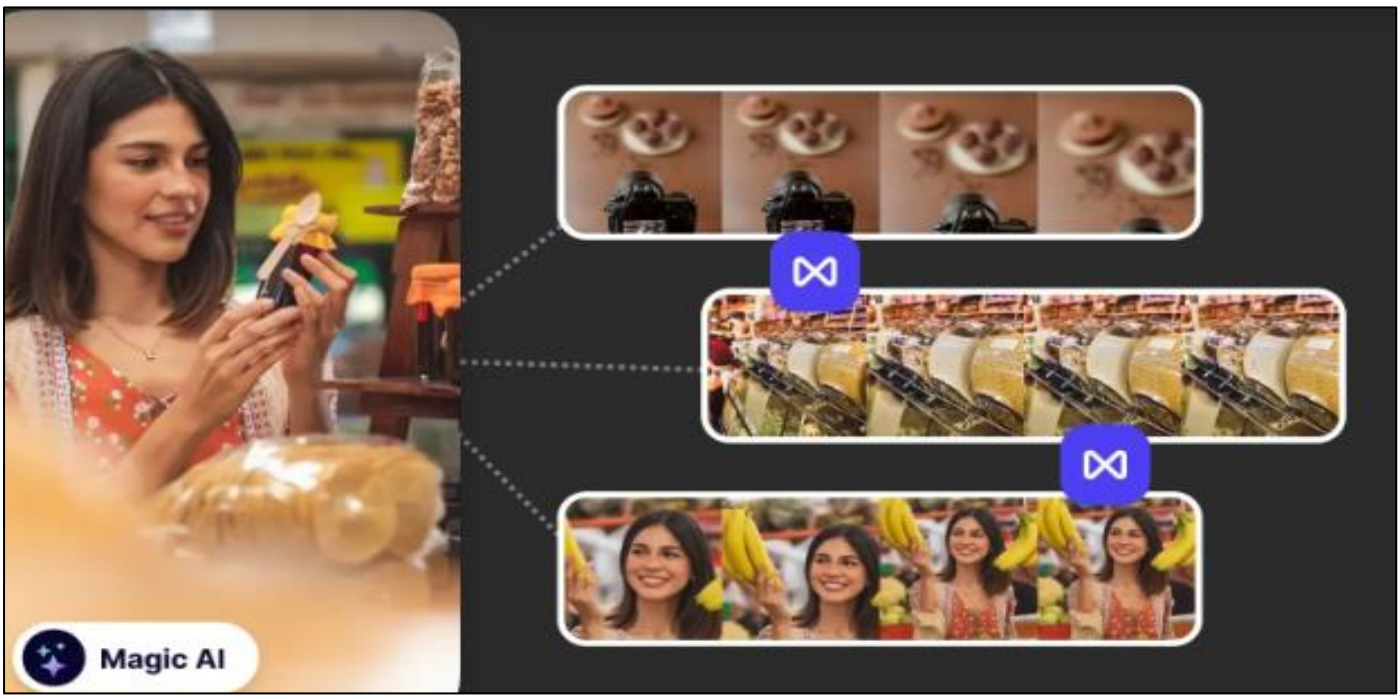

Fig 7 Video Editing

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V. PERFORMANCE ANALYSIS

Performance measurement plays a crucial role in AI-generated ad platforms in order to safeguard both content efficiency and brand goals. Primary performance indicators are Click-Through Rate (CTR) and Conversion Rate (CR), quantifying the proportion of viewers of the advertisement who engage with the ad and then take desired actions such as purchases or sign-ups. These metrics are key performance indicators for evaluating the business outcome of AI-generated content [1], [4].

Relevance and correctness of content are also assessed to identify how closely the advertisement matches the desired product messaging, brand tone, and consumer affinity. This is done through a mix of human analysis and automated similarity assessments that measure AI-created content against set marketing goals [8],[12].

Another important measure is voice naturalness, which evaluates the tonal and emotional truth of AI speech. Neutral TTS models are tested using listener surveys and qualitative measures to determine their human-like reading and applicability in multilingual markets [9].

Visual cohesiveness and video quality evaluations check whether avatars, graphics, transitions, and subtitles are seamlessly combined to create professional, high-impact ad videos. GAN-based video content quality has been specially tested in advertising scenarios [11], which ensured the value of smooth transitions, proper lip-sync, and consistency in the background.

Lastly, generation time is tracked to estimate the system's responsiveness and scalability. Artificial intelligence generators with the ability to generate high-quality ads within limited time frames enhance campaign responsiveness by allowing brands to react to market trends and viral content in real-time [4], [8]. Multi-modal systems integrated with each other in virtual galleries and immersive ad environments [13] establish rapid, cross-platform production pipelines as requirements for future AI ad systems.

VI. FUTURE RESEARCH DIRECTIONS

Sudden leaps in AI ad generation have created several lines of research that strive to improve technical effectiveness and ethical implementation. One of those is the development of adaptive personalization engines, where AI algorithms repeatedly adjust advertisement content in accordance with real-time user activity and context-pervasive feedback using reinforcement learning methods for on-the-fly content adaptation [4].

Another up-and-coming trend is sentiment-based ad generation, where sentiment analysis is combined with generative AI models to generate emotionally appropriate advertisements. By ensuring content aligns with the moods and tastes of users at a particular moment, emotional engagement and campaign performance are enhanced [6].

Realism progress in video synthesis is also important. Existing avatar-based systems are not yet able to perform natural motion and scene coherence. Combining Neural Radiance Fields (NeRFs) and video diffusion models is expected to make strong progress in realism, immersion, and contextual accuracy in AI-created advertisement videos [9], [13].

An equivalent challenge is the use of explainable AI (XAI) frameworks within ad generation systems. The models need to reveal how choices are made for ad tone, words, personalization tactics, and visual styling to increase transparency, equity, and accountancy [5].

Cultural sensitivity frameworks are underutilized. Advertisements produced through AI should not perpetuate cultural stereotypes or produce insensitive material. This entails creating datasets and AI models sensitive to regional values, norms, and languages [6], [14].

To integrate AI ad generators with ad publishing platforms via real-time APIs would make campaign deployment, A/B testing, and performance monitoring easier [7], [8]. New frameworks in dynamic content personalization [12] and interactive, multi-modal advertising [13] justify the necessity for real-time integration features.

Lastly, integrating interactive feedback loops into AI ad generators would enable marketers to modify AI-produced content during its production, providing alternatives for changing tone, visual organization, or language selection, enhancing content pertinence, consumer trust, and creative freedom [10].

VII. CONCLUSION

In recent years, artificial intelligence has significantly revolutionized the area of digital advertising through automating content generation, targeting audiences, and optimizing performance. In this survey, we analyzed and contrasted fifteen recent research papers that suggested a broad spectrum of AI-based systems for advertisement generation, including text-based ad scripting, image manipulation, generative AI-based video generation, multilingual voice synthesis, AI avatar animation, and personalized ad placement strategies.

The literature reviewed emphasizes the increasing importance of generative AI frameworks such as GPT in generating ad text, neural TTS models for multilingual voiceovers, and GANs in synthesizing dynamic image and video advertisements. Some papers suggested modular AI advertisement systems that could incorporate various AI models to generate ad videos, while others were concerned with machine learning algorithms for audience segmentation and ad performance prediction.

Our comparison found that although current frameworks show great performance within their own domains like AI-generated image ads, individualized

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A common constraint found in many papers is that they limit their focus either to image creation, static ads, or AR/VR environments with little flexibility to accommodate mainstream digital and social media ad platforms. Such papers as MARK-GEN provided scalable, modular AI ad generation pipelines directly aligned with the goals of our proposed architecture but still did not provide modules for explainable AI, cultural awareness, or bias management.

In summary, the survey unequivocally demonstrates the urgent requirement for end-to-end, modular AI ad generation systems that bring together text, image, video, multilingual voice synthesis, and AI avatars in one coherent system. Next-generation research needs to focus on explainable AI methods, ethical regulation, emotion-aware content transformation, and culturally diverse ad generation to facilitate safe and scalable usage of AI ad generation systems. Our project seeks to fill these gaps by creating a multilingual, AI-driven advertisement generator with OpenCV-based image processing, GPT-driven ad scripting, neural TTS, AI avatars, and AI video editing modules combined into one seamless pipeline for automated, efficient, and interactive digital ads.

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