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Research Paper

CARTONIZATION OF IMAGES AND VIDEOS USING GAN AND OPEN CV

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Abstract:

Cartoonization is a creative transformation of real-world images or videos into cartoon-style visuals. It has applications in social media filters, animated content creation, and digital art. This project proposes a system that uses Generative Adversarial Networks (GANs) in combination with OpenCV to cartoonize both static images and dynamic videos. While OpenCV provides image processing utilities such as edge detection and color smoothing, GANs—especially models like CartoonGAN and CycleGAN—are trained to learn the artistic style of cartoons and apply it to real images. The goal is to produce high-quality, real-time cartoonized outputs while maintaining the structure and integrity of the original input.

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I.INTRODUCTION

With the rise of digital media and online content creation, there is a growing interest in stylizing images and videos for creative and entertainment purposes. One popular style is cartoonization, which simplifies textures, enhances edges, and adds a surreal artistic look. Traditional cartoon effects were implemented using rule-based image filters, but they often lacked realism and consistency.

In contrast, deep learning-based techniques, particularly GANs, have demonstrated excellent results in artistic style transfer. These models can learn from large datasets of cartoon images and apply similar transformations to real-life photos. Combined with OpenCV for frame manipulation and pre/post-processing, a hybrid approach can deliver efficient and appealing cartoonization in both images and videos.

II.LITERATURE SURVEY

- Chen et al. (2018) proposed

CartoonGAN, a generative model capable of converting real photos into cartoon-style images while preserving structural features. Their work forms the foundation for many modern cartoonization systems.

- Zhu et al. (2017) introduced CycleGAN, which allows unpaired image-to-image translation, enabling style transfer from real-world photos to artistic domains like anime, without needing paired datasets.
- Isola et al. (2017) worked on pix2pix, a supervised GAN-based image-to-image translation model, which can be adapted for cartoonization with appropriate training data.
- Gatys et al. (2016) proposed a neural style transfer algorithm using convolutional neural networks to extract style and content separately and recombine them.
- Choi et al. (2020) presented StarGAN v2, which can apply multiple domain styles in a single model, useful for applying different cartoon styles.
- Kim et al. (2021) enhanced temporal consistency in video style transfer, solving issues of flickering in cartoonized video streams.
- Wang et al. (2020) used Lightweight GANs for real-time style transfer on mobile devices, a key direction for practical deployments.
- OpenCV (Documentation) provides filter pipelines such as bilateral filtering, edge-preserving filters, and Canny edge detection which are used in pre/post-processing.
- Liu et al. (2021) developed a GAN framework for anime-style transfer, demonstrating high-quality face cartoonization using facial landmarks.
- Santhanam et al. (2020) studied cartoon effect enhancement using edge-aware upsampling and downsampling techniques, improving clarity and edge sharpness.
- Ghosh et al. (2019) proposed a real-time implementation of image cartoonization using a combination of CNNs and OpenCV on embedded platforms.
- Xu et al. (2022) experimented with style-disentangled GANs to allow dynamic change in cartoon features like eye size or head shape in facial cartoonization.
- Shen et al. (2021) implemented GAN-based video cartoonization with attention mechanisms to preserve object consistency across frames.
- Huang & Belongie (2017) introduced

Adaptive Instance Normalization (AdaIN), useful in real-time style transfer, including cartoonization.

- Li et al. (2019) reviewed image-to-image translation applications in art and entertainment, highlighting the role of GANs in creative industries.

III.EXISTING SYSTEM

Traditional cartoonization techniques rely on hand-crafted filters and image processing techniques such as bilateral filtering, edge detection, posterization, and color quantization. These approaches, implemented via OpenCV or other libraries, can give cartoon-like effects but often lack depth, artistic texture, and consistency across frames in videos. They also cannot generalize well to different lighting or background scenarios, and their performance degrades with complex scenes or human faces. Existing systems also lack personalization and learning capability—they apply the same filter logic to all images without adaptation.

IV.PROPOSED SYSTEM

The proposed system introduces a deep learning-based cartoonization framework that integrates Generative Adversarial Networks (GANs) with traditional OpenCV-based preprocessing and postprocessing. The system takes real-world images or video frames, resizes and smooths them using Open-CV, and feeds them into a pr-trained CartoonGAN or CycleGAN model trained on paired or unpaired datasets of real and cartoon images. The GAN generator learns to translate realistic photos into stylized cartoon equivalents while a discriminator ensures high-quality output. The video stream is handled frame by frame, with smooth transitions ensured using temporal consistency techniques. This hybrid system delivers more aesthetically pleasing, artistic, and temporally stable cartoonized images and videos in real-time.

V.SYSTEM ARCHITECTURE

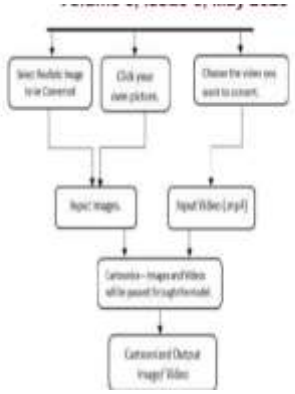

Fig 5.1 System Architecture

The system architecture for Cartoonization integrates deep learning models (GANs), image/video processing (OpenCV), and optional real-time modules for streaming and UI display. The architecture is modular, scalable, and suitable for both offline batch processing and real-time applications (e.g., webcam filters, mobile apps)

VI.IMPLEMENTATION

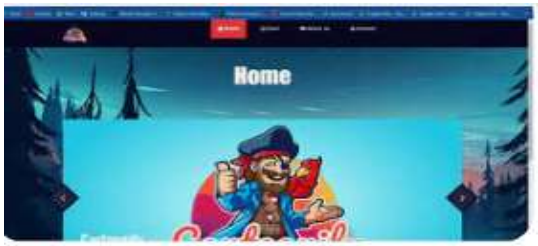

Fig 6.1 Home Page

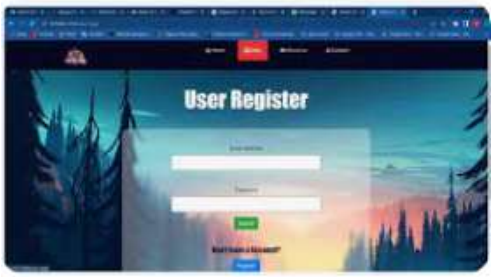

Fig6.2 :User Register

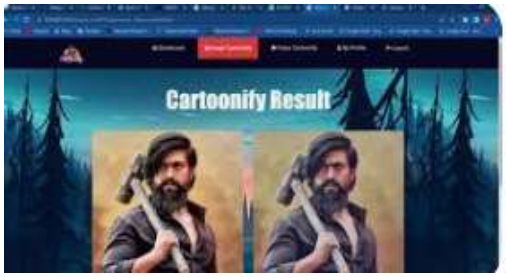

Fig 6.3 Results

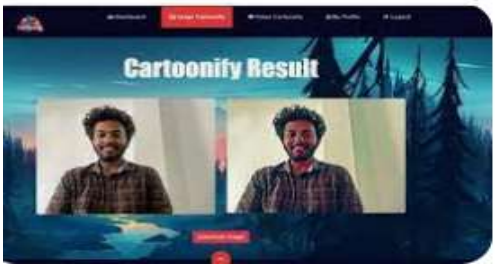

Fig 6.4 Result

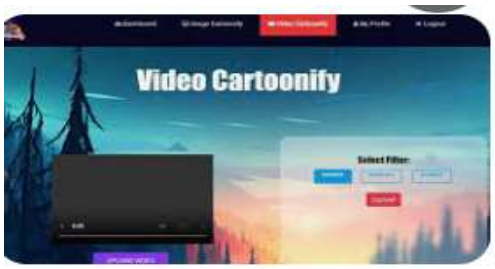

Fig 6.5 Video Results

VII.CONCLUSION

The Cartoonization of Images and Videos Using GAN and OpenCV project effectively bridges classical computer vision and modern deep learning techniques to create compelling, stylized visual content. GANs offer powerful tools for learning artistic transformations from large datasets, while OpenCV supports fast and efficient frame manipulation. This hybrid approach enables the system to generate high-quality cartoonized visuals in real time, opening avenues for social media, animation, gaming, and virtual reality applications.By leveraging the strengths of both domains, the system overcomes the limitations of traditional filters and enables greater artistic control, realism, and personalization. With future enhancements like real-time streaming, mobile deployment, and multi-style generation, cartoonization systems can revolutionize how digital media is consumed and created.

VIII.FUTURE SCOPE

- Mobile/Edge deployment: Optimize

GAN models for smartphone apps using TensorFlow Lite or CoreML.

- Style customization: Allow users to select or upload their own cartoon styles for personalized output.
- 3D cartoonization: Extend the system to convert 3D camera feeds or AR scenes into cartoon styles.
- Real-time video conferencing: Use cartoonization in live video calls as a privacy-preserving and stylistic filter.
- Multilingual lip-sync animation: Combine with speech recognition to create cartoon avatars that talk.

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