CARTOONIZATION OF IMAGES AND VIDEOS USING GAN AND OPEN CV

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ABSTRACT

Cartoonization of images and videos could be used in various different applications, which can be ease in publishing a comic book for a comic, anime, T.V. shows as well as for fun events on social media. This paper proposes cartoonization of images and videos through Generative Adversarial Networks (GANs). Thus an idea to convert real world images and videos into cartoonized one is proposed through this paper. With carbonization, the paper also proposes to make a complete Image-hub for the user with features including upscaling, denoising and editing filters to the input images through the Python OpenCV library. The project also includes video to GIF conversion to use in various social media platforms to achieve cartoon filters. Thus the project is built to be user friendly and leveraging various other features rather than only cartoonization of images and videos.

KEYWORDS: Deep Learning (DL), Generative Adversial Networks (GAN)

INTRODUCTION

Cartoon is an image or series of images that are formed using a sequence of illustrations for animations. These cartoons may represent realistic or non-realistic features. However cartoons have gained a huge attention especially by the children, teenagers and artists. Due to which there exists many applications where cartoons are used. Some of these applications include cartoon television shows, comic magazines, cartoon based image filters and animated films. Some of the applications may also contain some real-world scenes. For example, an animated film may contain an image having a city drawn which corresponds to a city that is present in a real world.

These cartoon images are created by a skillful artist manually drawing those scenes or by using computer software's to create a single image. To obtain a better quality, the artists need to draw lines and must shade each color region based on real-life scenes. This entire process requires a lot of labor skills and is really time consuming especially while working on animated comics or films. Also the existing computer software's like Corel Draw or Adobe Photoshop are not free to use and also may not be easy for the beginners to understand and achieve the required quality. So there is a requirement of technology that can help transform a real-world based photo or video into an animated image or video respectively.

This technology when integrated with other software's can help the user to convert their real-world photos or videos into cartoon versions as and when required or can also act as an image filter which is also freely available and easy to use. In this paper, we propose a Generative

Adversarial Networks (GANs) based approach along with features like image denoising and image upscaling to convert an image, GIF or video files into their cartoon versions. The image upscaling and denoising is achieved using OpenCV. To train the model, data used are a set of photos and a set of cartoon images. The trained model helps in generating the cartoon images or videos that are not a part of training data.

LITERATURE SURVEY

TITLE: "Transforming photos to comics using convolutional neural networks" AUTHORS: Prof. Martina Rodrigues, Mukesh Parmar, Omkar Gorhe, and Vedant Prabhu. ABSTRACT: In this paper, inspired by Gatys's recent work, we propose a novel approach that transforms photos to comics using deep convolutional neural networks (CNNs). While Gatys's method that uses a pre-trained VGG network generally works well for transferring artistic styles such as painting from a style image to a content image, for more minimalist styles such as comics, the method often fails to produce satisfactory results. To address this, we further introduce a dedicated comic style CNN, which is trained for classifying comic images and photos. This new network is effective in capturing various comic styles and thus helps to produce better comic stylization results. Even with a grayscale style image, Gatys's method can still produce colored output, which is not desirable for comics. We develop a modified optimization framework such that a grayscale image is guaranteed to be synthesized. To avoid converging to poor local minima, we further initialize the output image using grayscale version of the content image. Various examples show that our method synthesizes better comic images than the state-of-the-art method.

TITLE: “CartoonGAN: Generative Adversarial Networks for Photo Cartoonization”,

AUTHORS: Xinrui Chen and Jiaya Jia.

ABSTRACT: In this paper, we propose a solution to transforming photos of real-world scenes into cartoon style images, which is valuable and challenging in computer vision and computer graphics. Our solution belongs to learning based methods, which have recently become popular to stylize images in artistic forms such as painting. However, existing methods do not produce satisfactory results for cartoonization, due to the fact that (1) cartoon styles have unique characteristics with high level simplification and abstraction, and (2) cartoon images tend to have clear edges, smooth color shading and relatively simple textures, which exhibit significant challenges for texture-descriptor-based loss functions used in existing methods. In this paper, we propose CartoonGAN, a generative adversarial network (GAN) framework for cartoon stylization. Our method takes unpaired photos and cartoon images for training, which is easy to use. Two novel losses suitable for cartoonization are proposed: (1) a semantic content loss, which is formulated as a sparse regularization in the high-level feature maps of the VGG network to

cope with substantial style variation between photos and cartoons, and (2) an edge-promoting adversarial loss for preserving clear edges. We further introduce an initialization phase, to improve the convergence of the network to the target manifold. Our method is also much more

efficient to train than existing methods. Experimental results show that our method is able to generate high-quality cartoon images from real-world photos (i.e., following specific artists' styles and with clear edges and smooth shading) and outperforms state-of-the-art methods.

TITLE: "Generative adversarial nets,"

AUTHORS: Ian Goodfellow, Jean Pouget-Abadie, Mehdi Mirza, Bing Xu, David Warde. ABSTRACT: We propose a new framework for estimating generative models via adversarial nets, in which we simultaneously train two models: a generative model G that captures the data distribution, and a discriminative model D that estimates the probability that a sample came from the training data rather than G. The training procedure for G is to maximize the probability of D making a mistake. This framework corresponds to a minimax two-player game. In the space of arbitrary functions G and D, a unique solution exists, with G recovering the training data distribution and D equal to 1/2 everywhere. In the case where G and D are defined by multilayer perceptrons, the entire system can be trained with backpropagation. There is no need for any Markov chains or unrolled approximate inference networks during either training or generation of samples. Experiments demonstrate the potential of the framework through qualitative and quantitatively evaluation of the generated samples.

TITLE: "Transformation of Realistic Images and Videos into Cartoon Images ", AUTHORS: Akanksha Apte, Ashwathy Unnikrishnan, and Prof. Sachin Gavhane. ABSTRACT: Aim of the project is to put forward a solution for transforming snapshots or videos of real-world into animated photos (Cartoon Images) or Video. The earlier method of transformation requires complicated computer graphics and skills. The idea of the paper is based on designated snapshots and videos which are converted to an art form such as painting. Amongst all the techniques usable, the application of a Generative Adversarial Network (GAN) called Cartoon GAN will be used for the styling real-world images that use 2 loss functions namely, content loss and adversarial loss for getting a sharp and clear image. With the help of GAN, it is possible to convert video as well to its cartoonized version and the development of the project shows that our Proposed Idea provides high quality cartooned images and videos.

TITLE: "Enhanced Deep Residual Networks for Single Image Super-Resolution"

AUTHORS: Bee Lim, Sanghyun Son, Heewon Kim,Seungjun Nah

ABSTRACT: Recent research on super-resolution has progressed with the development of deep convolutional neural networks (DCNN). In particular, residual learning techniques exhibit improved performance. In this paper, we develop an enhanced deep super-resolution network (EDSR) with performance exceeding those of current state-of-the-art SR methods. The significant performance improvement of our model is due to optimization by removing unnecessary modules in conventional residual networks. The performance is further improved by expanding the model size while we stabilize the training procedure. We also propose a new multi-scale deep super- resolution system (MDSR) and training method, which can reconstruct high-resolution images of different upscaling factors in a single model. The proposed methods

show superior performance over the state-of-the-art methods on benchmark datasets and prove its excellence by winning the NTIRE2017 Super-Resolution Challenge.

TITLE: “Accelerating the Super-Resolution Convolutional Neural Network”,

AUTHORS: Chao Dong, Chen Change Loy, Kaiming He

ABSTRACT: As a successful deep model applied in image super-resolution (SR), the Super-Resolution Convolutional Neural Network (SRCNN) has demonstrated superior performance to the previous hand-crafted models either in speed and restoration quality. However, the high computational cost still hinders it from practical usage that demands real-time performance (24 fps). In this paper, we aim at accelerating the current SRCNN, and propose a compact hourglass- shape CNN structure for faster and better SR. We re-design the SRCNN structure mainly in three aspects. First, we introduce a deconvolution layer at the end of the network, then the mapping is learned directly from the original low-resolution image (without interpolation) to the high- resolution one. Second, we reformulate the mapping layer by shrinking the input feature dimension before mapping and expanding back afterwards. Third, we adopt smaller filter sizes but more mapping layers. The proposed model achieves a speed up of more than 40 times with even superior restoration quality.

SYSTEM ANALYSIS

EXISTING SYSTEM:

This entire process requires a lot of labor skills and is really time consuming especially while working on animated comics or films. Also the existing computer software’s like Corel Draw or Adobe Photoshop are not free to use and also may not be easy for the beginners to understand and achieve the required quality. So there is a requirement of technology that can help transform a real-world based photo or video into an animated image or video respectively. This technology when integrated with other software’s can help the user to convert their real-world photos or videos into cartoon versions as and when required or can also act as an image filter which is also freely available and easy to use.

DISADVANTAGES:

•Lack of adaptability

•low-quality outputs

•loss of fine details.

PROPOSED SYSTEM:

This paper proposes cartoonization of images and videos through Generative Adversarial Networks (GANs). Thus an idea to convert real world images and videos into cartoonized one is proposed through this paper. With carbonization, the paper also proposes to make a complete Image-hub for the user with features including upscaling, denoising and editing filters to the input images through the Python OpenCV library. The project also includes video to GIF conversion to use in various social media platforms to achieve cartoon filters.

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ADVANTAGES:

•High-quality cartoonized outputs.

•Adaptability to different cartoon styles.

•Can be deployed for real-time applications.

IMPLEMENTATION AND RESULTS

The major modules of the project are

1.IMAGE DENOISING

2.IMAGE UPSCALING

3.CARTOONIZATION OF IMAGE USING GAN

4.CARTOONIZATION OF VIDEOS USING GAN

MODULE DESCRIPTION

IMAGE DENOISING

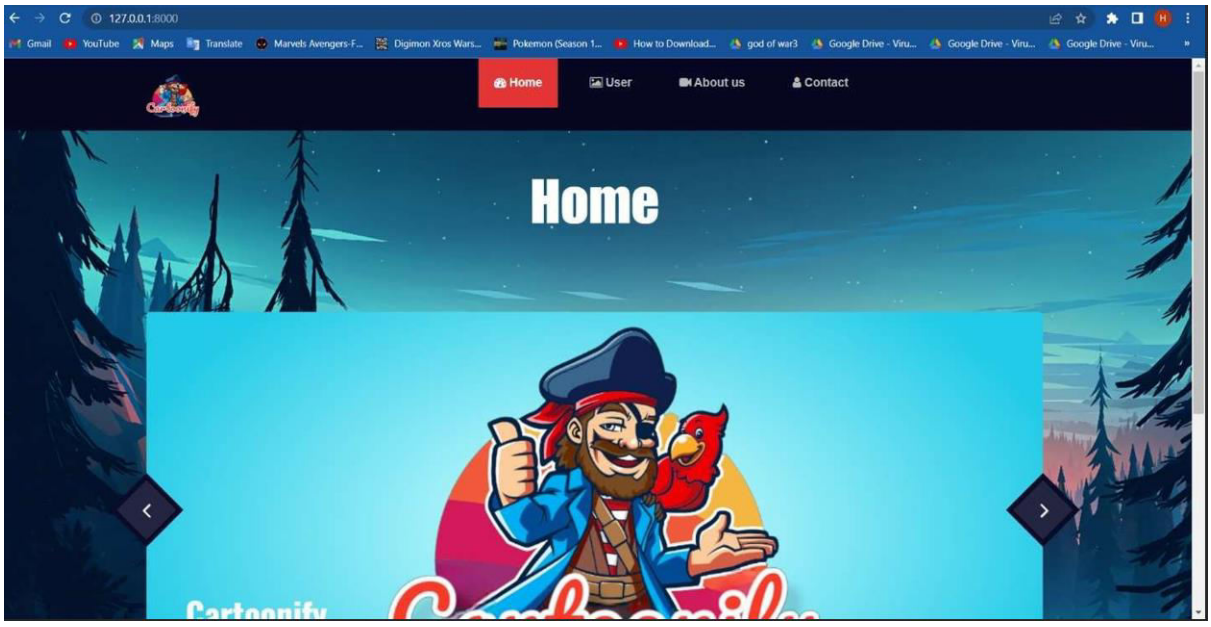
One of the basic challenges within the field of image process and computer vision is removal of unnecessary things in an image file which is generally termed as image noise. Image noise could also be caused by totally different intrinsic (i.e., sensor) and accidental (i.e., environment) conditions. To remove those unnecessary things in an image, image denoising plays a vital role in a very wide selection of applications like image restoration, visual pursuit, image registration, image segmentation, and image classification. The underlying goal is to estimate the original image by suppressing noise from a noise-contaminated version of the Image. To obtain this image denoising feature, the OpenCV library contains a function fast Nl Means Denoising Colored which input converts image to CIELAB color space and then separately denoise L and AB components

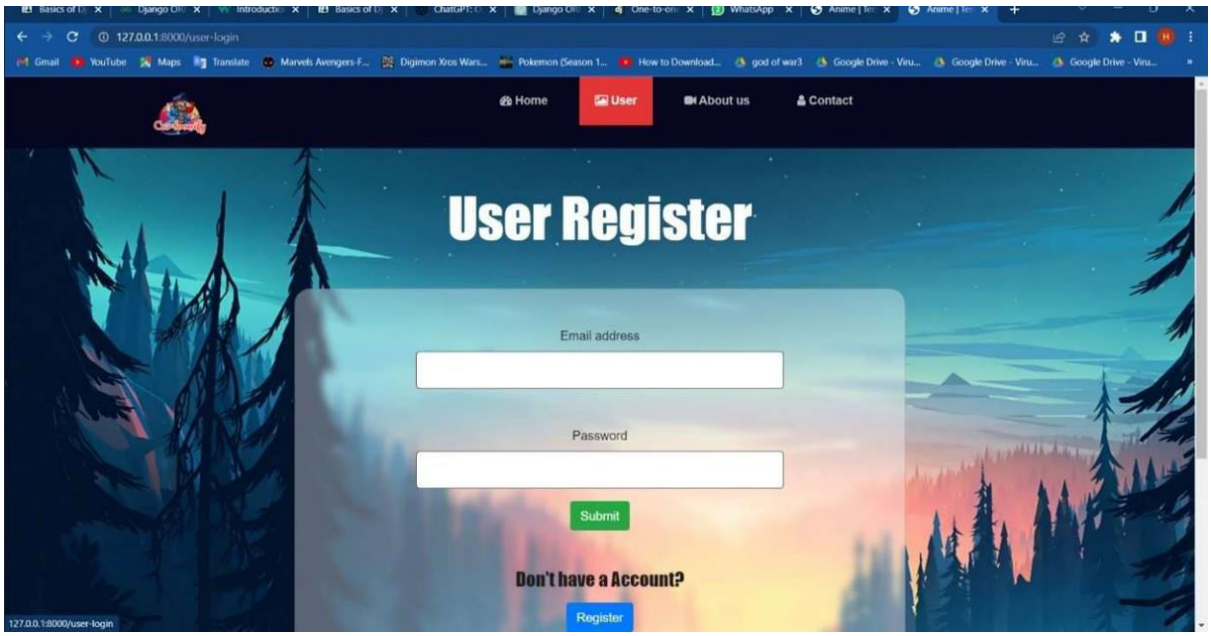
IMAGE UPSCALING

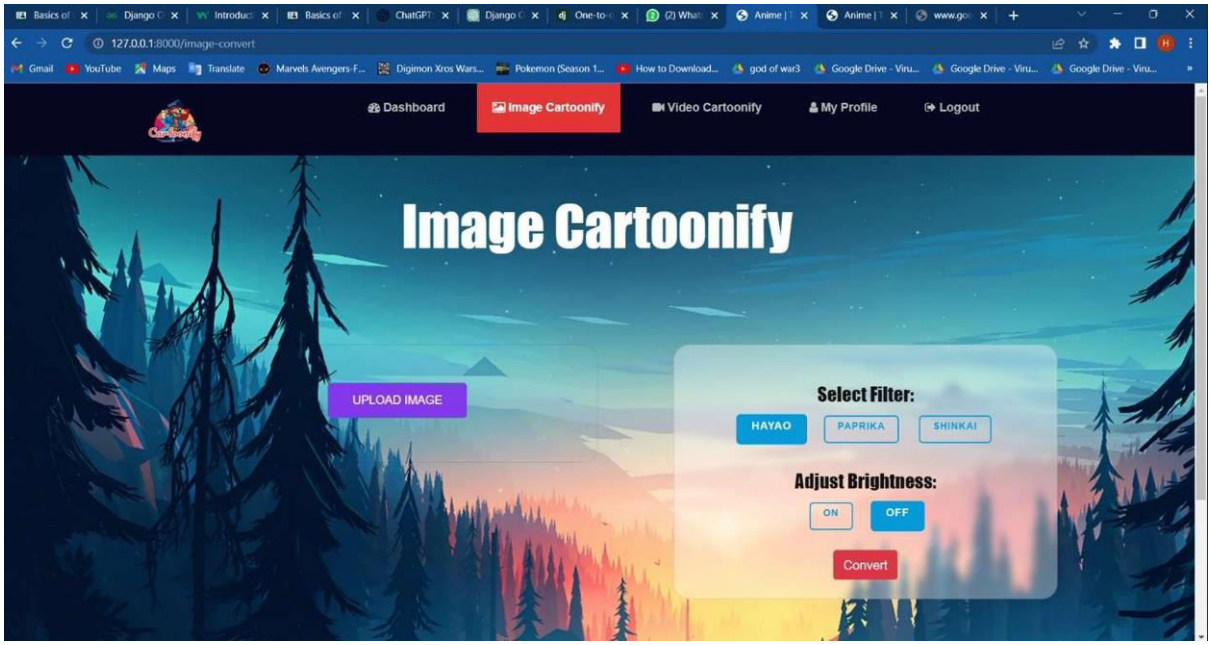
When scaling a vector graphic image, the graphic primitives that conjure the image can be scaled victimization geometric transformations, with no loss of image quality. When scaling a formation graphics image, a different image with an improved or lower vary of pixels must be generated. at intervals, the case of decreasing the image part varies (scaling down) this usually finally ends up during a plain quality loss. The two techniques which we applied are EDSR (Enhance Deep Super-Residual Network) and FSRCNN (Fast Super Residual Convolutional Neural Network). EDSR takes up to 120 seconds to upscale the image whereas FSRCNN is afaster technique and gives an upscaled image output within 10 seconds. But comparison wise EDSR gives a higher upscaled image than FSRCNN

CARTOONIZATION OF IMAGE USING GAN

The Image will be first Denoised and then it will follow the cartoonization Algorithm. In Cartoonizing Images, the generator network is utilized to map input pictures to the animation complex. Cartoon stylization is created once the model is prepared. The generator starts with a flat level convolution stage followed by two down-convolution squares to spatially pack and encode the pictures. Valuable local signals are separated in this stage for downstream change. Afterward, eight remaining squares with indistinguishable formats are utilized to build the substance and complex element. At last, the output cartoon-style pictures are reproduced by two up-convolution blocks and it will be up scaled in order to increase the quality of image.



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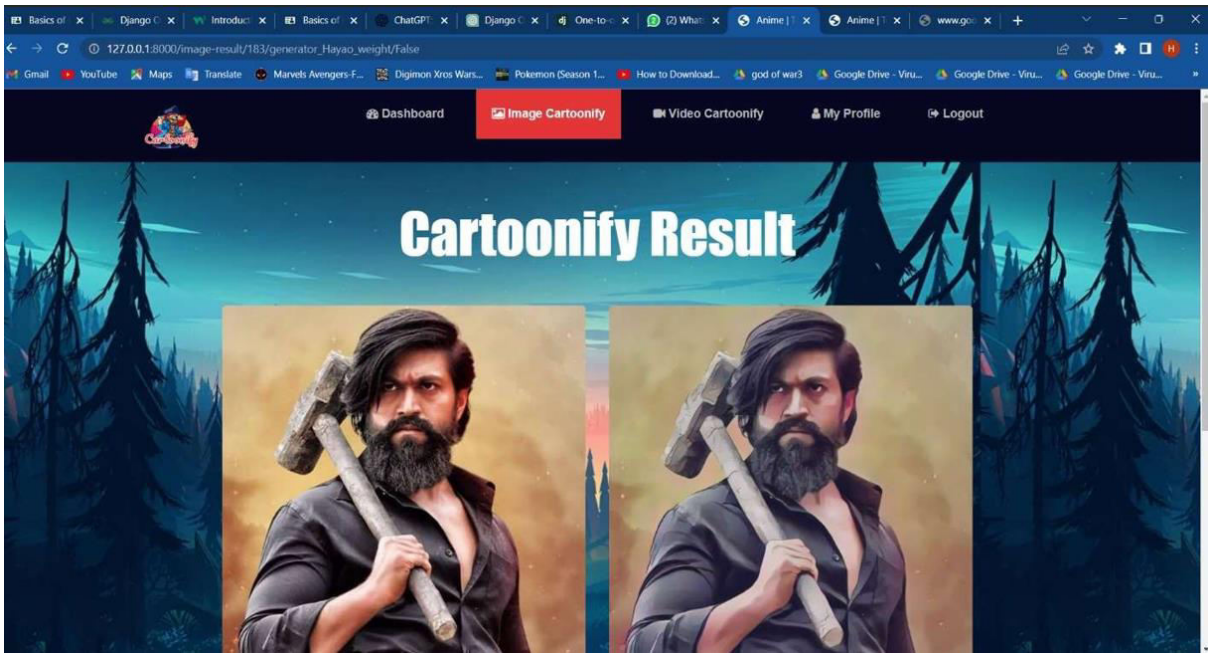
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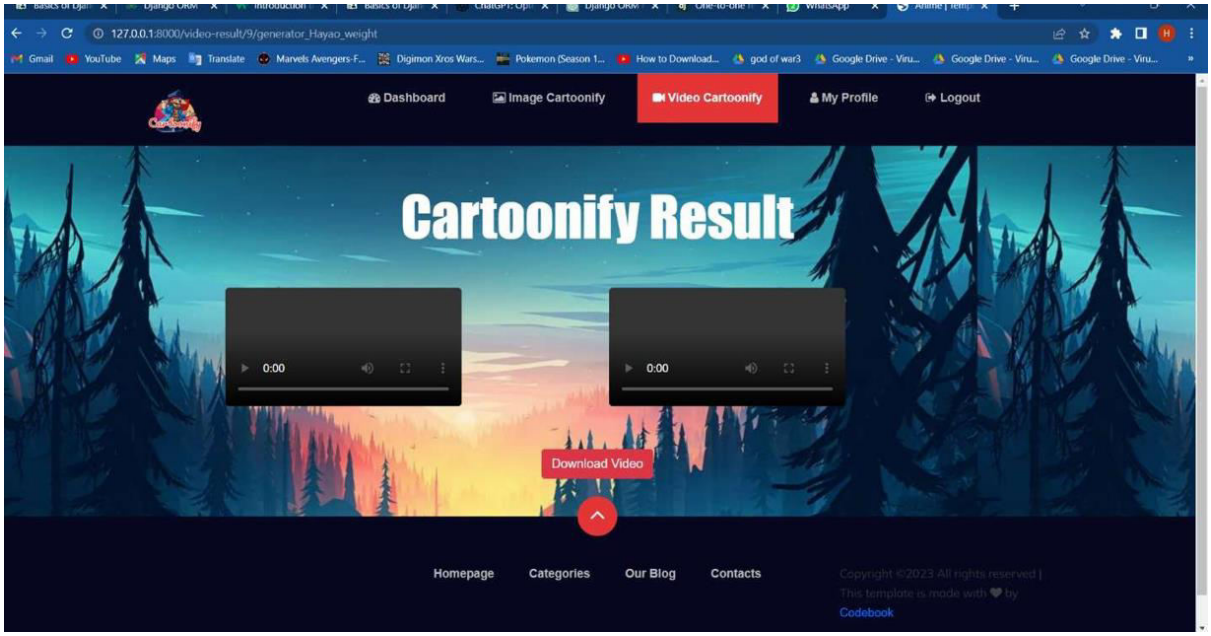

CONCLUSION

To address the challenges of vast differences between individual stress response, the time-series nature of physiological signals, this research evaluated the objectivity, reliability, and validity of a real-time stress detection system using a personalized time-series interval approach. The simple and complex tasks were able to achieve distinct levels of stress enabling their use as machine learning ground truth. Analysis of the window sizes provided insight into which sensors/features were useful for varying time-intervals. The personalized model was found to have better performance than a generalized model. It was found that indirect approximations can have a minor-to moderate effect on classifier performance (-11% to +14% of A Bayes). The current findings suggest that a personalized system provides promising performance when compared to past research on multi-class stress detection. Researchers should be careful about the selection of HMIs, sensors, and features for models, as they may not account for inter and intra- individual differences in stress physiology.

FUTURE SCOPE

The future scope of cartoonization of images and videos using GAN (Generative Adversarial Networks) and OpenCV is promising and spans across diverse industries. In the entertainment and media sector, this technology can revolutionize animation and film production by converting live-action videos into cartoon-style animations, significantly reducing manual efforts. It can also enhance gaming experiences by enabling real-time cartoonization of characters and environments, making games more visually appealing and interactive. Content creators on platforms like YouTube, Instagram, and TikTok can leverage this technology to apply unique artistic effects to their videos, creating engaging content effortlessly.In advertising and marketing, cartoonization can play a vital role in branding and campaigns by creating visually appealing, animated advertisements that resonate with younger audiences. It can also enable personalized marketing strategies, where businesses can use cartoonized videos

to tell compelling stories and connect emotionally with their customers. Moreover, in virtual reality (VR) and augmented reality (AR), cartoonization can enhance immersive experiences by allowing users to interact with cartoon-style environments and apply AR filters that add a creative and fun dimension to user .

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