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BLOCKCHAIN REVOLUTIONIZING HEALTHCARE: AN ORGANIZED ANALYSIS OF THE OPPORTUNITIES AND OBSTACLES OF BLOCKCHAIN TECHNOLOGY

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ABSTRACT

In recent years, the medical field has seen a notable increase in the use of blockchain technology. Enhancing interoperability between healthcare institutions is the value proposition of utilizing the technology of blockchain. Healthcare is a statistics-intensive industry due to the constant generation of large amounts of health data. Various healthcare actors must gather, preserve, and exchange this data for a variety of uses, including evaluation, reporting, team research, and individualized medical care. However, there are several issues with the healthcare industry's current data storage and exchange systems, including interoperability, data security, and patient privacy. The potential application of blockchain technology to address some of these issues in the healthcare sector has recently drawn attention from the industry and scientific communities. Secure and effective health data exchange is thought to be made possible by blockchain technology and smart contract support. This is because of its special qualities, which include transparency, immutability, traceability, decentralization, and trust lessness. Examining the advantages and risks of blockchain technology as a disruptive innovation in the healthcare industry is the goal of this article. To discover prospective issues and uses of blockchain technology based on its present implementations, studies were undertaken to analyse current blockchain applications. This study of the literature identifies research gaps and the need for further blockchain investigations, especially in the field of healthcare.

Keywords: Blockchain, Healthcare, Disruptive Innovation, Healthcare Interoperability, Distributed ledger.

1. INTRODUCTION

Blockchain is a public, decentralized digital ledger that keeps track of transactions across several computers, preventing any record from being changed in the past without changing any subsequent blocks. Blockchain creates a lengthy chain by being validated and connected to the previous "block." Blockchain is the name of the record, after all. Because every transaction is publicly published and verified, Blockchain offers a high degree of accountability. No one can change any of the data that is recorded into the Blockchain. It proves that the information is true and unaltered. Blockchain improves stability and demonstrates its vulnerability to hacking by storing data on networks rather than a central database. Blockchain provides an excellent platform for creating and competing with established businesses for contemporary [1].

Computerized healthcare systems can keep historical data that can reveal important details about a patient's health. Furthermore, it may be compiled and utilized to examine epidemics and the medical treatment provided in both urban and rural regions. Researchers across a wide range of disciplines might benefit greatly from this data, which can help them comprehend phenomena and overcome specific obstacles [2]. However, as it pertains to the patients' personal information, this information needs to be handled with confidentiality. Unauthorized release of patient data might have negative consequences and damage healthcare organizations' reputations in the eyes of the public [3]. To avoid unethical or humiliating circumstances, it is imperative to preserve patient clinical information and prevent its spread.

A distributed ledger network called blockchain adds entries and never removes or changes them without unanimous consent. The value of a Blockchain hash is determined by a cryptographic hash that links each data block with freshly updated information block records. Data is available and accountable to all network users thanks to the distributed Blockchain ledger design, which guarantees that data is not handled in any centralized location. By preventing a single assault, this decentralized method fortifies and secures the system. By doubling the quantity of medical practice and monitoring, it makes it easier to manage health data and patient care while saving time and money for both patients and practitioners. By storing health records on a blockchain, the patient will be able to monitor where their information is going [4].

This technique allows researchers to analyze vast amounts of previously undiscovered information on a certain population. Appropriate provision for longitudinal research aids in the development of precision medicine. With the aid of wearable technology and the Internet of Things (IoT), we leverage blockchain technology in real-time healthcare to store and update important patient data, such blood pressure and blood sugar levels. It assists physicians in monitoring high-risk patients and, in the event of an emergency, in informing and warning their relatives and colleagues. Because of its decentralized nature, blockchain may be safely hacked without jeopardizing any one copy of the data [5]. The following research questions are addressed in this article:

- Q1: Researching blockchain technology and its important applications in the medical field;
- Q2: to determine how Blockchain technology might help the global healthcare culture;
- Q3: to determine and talk about blockchain technology's enablers for bringing healthcare
- services back to life;
- Q4: to determine the "Unified Work-Flow Process" of implementing blockchain technology in the provision of medical facilities;
- Q5: to list and talk about important blockchain uses in the medical field.

2. LITERATURE STUDY

The durability and high feature extraction capacity of deep learning-based detectors allow for good performance [1]. One- and two-stage object detectors are the two most common types. In a single step, one-stage detectors regress the bounding boxes directly. The method used in YOLOv1 [2] separated the image into many cells and attempted to locate items within each one; however, this method was not effective for small objects. YOLOv1 performs poorly when it simply uses the final feature output since it can only see specific regions of the source images due to its fixed receptive field. To perform detection on many feature maps and identify faces of varying sizes, multi-scale detection was added to a single shot detector (SSD).

Using a technique that extracts features using a Haar feature descriptor with an integral picture approach and a cascaded detector, the Viola-Jones detector [3] detects objects in real time. Despite using integral pictures to speed up the process, it is still computationally costly. Histogram of Oriented Gradients (HOG), an efficient feature extractor for human detection, calculates the magnitudes and directions of oriented gradients across picture cells [4] links object pieces to determine which classes they belong to after detecting them as a deformable part-based model.

A solution to the problems with facial recognition was offered by the authors in [5]. The notable distinctions between frontal and profile faces present a substantial challenge for face recognition applications. To solve this problem, current methods either learn posture invariance or synthesize frontal faces. The authors provide a novel method to examine how rotating a face in 3D space impacts CNN deep feature generation using Lie algebra theory. According to the article, face rotation in the image space corresponds to an extra residual component in the CNN feature space, which is entirely governed by the rotation.

A facial recognition web platform was suggested by the authors in [6]. They demonstrate that the suggested platform has capabilities including real-time facial recognition for identifying criminals via a live stream camera feed and the ability to handle user and criminal information. Police personnel and administrators with higher-level access and database maintenance duties are the two user types intended for the system. Effective real-time recognition is achieved by extending and using the Haar Cascade method. The website features a live feed portion with video filters to maximize identification results and was created using the MVC framework. In-depth study of facial recognition algorithms and associated platforms, requirements specification, persona and scenario creation, stakeholder communication, heuristic evaluation, and questionnaire-based feedback gathering were all part of the development process. In a similar vein, the authors of [7] emphasized the latest developments in 2D face identification while also pointing out that the research was limited in terms of face spoofing, poses, and lighting conditions. These restrictions are addressed with 3D facial recognition. One of the biggest obstacles, though, is building an appropriate database for 3D face recognition. In order to address this issue, the authors introduce a brand-new database named CAS-AIR-3D Face, which includes 24713 films taken by InteRealSense SR305 of 3093 people. Pose, expression, occlusion, and distance variations are among the three modalities that are included in this database: colour, depth, and near infrared. The RealSense SR305. Pose, expression, occlusion, and distance variations are among the three modalities that are included in this database: colour, depth, and near infrared. According to the quantity of persons and sample variations, CAS-AIR-3D Face is the largest low-quality 3D face database that we are aware of.

3. PROBLEM STATEMENT

The technique of turning facial photographs into individualized or creative representations, or face stylization, has grown in importance in applications including digital content production, virtual avatars, and augmented reality. The following restrictions, however, make it difficult to achieve real-time performance with excellent outcomes:

1. Data Dependency: Traditional face stylization methods often rely on large datasets and extensive training to achieve effective results. This limits their adaptability to new styles or tasks, making them computationally expensive and time-consuming.

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2. **Dynamic Environments**: Stylization in dynamic scenarios, where facial expressions, poses, and lighting conditions vary, demands robust and efficient methods for consistent feature alignment and localization. Many existing approaches struggle to maintain performance in such conditions.

3. **Lack of Scalability**: Methods that require retraining for each new style or task lack scalability and are unsuitable for real-time applications.

4. **Computational Overhead**: Iterative optimization techniques commonly used for stylization introduce significant computational overhead, making it difficult to achieve real-time performance.

To overcome these obstacles, a lightweight and flexible face stylization framework is required, one that can work in real time, generalize between styles with little input, and manage the intricacies of changing settings. This paper suggests a novel approach to accomplish effective, reliable, and high-quality face stylization in real-time scenarios by utilizing one-shot learning, regression networks, and generic object tracking.

All the main points of the research work are written in this section. Ensure that abstract and conclusion should not same. Graph and tables should not use in conclusion.

4. METHODOLOGY

Creating a system that can produce creative or stylized representations of a person's face from a single input image is the goal of one-shot face stylization utilizing SRGANs (Super Resolution Generative Adversarial Networks). The main objective is to create an intuitive system that allows users to quickly apply different artistic styles to their face photos without needing a sizable dataset of linked ages. Our goal is to provide an environment where individuals may express their creativity and create unique creative representations of their pictures. This is widely used in social media filter applications. Additionally, this project should be a perfect one-shot face stylization model that can adapt well to different artistic styles and unseen faces.

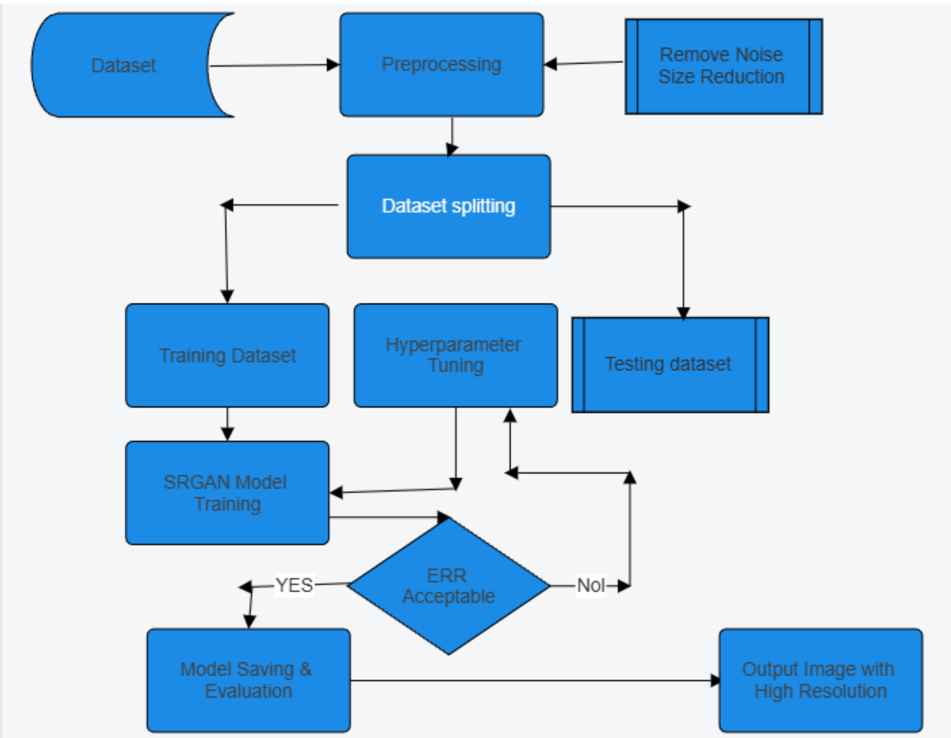

Figure 1: Proposed Method

We first explain why we are taking this strategy. We are worried about the situation in which we see a single face image that appears to be artificially created, or "fake," but we don't know the method used to create it. With the help of the one-shot example, we hope to: (1) predict the target's probabilistic distribution; (2) sample from the distribution to create random images that resemble the target domain; and (3) train a classifier to recognize face images produced by the same method in the future.

4.1 Dataset

Three popular benchmark datasets—Set5 [8], Set14 [9], and BSD100, the testing set for BSD300 [10]—are employed in our investigations. Every experiment uses a 4× scale factor to compare low- and high-resolution photos. This translates as an image pixel reduction of 16×. To ensure fair comparison, the data package was used to generate all stated PSNR [dB] and SSIM [11] metrics on the y-channel of center-cropped pictures, removing a 4-pixel wide strip from each border.

4.2 Experiment and Results

A random sample of 350 thousand photos from the ImageNet database was used to train all networks on an NVIDIA Tesla M40 GPU [45]. The testing photographs are not the same as these images. We used a bicubic kernel with a downsampling factor of r = 4 to downsample the HR images (BGR, C = 3) in order to produce the LR images. We randomly crop 16 96 x 96 HR subimages of different training images for every mini-batch. 105 update rounds at a learning rate of 10−4 and an additional 105 iterations at a lower rate of 10−5 were used to train all SRGAN variations. As in Goodfellow et al. [13], we switch between updates to the discriminator and generator networks, which is equal to k = 1. There are 16 identical (B = 16) leftover blocks in our generator network. To get a result that solely depends on the input deterministically, we disable the batch-normalization update during test time [14].

5. CONCLUSION

We have presented SRRes Net, a deep residual network that, when assessed using the popular PSNR metric, establishes a new state of the art on publicly available benchmark datasets. We have pointed out some of the drawbacks of this PSNR-focused image super-resolution and presented SRGAN, which trains a GAN to add an adversarial loss to the content loss function. We have verified through extensive MOS testing that SRGAN reconstructions for large upscaling factors (4×) are significantly more photo-realistic than reconstructions made using the most advanced reference techniques. In this paper, we presented a novel framework for real-time face stylization that combines one-shot learning, regression networks, and generic object tracking. Unlike traditional methods that rely on large datasets and extensive training, our approach demonstrates the ability to adapt to new stylization tasks with minimal input data while maintaining high-quality and consistent results. The integration of regression networks enables efficient modeling of transformation parameters, while object tracking ensures robust performance in dynamic environments with variations in pose, lighting, and expressions.

Our experimental results show that the proposed method outperforms existing approaches in terms of speed, generalizability, and visual fidelity. By achieving real-time performance, our framework opens new possibilities for interactive and personalized applications in augmented reality, virtual avatars, and creative content generation. Future work will focus on further enhancing the scalability and flexibility of the framework to support more complex and multi-modal stylization tasks. Additionally, exploring lightweight network architectures and optimization techniques will enable deployment on resource-constrained devices, expanding the practical applications of real-time face stylization. This work represents a significant step toward bridging the gap between efficiency, adaptability, and artistic quality in face stylization, providing a foundation for further advancements in the field.

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