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Survey on Different Morphology Detection Techniques

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ABSTRACT

There is a lot of data traffic that translates and transports data in the digital environment of the World Wide Web. The data is presented as files and photos. Data can morph, so it's important to detect these instances. The suggested method will identify modified photographs and alert the user to the validity of the images. In recent years, the research community has paid a great deal of attention to the problem of morph attack detection. To accurately detect morph attacks, various studies have been done in this area and various methods have been used. Although enough morph images are not readily available for research purposes, a variety of face databases are used to create morph image databases. Attack detection via face morphing is difficult. Automated border control gates utilize both manual inspection and automatic categorization methods to identify morphing attacks. It is vital to comprehend how a machine learning system can recognise altered faces and the most pertinent facial regions.

Keywords : Morph Attack detection, Artificial Neural Network

I. INTRODUCTION

In today's progressive world it is a aid to have a powerful decision making systems to adapt to inputs passed to it and provide decisions and options to choose. To elaborate it lets consider examples like Artificial intelligence managed systems and environments which help us solve real time problems like scheduling, arranging, ordering which are required in each field of today's world like hospitals, traffic signals, hotels, public sector, airlines etc. Such fields need to take decision based actions to accomplish tasks like traffic monitoring, detection of early diseases, scheduling flight departures, seat allocation. These all kinds of tasks can be easily accomplished by use of advanced neural network algorithms which have high capacity to take multiple inputs and provide better decisions.

II. DIFFERENT SYSTEMS INVOLVING MORPHOLOGY DETECTION MECHANISM

A significant security risk for automatic face recognition systems is the morphing attack. The

likelihood of success is higher for high-quality morphed images, which are those free of obtrusive visual artifacts like ghosts, noise, and blurring. These images can deceive both human examiners and commercial face verification algorithms. To train and evaluate reliable morphing attack detection algorithms, it is essential to have access to big sets of high-quality morphs. But creating a high- quality morphed image is a costly and time-consuming job because manual post-processing is frequently needed to get rid of the typical artifacts produced by landmark-based morphing techniques. This study outlines a method for automated morphing artifact retouching based on the Conditional Generative Adversarial Network paradigm[1] that uses Attention Maps to direct the generation process and restrict the retouch. The framework is applied to various facial crops in order to work with high- resolution pictures, and after those crops have been edited and refined, they are precisely blended to recreate the entire morphed face. We concentrate on four distinct squared facial regions in particular because they are frequently impacted by artefacts: the right and left eyes, the nose, and the mouth. In order to corroborate the effectiveness of the plan in terms of, among other things, pixel-wise metrics, identity preservation, and human observer analysis, several qualitative and quantitative experimental evaluations have been carried out. Results support the validity and precision of the suggested structure.

Several illegal actions could result from a facial recognition and authentication system failure. Systems used for facial identification today are susceptible to various biometric attacks. The subject of this study is the identification of morphing attacks. This study suggests a reliable identification method that can account for age, lighting, eye, and headgear variations. A classifier and feature generator based on deep learning are both used. To improve the detection outcomes, picture enhancement[2] and feature combination are also suggested. The development of a flexible dataset also includes the creation of Morph-2 and Morph-3 images using sophisticated software and human input. Morph-3 images can look more realistic, making them harder to spot. Additionally, Morph-3 pictures have not previously been discussed in the literature. A more realistic morph attack situation is shown by professional morphing software. Compared to the morphs produced in the earlier work from free programmes and code scripts, professional morphing software portrays a more realistic morph attack scenario. To account for variance, morphs are made using eight face databases. Celebrity2000, Extended Yale, FEI, FGNET, GT-DB, MULTI-PIE, FERET, and FRLL are the datasets that make up this list. Multiple experimental setups are used to investigate the findings, and it is determined that the suggested methodology yields encouraging outcomes.

Attacks using face morphing have shown a high susceptibility to human observers and commercially available Face Recognition Systems (FRS)[3], particularly in the context of border control. As a result, preventing face morphing attacks is essential for a trustworthy and safe border control operation. The framework for single image-based morphing attack detection presented in this work is unique and is based on multimodal regions like the mouth, nose, and eyes. Each of these areas is processed using a colour scale-space representation, from which two distinct kinds of features are extracted using the methods known as local binary features (LBP) and binarized statistical image features (BSIF). These features are then given to classifiers like the Spectral Regression Kernel Discriminant Analysis and Probabilistic Collaborative Representation Classifier. To reach a conclusion, their choices are added up at the score level. To compare the performance of the proposed method to the existing methods, extensive experiments are conducted on three distinct face morphing datasets. Additionally, the suggested technique is evaluated against the Bologna Online Evaluation Platform. (BOEP)[3]. Results obtained show that the suggested method performs better than

current state-of-the-art methods. Attack detection using face morphing is difficult. Automatic border control gates implement both human inspection and automatic classification techniques to identify morphing attacks. It is crucial to comprehend how a machine learning system can recognise morphed faces and the most pertinent facial regions. The texture signals in those pertinent regions enable us to distinguish between the real and the morph images. Additionally, it aids in the manual examination's ability to spot a passport produced using morphed pictures. In order to choose the most pertinent and least redundant features, this article investigates features extracted from intensity, shape, and texture and suggests a feature selection stage based on the Mutual Information filter. By making this choice, we can lessen our workload, pinpoint the location of these regions, comprehend the effects of morphing, and develop a reliable classifier. The method based on Conditional Mutual Information[4] and Shape features produced the best results, requiring only 500 features for FERET images and 800 features for FRGCv2 images out of a total 1,048 features. The most important body parts to be examined are the eyes and nostrils.

In processes like image segmentation and computer vision, edge detection is a basic and crucial pre-processing stage. A single edge detection technique, as is the case, can only reflect the edge information from a particular aspect. This article focuses on mathematical morphology methods while carefully examining edge detection techniques for noisy images. The paper builds edge detection operations and examines the specialties of these operations as well as the structure elements by analysing and studying the theory of mathematical morphology. The novel approach to edge detection based on the morphology of multiple structural elements and image fusion is suggested. The suggested method can successfully keep good edge information while also effectively removing image noise through simulation and comparison with the conventional edge detection operations[5].

III. CONCLUSION

The above paper mainly focuses on different approaches where the morphology was detected and was successfully implemented to give detection and correction .Hence it can be concluded that the Neural Network based algorithms are extensively used in large networks where tracing and understanding of the nature of the system is required. Basically Neural Networks are extensively used in all sectors like traffic management, Aviation systems, Ship industries, Voltage management and health care systems where it has worked in a efficient manner and provided best results.

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