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Theft Detection Using Artificial Intelligence Video Retrieval Technique

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Abstract: Video-based facial recognition has gotten a lot of interest in recent years due to its wide range of applications. Face identification is complicated by the significant diversity of pictures caused by position changes, lighting conditions, facial emotions, and image occlusion. Surveillance and mobile cameras, on the other hand, are low-cost equipment that cause significant motion blur, out-of-focus blur, and a broad range of posture variation, lowering video frame quality. Face recognition from video image processing is achieved using machine learning techniques. Image capture, segmentation, feature extraction, classification, and face detection are all processes in the process. The retrieved characteristics are used to train classifiers for pictures that have been processed. As a result, the most current algorithms produced provide an overview of the state of the art in video facial recognition technology.

Keywords: Face detection, security monitoring, video retrieval, face recognition.

I. INTRODUCTION

Face recognition based on video is a technique for recognizing one or more human faces in a video based on their facial features. The most typical applications of face recognition are verification and identification. Face recognition refers to a computer's capacity to scan, store, and recognize a person's face in order to identify them. Due to lighting, position, and mood, faces in video-based face recognition exhibit a broad range of appearance variances. Various image processing and machine learning approaches may be used to recognize human faces in video. When used in security settings, face recognition in video has numerous uses. The visual system of humans has the innate ability to distinguish hundreds of faces. It allows individuals to identify familiar faces even after a lengthy time has passed. The development of intelligent systems that are akin to human perception systems is still a work in progress. Due to its inflexible architecture, which means that all faces may have the same characteristics, the human face is difficult to distinguish and detect. At the same time, environmental and personal variables influence the facial look. Face, expression, and scene detection are among of the additional issues that VFR encounters. The most challenging task is deciding whether two face images belong to the same person. Face recognition from video approaches has been successfully utilized to execute specified tasks in a variety of applications. Face recognition from video has been attempted for real-time applications, however issues such as location change, occlusion, age, lighting, motion blurriness, and illumination all pose substantial challenges.

Recognizing human faces is mostly employed in businesses for access and security, and it aids in the detection of theft in surveillance cameras and other industries. Due to low image quality caused by position change, fluctuating lighting conditions, noise, and blurriness, face recognition in surveillance video is challenging. Support Vector Machine (SVM) is a type of machine that is used to study data, particularly in the field of image processing. It may be used as a classifier or a regression model to provide useful information by examining input data. Some of the datasets used in video-based face recognition include the COX Face database, Honda/UCSD database, Labelled Faces in the Wild (LFW), YouTube Face database, and others. Face emotions, position, lighting circumstances, hairdo, and cosmetic usage should all be taken into account when recognizing human faces. For recognizing human faces, many algorithms such as SVM, Convolutional Neural Network (CNN), Nearest Neighbor (NN), and other classifiers are utilized. Approaches for detecting human faces that have been utilized in trials to increase accuracy and performance include image acquisition, pre-processing, segmentation, feature extraction, and classification. Image processing is a technique for converting an image to digital form and then performing operations on it to create a better image or extract important information. It's a signal distribution method in which the input is an image, such as a video frame or a photograph, and the output is an image or image-related features. Typically, an Image Processing system treats pictures as two-dimensional signals that are subjected to pre-determined signal processing procedures. It is one of today's

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fastest-growing technologies, with applications in a variety of industries. In both engineering and computer science, image processing is an important study issue.

A. Steps Involved in Image Processing

- Using an optical scanner or digital photography to import the image analysing and editing the image, including data compression and manipulation.
- Picture enhancement and the detection of patterns that are not visible to the naked eye, such as pictures taken from space.
- The final stage of the process is output, which can be a transformed image or report based on the examination of images.

B. Types

The two types of image processing procedures are analogue and digital image processing. For tangible copies such as printouts and photographs, analogue or visual image processing techniques can be applied. Image analysts use a number of interpretive basics while using these visual techniques. Image processing is constrained not just by the area to be examined, but also by the analyst's knowledge. Another key element in image processing via visual processes is association. As a result, analysts use a combination of personal expertise and secondary data to interpret images. Computer-assisted photo editing is possible thanks to digital processing techniques. The raw data from image sensors on the satellite platform has flaws. To overcome these weaknesses and ensure information's uniqueness, it must go through several stages of processing. Pre-processing, augmentation and presentation, and information extraction are the three general processes that all sorts of data must go through when using digital techniques.

II. EXISTING SYSTEM

Biometric systems try to differentiate humans based on their physiological and behavioural features. Human faces offer various benefits over other prominent biometric modalities such as iris, fingerprint, voice, hand shape, and gait that make them appealing for certain applications. Face recognition systems may be used in a wide range of applications, including surveillance systems, because they are simple to acquire facial photographs without requiring subject consent. Despite recent research indicating that face recognition algorithms may equal the performance of high-security biometric modalities such as fingerprint and iris, recognizing people from their faces in dangerous scenarios remains a challenging task. When compared to two-dimensional facial structure information, it is possible to deal with some of these difficulties more effectively using three-dimensional (3-D) face structure information (2-D). Challenges posed by lighting, position, and expression fluctuations can be better managed in the three-dimensional (3-D) domain. Extreme occlusion differences, on the other hand, continue to make identification difficult. We offer a 3-D face recognition system that is resilient in the face of realistic occlusions in this paper.

A. Drawback

- Lighting variations, in-depth position changes, and facial emotions, in particular, are important factors that impact the accuracy of a face recognition system.

III. PROPOSED SYSTEM

CNN classifier is one of the state-of-the-art machine learning algorithms in the proposed system. CNN is a type of multilayer perception that employs a number of specialised hidden layers for categorization. CNN improves performance while also being cost-effective. When compared to other image processing approaches, the CNN classifier has a high accuracy rate. Variable illuminance and posture are discussed. The CNN classifier may use input data to learn local features and use them to discriminate between facial images. CNN uses an alternating series of convolution and sub-sampling layers for feature extraction, with the neural network being the last layer for classification. CNN network structure includes convolution layers, pooling layers, and fully connected layers. The feature extraction layer is the convolution layer. The convolution process employs the training convolution kernel and a layer of feature maps. On a facial image, a pooling layer is utilised to decrease dimension. A one-dimensional layer is used as input for the full connection layer, which is a convolution layer. Uses CNN as a regression model for spectrum pictures, which is a combination of process time domain and frequency domain features. CNN enhances the pre-processing procedure and makes time domain feature representation more robust. When compared to other algorithms for recognising human faces, CNN has a high accuracy rate.

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IV. SYSTEM REQUIREMENTS

A. Hardware Requirements

- CPU type : Intel Pentium 4
- Clock speed : 3.0 GHz
- Ram size : 512 MB
- Hard disk capacity : 40 GB
- Monitor type : 15 Inch color monitor
- Keyboard type : internet keyboard

B. Software Requirements

- Operating System : Windows OS
- Language : MATLAB

V. SYSTEM IMPLEMENTATION

A. Module Split Up

- Image Acquisition
- Image Pre-Processing
- Image Segmentation
- Feature Extraction

B. Modules Description

Image Acquisition: The first phase is picture acquisition, which involves extracting facial images from video in order to identify human faces. The picture captures clipped face patches from videos frame by frame. Human faces are recognised using cropped face patches. The dataset includes a high-quality picture that may be used to recognize human faces with high accuracy.

Image Pre-Processing: The original photos are converted into grayscale images or pixels via image pre-processing. The noise in the photos is eliminated during the pre-processing stage, resulting in a high-quality image.

Image Segmentation: One of the processes for splitting digital data into various parts is image segmentation. The image is divided to extract the main region of interest, which is the human face, as well as the facial features, from the entire image. Face recognition technique based on video. The Image Averaging Technique allows for decision-making over several testing frames. After image segmentation and tracking are completed, the efficiency of representing a facial picture is increased.

Feature Extraction: The LBP (Local Binary Patterns) approach is used to extract features. LBP is used to store information on the shape and texture of the face. Feature extraction is the process of determining the brightness of a face image using grayscale, the illuminance of a facial image using facial landmarks, and the sharpness of a facial image using the FISH algorithm (Fast Image SHarpness).

VI. CONCLUSION

Human face identification from video has been more relevant in a variety of sectors in recent years. Attendance is automatically recorded by identifying faces from security cameras in the areas of education and information technology; similarly, video-based face recognition may be used to detect whether a person is pleased or sad based on their facial expression. As a result, being able to recognise human faces on mobile phones and security cameras is crucial. To extract pictures from video, image processing is utilised. SVM, NN, and other image processing algorithms are among the approaches used. When compared to SVM and NN approaches, CNN techniques perform better in recognising human faces with good picture quality. When compared to other state-of-the-art algorithms for detecting human faces, the CNN approach has a high accuracy rate.

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