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Course Title : Image Processing and Computer Vision

1. **Title: Prototype of Student Attendance Application Based on Face Recognition Using Eigenface Algorithm**

To address flaws in the manual attendance system for DTETI UGM students, a prototype of a face recognition-based attendance application has been created. The problems found include decreased facial recognition accuracy under different lighting situations and when faces are rotated in the direction of the z-axis rotation centre. The new application prototype makes use of the Haar-based Cascade Classifier and the Eigenface face detection and recognition method.

A pre-processing technique from another study was added to the prototype in order to enhance performance. This technique uses a number of steps, including geometry transformation, distinct histogram levelling, bilateral filtering for image smoothing, and elliptical masking. According to test results, under various environmental lighting circumstances, the produced application prototype improved facial recognition accuracy by 16.71% over earlier prototypes

1. **Title: Face recognition using Viola-Jones depending on Python**

In this work, a software system based on face recognition is introduced. It can be used in smart buildings or VIP buildings that demand higher levels of security. The programme uses the Python implementation of the Viola-Jones object detection framework to identify human faces in a stream of images or video. The suggested facial recognition system entails two steps: first, it uses a web camera to recognise a person's face in real-time video, then it compares that face to one in an existing database to determine whether or not admission to the facility is permitted. For face detection, the system uses the well-known computer vision library OpenCV, which also offers functions for reading and writing frames. Utilising the developments in technology, the proposed software system can be used as a security system to regulate access in smart buildings.

1. **Title: Proposed Image Pre-processing Techniques for Face Recognition Using OpenCV**

With the help of lighting and position considerations, this study aims to enhance facial recognition. In addition to well-known face recognition algorithms like Eigenface, Fisherface, and LBPH that are accessible in OpenCV, the study also examines additional pre-processing approaches including illumination, pose, and illumination paired with pose. To assess the effectiveness of various combinations, the researchers took measurements of important variables like speed, identification rate, and threshold. Frontal faces from the Yale Face Database and the faces of 20 people were used in experimental study. The results showed that algorithms with improved pre-processing techniques had statistically significant changes in speed and threshold levels, but not in identification rate. Additionally, a substantial interaction impact between improved pre-processing methods and face recognition algorithms was seen in

**14. Title: Performance Evaluation of Eigen faces and Fisher faces with different pre-processed Data sets.** This Despite the development of numerous algorithms throughout the years, this study looks at the difficulties in facial recognition. The main objective is to assess the effectiveness of supervised (Fisher faces) and unsupervised (Eigenfaces) face recognition algorithms in various pre-processing scenarios. Low contrast and dark or poorly lit photos are dealt with using three pre-processing phases, including contrast stretching, homomorphic filtering, and image format conversion. The performance of Eigenfaces and Fisher faces is compared in the evaluation using the AT&T ORL database. The findings show that while handling changes in illumination, Fisher faces outperform Eigenfaces. For both Eigenfaces and Fisher faces, the study also analyses performance evaluation curves such the Cumulative Match Characteristics (CMC), Expected Performance Curve, and Receiver Operating Characteristics (ROC).

1. **Title: Face Recognition Based on Improved SIFT Algorithm**

Face recognition has made great strides in recent years, making it possible to identify people automatically. Improved matching techniques and statistical science have been the driving forces behind these developments. The many practical systems that use facial recognition algorithms has inspired a great deal of interest in creating algorithms with excellent success rates. The SIFT face recognition algorithm is being improved in this work. When compared to the original SIFT algorithm, the new technique performs better. The technique is applied to the ORL database and contrasted with various face identification algorithms as Gabor, GPCA, GLDA, LBP, GLDP, KGWRCM, and SIFT in order to assess its efficacy. The results of several testing show that the suggested method runs faster and has an accuracy rate of 98.75%.

1. **Title: Face Recognition: A Combined Parallel BB- BC & PCA Approach to Feature Selection**

In particular for face recognition applications, this work proposes a soft computing-based approach for the best feature selection and dimensionality reduction of images. Image feature reduction frequently employs Principal Component Analysis (PCA). PCA and Parallel Big Bang-Big Crunch (PBB-BC) are combined in the suggested method. The principle components of an image are analysed using PCA, and the best number of features from the evaluated components is chosen using PBB-BC. The ORL dataset is used to validate the methodology, which is put into practise in MATLAB. Fisherfaces, Eigenfaces/PCA, and PCA-MA techniques are used to compare the performance of the suggested PBB-BC-PCA methodology. According to the data, the integrated technique performs better than the other three methods, proving its superiority in face recognition applications..

1. **Title: Comparative Study of Face Recognition Techniques: A Review**

An overview of several facial recognition methods and their uses is given in this work. The authors acknowledge the popularity of several face recognition algorithms, each of which has advantages and disadvantages of its own. They stress the significance of feature representation and classification as crucial phases in the identification of faces. In order to increase effectiveness and handle issues with changing lighting and facial emotions, the article also introduces unique face recognition methods. The paper provides a thorough overview of facial recognition algorithms and their possible applications, even though the summary omits the specifics of these techniques..

1. **Title: Review Of Existing Algorithms For Face Detection And Recognition.**

The most effective face recognition algorithms and techniques are reviewed in this work. The review's objective is to pique the interest of academics interested in this subject. Using data from completed and ongoing investigations carried out by other academics, the report presents a comprehensive overview of facial recognition technologies. Principle Component Analysis (PCA), Linear Discriminant Analysis (LDA), skin color-based algorithms, wavelet-based algorithms, and Artificial Neural Network (ANN) techniques are five algorithms that are recognised due to their broad application. The evaluation takes into account a number of factors, including the size and nature of the database, tolerance to varied lighting situations, differences in facial expressions, and position variations. Please be aware that this study only reviews prior studies and does not offer any new arguments or explanations.

1. **Title: Motion Detection and Face Recognition using Raspberry Pi, as a Part of, the Internet of Things**

This paper describes the creation of an intelligent system for home automation or as a component of a broader Internet of Things (IoT) system that combines face recognition with motion detection. The system makes use of a Raspberry Pi 3 microcomputer and a motion- and face-recognition programme. Cloud storage is used to store the collected data for later processing or archiving. With the help of a battery and a solar panel, the system may be deployed anywhere because it is autonomous and portable. It may be used in healthcare to track the spatial activities of people or animals as well as to monitor patients in real-time. The system, in its entirety, functions as a part of the IoT ecosystem, offering intelligent solutions for diverse

1. **Title: Face Recognition in Mobile Devices**

This study examines the use of facial recognition algorithms on mobile devices and the expanding demand for mobile device security. Human traits including fingerprints, faces, hand shapes, voices, and iris are used for authentication in place of conventional password-based methods in an effort to increase security. The suggested method makes use of the PCA algorithm with FPIE and DCV on the actual mobile device. Using a limited number of photos, the system's calculations and testing are done on a mobile device. When a suitable threshold is selected, the system's accuracy is reported to be 92%. A face may be recognised in about 0.35 seconds, though this time may increase as the database size expands.

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