A Study of Hand Gesture Recognition Technique

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Abstract *: Hand gesture is the method of the hand movement or the way in which we can identify a hand of an individual and recognition of an individual. Hand Gesture Recognition is the biometric process by which an individual can be identify by the motion of his hand. Hand gesture recognition has a number of applications in feature extraction, machine vision, virtual reality, machine manage in industry etc. In this paper we present the review of hand gesture recognition method and different approaches SVM, Speeded up Robust Feature (SURF).*

1.INTRODUCTION   Recognition of an individual is an important task to identify people. The detection through biometric is a better way because it relate with individual not with in order passing from one place to another. Biometrics was about perceiving those naturally. Basically we verify a set of numbers that are appealing to a specific individual. The definition of Hand Gesture is defined as "Movement of our hand". Hand gesture as a biometric recognition technique used to study in the domains of work station vision. It has developed advantages inside the workstation vision group and various stride measurements have been produced. Hand gesture recognition is an increasing biometric innovation in which individuals are absolutely recognized by the movement of their hand. It has been pulled in advancement as a technique for ID on the grounds that it is not obtrusive and does not oblige the subject's participation. Hand gesture recognition could be utilized from a separation that making it appropriate to recognizing the culprits at a wrongdoing scene. The hand gesture of an individual could be caught at a separation of dissimilar to different biometrics. For example: - fingerprint recognition.

Hand gesture recognition works from the sensitivity that a singular's strolling style is one of a kind and could be utilized for human distinctive proof. In bank situation, just few accepted individuals are allowed to go into lockers room, here tread examination system is utilized, hand gesture movement successions of those approved individuals are put away in bank's database, thusly at whatever point an unapproved individual tries to go into room, his movement of hand won't match with put away groupings and alert framework will be enacted for any activity.

1.1 HAND GESTURE RECOGNITION SYSTEM

This method includes various methods for recognition:

Feature Extractions: This is an essential step in hand gesture recognition. The feature must be robust to in use conditions and should yield good discriminability across individuals. Each hand motion sequence is divided into cycles. Hand gesture cycle is define as person starts from rest, left hand forward, rest, right hand forward, arrangements rest. The stance during hand gesture cycle, Hand gesture cycle is determined by conniving sum of the foreground pixels. At rest position this value is less. By computing range of frames between two rest positions, hand gesture cycle (period) is estimated.

1.2 Matching and Recognition:

Matching and Recognition is the final step of hand gesture-based person identification. Here, input test video sequence is compare with the trained chain in the database. In general, minimum distance classifier may be used for hand gesture recognition. In the training, after parallel processing of two training processes, spatial and temporal templates are extracted. Test sequences are pre-processed by template extraction and projection.

1.3 Model based approach:

Model-based methodologies utilize models whose parameters are controlled by handling of stride groupings (paired shapes). These systems are scale, view invariant and oblige great quality feature arrangements. In this methodology human outline is partitioned into neighbourhood areas relating to distinctive human body parts, and ovals are fitted to every area to speak to the human structure.

HANAVAN MODEL: The statistical human body model planned by Hanavan's. This was initially try by Miller & Morrison. The stalk was divided into three segment at the omphalion (navel) and xyphion level upper (elliptical Column), middle (elliptical solid) and lower (elliptical column). The hand was distinct as an ellipsoid of revolution. The foot was defined as an elliptical solid with base (proximal end) being circular. The thigh was defined as an elliptical solid with top (distal end) being circular. A total of 41 anthropometric parameters need to be measured in this model.

Speeded Up Robust Features (SURF features) is a vigorous local feature identifier. It was representing by Herbert Bay .that could be utilize within machine vision activities like item distinguishment or 3D imitation. It is partly encouraged by the filter descriptor. The standard demonstration of SURF is a duo times snappier than SIFT and ensured by its inventors to be more able against conflicting picture transformation than SIFT. The most precious property of a concentration point detector is its repeatability. The repeatability expresses the dependability of a detector.

Support vector machine (SVM) The Support Vector Machine is a state-of-the-art classification method .The SVM classifier is usually utilize as a part of bioinformatics (and different orders) because of its intensely exact, ready to figure and procedure the high-dimensional in sequence, for example, gene interpretation, and edibility in display assorted well springs of data . SVM is fit in with the common class of piece systems. A piece system is a computation that relies on upon the information just through spot items. At the point when this is the situation, the dab item could be supplanted by a bit capacity which registers a spot item in some possibly high dimensional peculiarity space. This has two points of concern: First, the ability to create non-direct choice limit utilize routines intended for straight classifiers. Second, the utilization of bit capacity permits the client to apply a classifier to Data that have no evident settled dimensional vector space demonstration. The double SVM issue give us a chance to find the supreme idea of vector. Identically, the compare qualities are non-zero. Consequently, the help vectors are the "vital" prepare focuses, and the purpose of preparing is to uncover them.

2. LITERATURE REVIEW

This block described the research work that has been done in recent years. Image compression is the ultimate favourable field of research in which assemble the interest of all analysts. A literature review goes beyond the inquiry of report or knowledge and it relates the recognition and connection of relationships among the literature and research field.

D.K. Vishwakarma,Rajiv Kapoor and Rockey Maheshwari "et.al" [1] —In this paper, a simple and effective move

toward for the recognition of hand gestures from very low resolution images was projected. Improvement of the low resolution images has always been the focus in the dispensation of the digital images. Images with declaration as low as [50×50 pixels] are also taken for recognition. The gestures under thought here were the number of fingers (one, two, three, four or five) increased by the person. The less resolution gesture picture capture from mobile phone, web camera, or low cost cameras was processed methodically to amount produced the number of fingers raised. Simple logic of the geometry of the hand has been used for the identification of hand gesture from the input low declaration images. The projected method extracts the hand gesture directly from the low resolution image without the need of renovation to a high resolution image or use of any classifier. The proposed method is based on the creation of a mask for the image which was vital in the recognition of the hand gesture recognition.

Dhanashree Pannasa "et.al" [2] Almost all purchaser electric apparatus equipment today utilizes isolated controls for user interfaces. Although, the type of individual types and focused directions that each isolated order distinctiveness furthermore raise many Problems: the adversity in locating the needed inaccessible command, the disorder with the button design, the substitution topic and so on. The buyer electronics domination design utilizes hand signs was a new inventive client interface that resolves the problems of using many inaccessible controls for household machines. We advise such a method for automatically identify a restricted set of signs from hand resemblance for electronics equipment command purpose by means of straddling consecutive facts and figures outcome from PC to wireless device manager circuits. Hand gesture recognition was a challenging difficulty in its universal form. We address a fixed set of physical commands and a logically organised natural situation, and go forward an easy, yet productive, method for sign recognition.

Sakshi Gupta and Sushil Kumar "et .al" [3]   Human gesture recognition was an stimulating research area. Hand gesture recognition could have marvellous applications in Human Computer interface .The mouse and keyboard were presently the main interface between man and computer. There was a need of mechanized hand that could perform events like human hand in real time application, as it was not probable for human to reach up to every object due to not easy environment. In other areas where 3D series was required, such as computer games, robotics and design, other mechanical strategy such as roller-balls, joysticks and data-gloves were used. User would perform gesture according to the act as he wanted to be done by robotic hand. The capability to recognize human gestures open up a broad range of probable applications such as automatic identification of sign language to make possible communication with the hearing impair, using gestures as input to explain the sentiment of a gesturing person. A variety of researchers was proposed unlike approach for real time gesture recognition

3. METHODOLOGY

The methodology is defined as the steps followed for performing the proposed research work.

METHODOLOGY

Here, the method of the projected work for the hand gesture recognition system is explained. Firstly the phases of the hand gesture recognition system are explained and then the algorithms used in the method are explained. Figure 4.1 explains the methodology, algorithms techniques that are used to implement this work.

Background Subtraction: The background subtraction process is the common method of movement of hand detection. It is a technique that uses the difference of the current image and the background image to detect the hands movement region. Its calculation is simple and easy to implement.

Median filtering: After background subtraction, median filtering is used to remove noise. Median filter perform 2d average sifting. The Median Filter block replaces the central value of an M-by-N neighbourhood with its median value. On the off chance that the area has a focal point component, the piece puts the average esteem there. Average separating can likewise do with the assistance of dialog box. The Main sheet of the If you choose same as input port I, the output has the same dimensions as the input to port.

4. EXPERIMENTAL RESULTS

The usefulness and accurateness of any work done could only be judge by its results and outputs generate. Depending on the kind of system used and its applications there are many parameters, basis on which a method is accepted or rejected. This effectiveness could be calculated only when the system runs on different datasets and values of different parameters are recorded and further used to deduce the net results.

Notwithstanding the way that we are getting ensuring results with the proposed philosophy, it must be upgraded for generous data bases. Thus Hand gesture is less unobtrusive biometric; which offers the possibility to identify people at a distance, without any interaction or co-operation from the subject; this is the property which makes it so attractive.

PARAMETERS USED FOR EVALUATION

As the thesis work is based on matching, the parameters that could be calculated for evaluating the efficiency of the system are:

CCR (Correct Classification Rate)
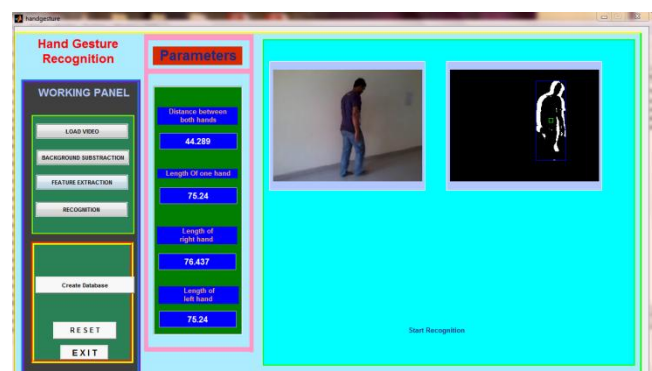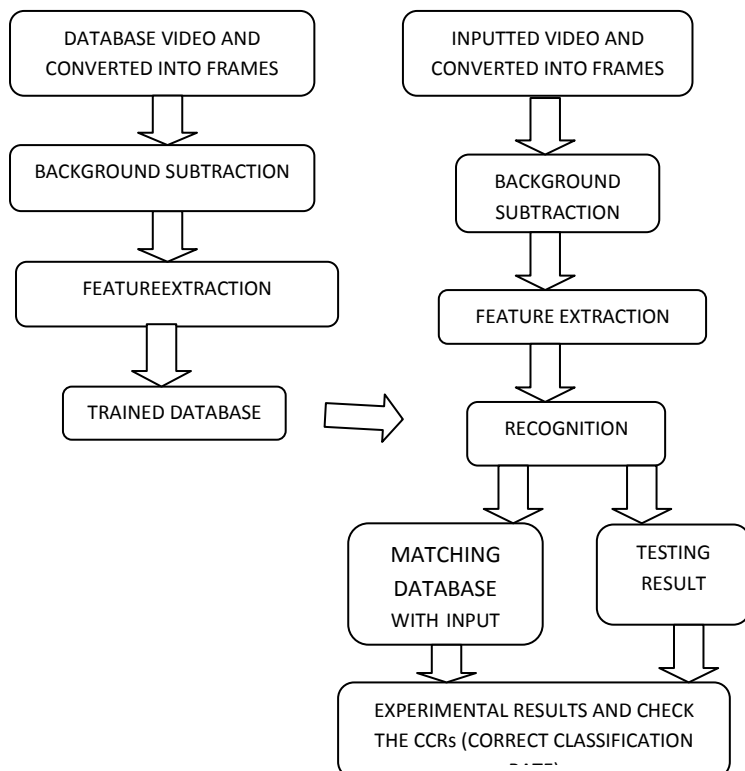
SVM (support vector machine)

Surf Feature

Fig. Various Parameters of input video are calculated

Parameter are calculated in order to extract the four features of the Hanavan's model Distance between both hands, Length of one hand, Length of right hand, Length of left hand, Height of person .
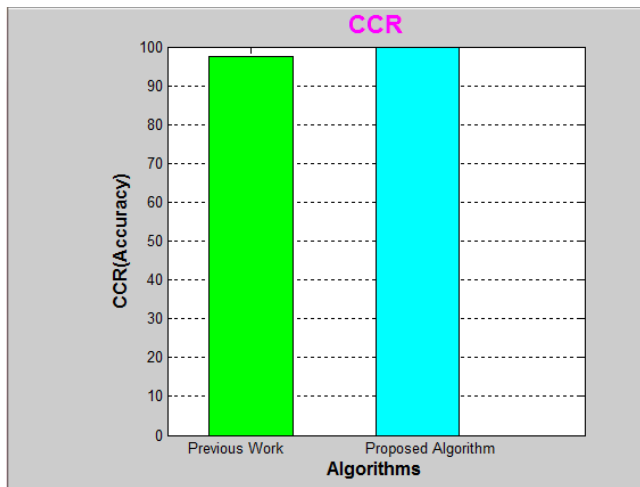
Flowchart boxes (left diagram):

```
DATABASE VIDEO AND
CONVERTED INTO FRAMES
        ↓
BACKGROUND SUBTRACTION
        ↓
FEATUREEXTRACTION
        ↓
TRAINED DATABASE
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INPUTTED VIDEO AND
CONVERTED INTO FRAMES
        ↓
BACKGROUND
SUBTRACTION
        ↓
FEATURE EXTRACTION
        ↓
RECOGNITION
   ↓         ↓
MATCHING     TESTING
DATABASE     RESULT
WITH INPUT
   ↓         ↓
EXPERIMENTAL RESULTS AND CHECK
THE CCRs (CORRECT CLASSIFICATION
```

Figure: Graph of comparison of pervious work and proposed work

Figure: Comparison of CCR between previous and proposed algorithm.
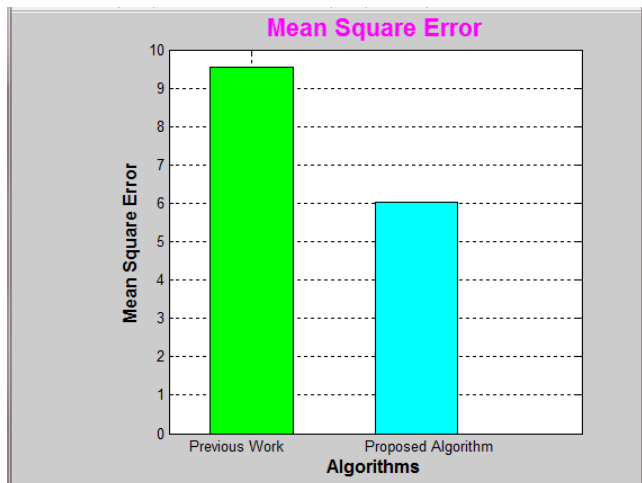
Figure: Graph of comparison of pervious work and proposed work on the basis of MSE

Figure: Comparison of MSE between previous and proposed algorithm
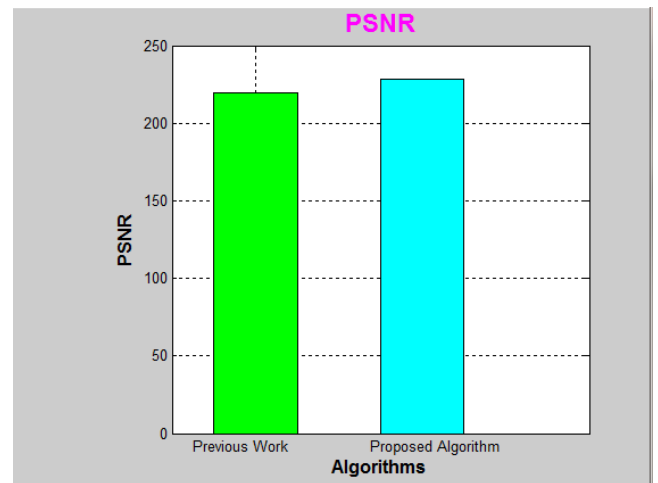
Figure: Graph of comparison of pervious work and proposed work on the basis of PSNR

Figure: Comparison of PSNR between previous and proposed algorithm
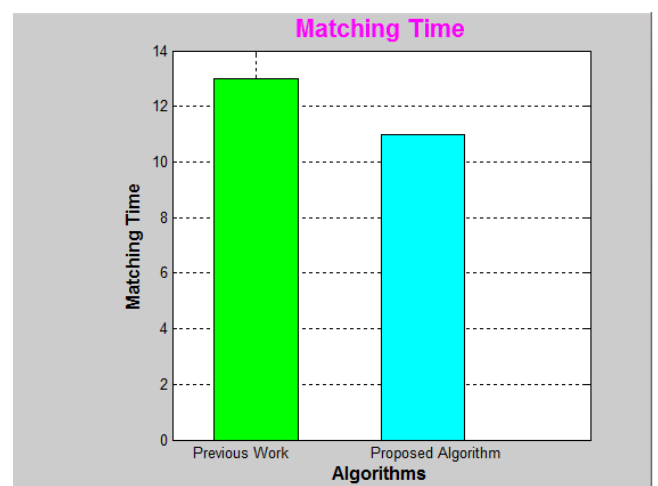
Figure: Graph of comparison of pervious work and proposed work on the basis of Matching Time.

Figure: Comparison of Matching Time between previous and proposed algorithm.

5. CONCLUSIONS

With the increasing demands of visual surveillance systems, human hand identification at a distance has recently gained more interest. Hand gesture is a potential behavioural feature and many allied studies have demonstrated that it has a rich potential as a biometric for recognition. This thesis has described a simple but effective method for automatic person recognition from hand silhouette and hand gesture. Simple feature selection hanavan model reduce the computational cost significantly during training and recognition. These methods have been applied on frames of videos, these videos are live and some from cassia database. In visual observation frameworks, human ID at a separation has as of late picked up more investment. The advancement of workstation vision methods has additionally guaranteed that vision based programmed motion of hand examination might be continuously attained. This proposition has depicted a basic however viable system for programmed individual recognition from the motion of hand.

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