

An Efficient Approach of Hand Gestures from very low Resolution Images

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Abstract - In this paper, an easy and efficient method for the identification of hand gestures from terribly low resolution image is planned. Improvement of the low resolution pictures has consistently been the key focus within the process of the digital pictures. Pictures with resolution as low as [50×50 pixels] are also treated for recognition. The gestures into consideration here are unit amount of fingers (1, 2, 3, 4 or 5) raised by the person. The low resolution gesture image captured from internet camera, portable or low price camera is processed consistently to output the amount of fingers raised. Easy ideas of the pure mathematics of the hand are used for the identification of hand gesture from the input low resolution pictures. The planned methodology extracts the hand gesture directly from the low resolution while not the requirement of reconstruction to a high resolution image or use of any classifier. The planned methodology is predicated on the production of a mask for the picture that is crucial in the identification of hand gesture. This methodology is tested on publically obtainable dataset of Marcel-Triess. The high accuracy of the experimental results shows the excellent performance of the planned methodology of the identification of hand gesture from low resolution pictures.

Keywords: Geometry; hand gesture; mask generation; recognition; low resolution

1.INTRODUCTION The definition of Hand Gesture is defined as “Movement of our hand”. The hand gesture as a biometric recognition technique used to study in the domains of workstation vision. It has developed advantages inside the workstation vision group and different stride calculations have been originated. 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 [13].

We utilize the term Hand gesture recognition to imply the ID of a single person from a feature succession of the subject strolling. This does not imply that the movement of hand gesture is constrained to strolling. Hand gesture recognition as a biometric in whom it might be seen as beneficial over different types of biometric distinguishing proof strategies for the accompanying reasons.

Unobtrusive: The hand gesture of an individual strolling could be concentrated without the client knowing they are. No doubt broke down and without any participation from the client in the data social affair stage dissimilar to fingerprinting or retina filters.

Hand Distance recognition: The hand gesture of an individual could be caught at a separation of dissimilar to different biometrics. For example: - fingerprint recognition.

Reduced details: Hand gesture recognition does not oblige any pictures that have been caught to be of a great not at all like different biometrics. For example: - face recognition, finger print recognition which might be effortlessly influenced by low determination pictures.

Difficult to conceal: The hand gesture of an individual is hard to camouflage by attempting to do so the individual will presumably seem more suspicious with other biometric strategies such as face recognition in which the people face can without much of a stretch be modified or covered up. An individual's biometric features will be affected by certain features such as:

Stimulants – Alcohol and drugs will affect the way a person moves his hand.

Physical changes – An individual throughout pregnancy after a mishap/sickness influencing the leg or after extreme weight pick up/ misfortune can all influence the development normal for a single person.

Psychological – An individual mood can also be affected an individual's hand gesture recognition.

1.1 Support vector machine (SVM)

The Support Vector Machine is a state-of-the-art classification method. The SVM classifier is mostly used as a part of bioinformatics (and completely different orders) due to its deeply actual, ready to figure and process the high-dimensional info, for example, gene interpretation, and edibility in displaying different wellsprings of info. SVM is slot in with the final category of piece systems. A piece system may be a calculation that depends upon the info simply through spot things. At the purpose once this can be the situation, the dab item can be supplanted by a bit capability that registers a spot item in some conceivably high dimensional peculiarity area [19]. This has 2 points of interest: 1st, the potential to form non-direct selection limits utilizing routines supposed for straight classifiers. 2nd, the

employment of bit capabilities allows the client to use a classifier to info that has no evident settled dimensional vector area illustration. The double SVM problem offers us an opportunity to describe the paramount plan of vector. Identically, the analyse qualities are non-zero.

1.2 Speeded Up Robust Features (SURF features):

SURF is a robust local feature detector. It was represented by Herbert Bay. That could be utilized within machine vision undertakings like item distinguish or 3D reproduction. It is partially impelled by the filter descriptor. The standard manifestation of SURF is a couple times snappier than SIFT and ensured by its inventors to be more capable against differing picture transformations than SIFT. The most valuable property of an interest point detector is its repeatability. The repeatability expresses the reliability of a detector. Surf feature is used for matching in their system here we use surf feature to find out the critical points which help us to matching the images more accurately.

2. LITERATURE REVIEW

This section described the analysis work that has been completed in recent years. Image compression is the ultimate favourable field of research within which assemble the interest of all analysts. A literature review goes on the far side inquiry of report or information and it co-relates the identification and affiliation of relationships among the literature and research field.

Dhanashree Pannasa "et.al" [1] Almost all purchaser electric apparatus equipment today utilizes isolated controls for user interfaces. Although, the kind of individual types and useful directions that each isolated order characteristics furthermore increases numerous problem: the adversities in locating the needed inaccessible command, the disorder with the button layout, the replacement topic and so on. The buyer electronics command mean utilizing hand signs was a

new modern client interface that resolved the problem of using many isolated control for household appliances.

Haitham Hasan and S. Abdul Kareem "et .al" [2] The eventual goal is to bring Human PC Interaction to a regime wherever interactions with computers are as natural as associate interaction between humans, and at this end line, assembling gestures in HCI is a vital analysis space. Gestures have long been thought-about as associate interaction technology that may probably deliver additional natural, artistic and intuitive ways for communicating with the PCs. This paper supports a outline of previous surveys wiped out this space and focuses on the various application domain that employs hand gestures for economical interaction.

Sakshi Gupta and Sushil Kumar "et .al"[3] Human gesture recognition was an stimulating examine area. Hand gesture recognition can have incredible applications in Human Computer interface and other robotic machineries. The keyboard and mouse were presently the main interface between man and computer. There was a requirement of robotic hand that can do actions alike human hand in real time applications, as it was not possible for human to attain up to each object due to difficult surroundings In other areas where 3D information was required, such as computer games, robotics and design, additional motorized devices such as roller-balls, joysticks and data-gloves were used, client would do gesture according to the action as he wanted to be done by robotic hand.

Nikhil Thakur , Sachin Sharma and Gunjan Thakur "et. al"[4] Gloves and sensor based trackers were burdensome, uncomfortable to use. For this constraint of these devices the useable command set based diligences was also imperfect. Direct use of hands since an input tool was an inventive process for provided that natural Human Computer Interaction which has its heritage from text- based interface through 2D graphical based interfaces, to full-grown multi-participant effective Environment systems.[5]For conceive a future period of human-computer interaction with the

implementations of 3D application where the client might be capable to move and rotate object basically by rotating and moving his hand - all lacking help of any input device.

Joseph J. Laviola "et.al" [6] This paper surveys the use of hand postures and gestures as a mechanism for interaction with computers, describing both the various techniques for performing accurate recognition and the technological aspects inherent to posture- and gesture-based interaction. First, the technological requirements and limitations for using hand postures and gestures are described by discussing both glove-based and vision-based recognition systems along with advantages and disadvantages of each. Siddharth S. Rautaray and Anupam Agrawal"et.al"[8] As PCs become a lot of pervasive in society, facilitating natural human-computer interaction (HCI) can have a positive impact on their use. Hence, there has been growing interest within the advancement of recent methods and techniques for bridging the human-computer barrier. The last word goal is to bring HCI to a regime wherever interactions with PCs are as natural as associate interaction between humans, and to the present finish, assembling gestures in HCI is a vital analysis space.

Archana S. Ghotkar "et.al" [10] In this paper, we tend to make known a hand gesture identification system to acknowledge the alphabets of Indian Linguistic Communication. In our planned system there are four modules: real time hand following, hand segmentation, feature extraction and gesture recognition. Camshift technique and Hue, Saturation, Intensity (HSV) colour model are employed for hand following and segmentation. For gesture identification, Genetic Algorithmic Formula is employed.

JoyeetaSingha "[14] During this paper, we have planned a system supported KL Transform to acknowledge totally different hand gestures. Foremost the hand is detected utilizing skin filtering and palm cropping was performed to extract out solely the palm portion of the hand. Once palm extraction, the options of hand were extracted using K-L

Transform approach and eventually the input gesture was recognized using correct classifier.

3. METHODOLOGY

The methodology is outlined because the steps followed for operating the planned analysis work. Algorithmic formula manages a candidate Support Vector set. It initializes the set with the nearest couple of points from opposite categories just like the Direct SVM algorithmic formula. As shortly algorithmic formula finds a violating purpose within the dataset it covetously adds it to the candidate set. It's going to happen that addition of the violating purpose as a Support Vector is also prevented by alternative candidate Support Vectors already exist within the set. We have tendency to merely prune away all that points from the candidate set. To ensure that the KKT conditions are fulfilled we have tendency to built continual passes through the dataset till no violators may be found.

Algorithm 1 : Simple SVM

Step 1: Candidate SV = {closest pair from opposite classes}

Step 2: while there are violating points do

Find a violator

Step 3: candidate SV = candidate SV ^S violator

if any $\alpha_p < 0$ due to addition of c to S then

Step 4: candidate SV = candidate SV \ p

repeat till all such points are pruned

Step 5: end if

4. EXPERIMENTAL RESULTS

In this section, we perform experiments to verify the efficacy of our approach. This section is divided into two sub parts which discussed the parameters used and results obtained.

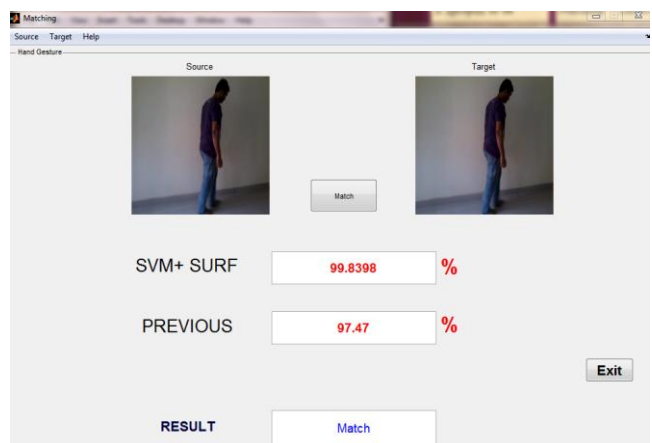
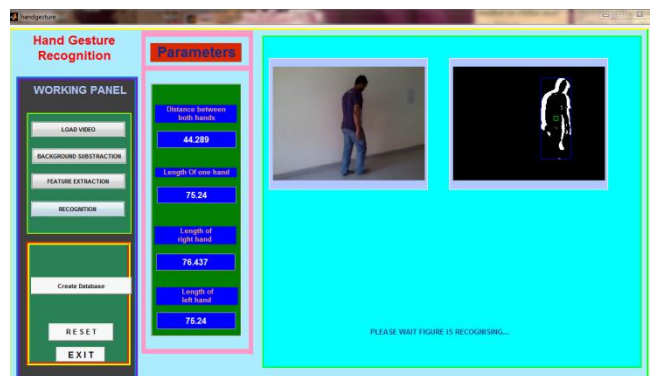
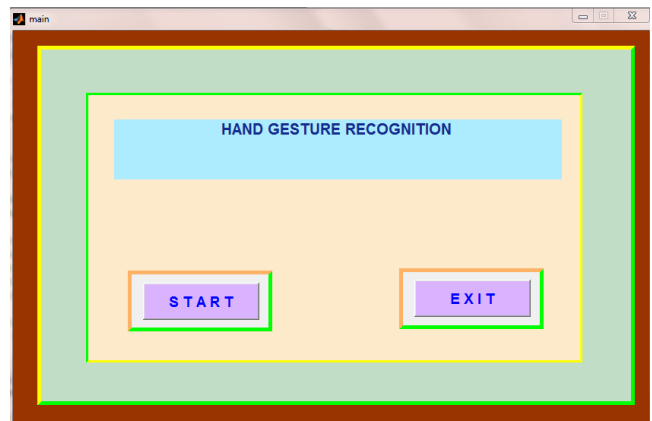
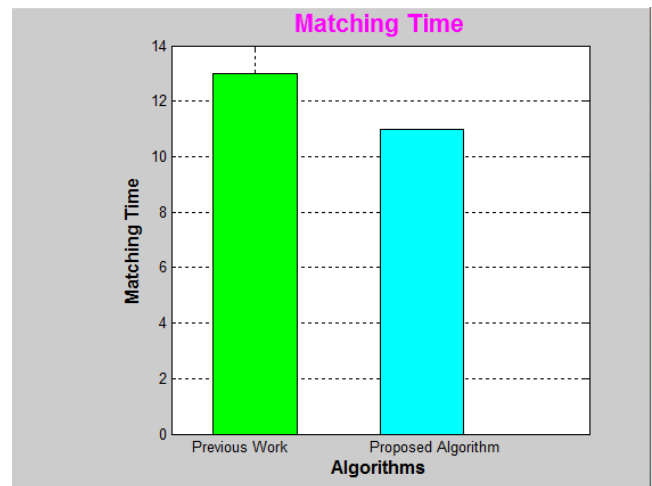
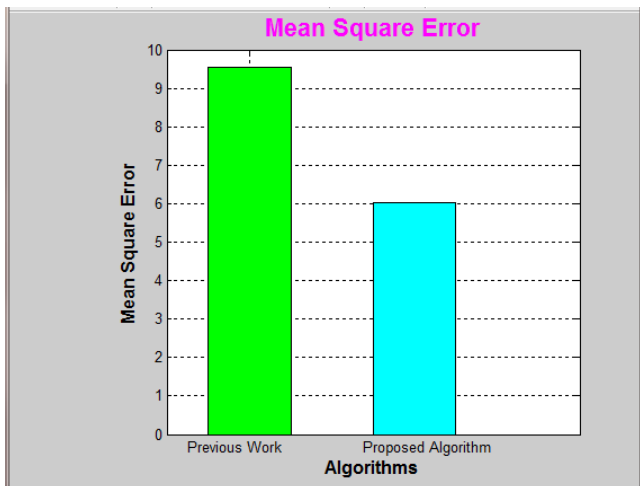


Fig: Results of recognition for the same person
In the first step matching of both the videos is done and after that the CCR is calculated for the combination of two classifiers SURF and SVM.

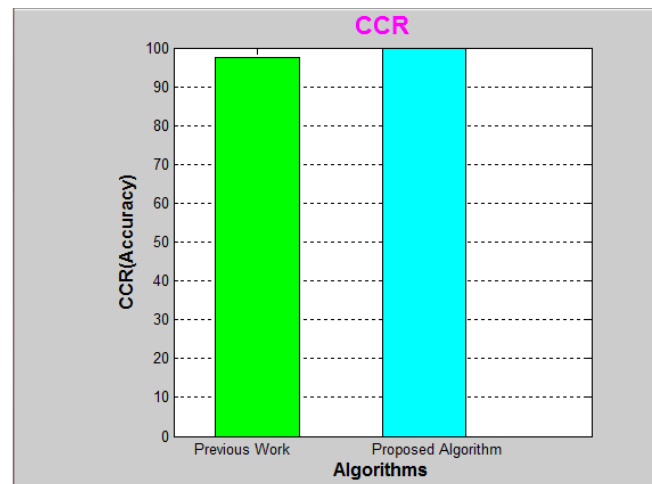
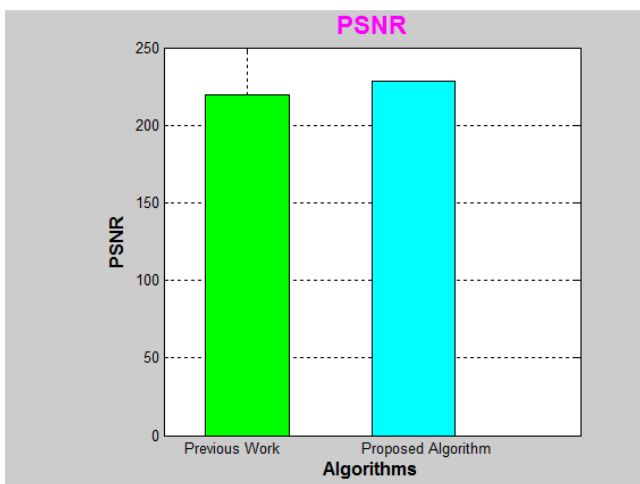


Mean Square Error of our algorithm

	Previous Work	Proposed Work
Mean Square Error	9.5424	6.0206

Matching Time of our algorithm

	Previous Work	Proposed Work
Matching Time	13	11



PSNR of our algorithm

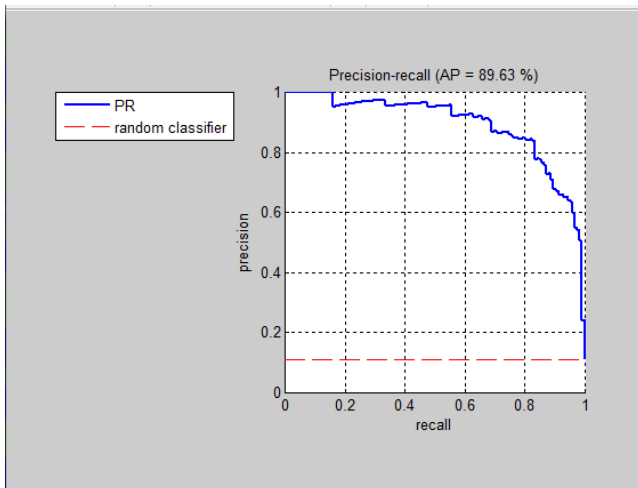
	Previous Work	Proposed Work
PSNR	219.3615	228.6025

Comparison of CCR between Previous and our algorithm

	Previous Work	Proposed Work
CCR	97.4700	99.8398

Fig. Graph of comparison of pervious work and proposed work

Fig. Comparison of CCR between previous and proposed algorithm



5.CONCLUSION

This thesis has described a simple but effective method for automatic hand gesture recognition. The advancement of workstation vision methods has additionally guaranteed that vision based programmed walk examination might be continuously attained. The created model of SVM based selection of training algorithm and setting the different parameter for training. The previous result by using SVM, LDA, BPNN and SURF feature Model has been made for gathering recognition. Effective results have been generated in the research work. . A large number of experimental results have demonstrated the validity of the proposed algorithm.

The future work involves the extension of the same technique by employing various transforms for covering image. Notwithstanding the way that we are getting ensuring results with the proposed philosophy, it must be upgraded for generous data bases. An extensive number of test outcomes have demonstrated the authenticity of the proposed figuring.

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