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A HYBRID APPROACH WITH COMBINATION OF LBP AND SVM FOR FACE EXPRESSION DETECTION

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Abstract: - In this research work, we propose a methodological improvement to raise face expression recognition rate by using SVM (Support Vector Machine) algorithm for representation of face using LBP (Local Binary Patterns). LBP features are originally proposed for text analysis but due to its important property, tolerance of illumination changes make it useful for face expression recognition with SVM classifier. A hybrid approach is developed with combination of SVM classifier and boosted-feature of LBP. The outcome of this approach provide us about expression of selected face, is it sad or happy? The analysis of performance is measured by graph that generate in completion point. This performance is compared with existing expression recognition technique PCA (Principle Component Analysis). We check for the expression is happy? Neutral? Or shocked?

Keyword*:* face recognition, LBP, PCA

I. INTRODUCTION

During 1964 and 1965, Bledsoe, along with Helen Chan and Charles Bisson, worked on using the computer to recognize human faces (Bledsoe 1966a, 1966b; Bledsoe and Chan 1965). He was proud of this work, but because the funding was provided by an unnamed intelligence agency that did not allow much publicity, little of the work was published. Given a large database of images (in effect, a book of mug shots) and a photograph, the problem was to select from the database a small set of records such that one of the image records matched the photograph. The success of the method could be measured in terms of the ratio of the answer list to the number of records in the database [19].

By about 1997, the system developed by Christoph von der Malsburg and graduate students of the University of Bochum in Germany and the University of Southern California in the United States outperformed most systems with those of Massachusetts Institute of Technology and the University of Maryland rated next. The Bochum system was developed through funding by the United States Army Research Laboratory. The software was sold as ZN-Face and used by customers such as Deutsche Bank and operators of airports and other busy locations. The software was "robust enough to make identifications from less-than-perfect face views. It can also often see through such impediments to identification as moustaches, beards, changed hair styles and glasses—even sunglasses."

II. SUPPORT VECTOR MACHINE (SVM)

Support Vector Machines (SVM's) are a relatively new learning method used for binary classification. Hyper-plane can be finding with a very simple idea which separates the d-dimensional data

perfectly into its two classes. No linear separation in data, SVM's introducing the notion of a \kernel induced feature space" which casts the data into a higher dimensional space where the data is separable. Typically, casting into such a space would cause the problems solved and over fitted. The key insight used in SVM's is that the higher-dimensional space doesn't need to be dealt with directly, above concern is stopped. Furthermore, the VC-dimension (a measure of a system's likelihood to perform well on unseen data) of SVM's can be calculated. Theoretically SVM can well- founded, and has shown to be successful in practical. Regression tasks can be solved by using extension in SVM's (where the system is trained to output a numerical value, rather than \yes/no" classification).

Support vector machine classifier is used to make segments of selected data on the basis of images, emotions and simple text. Input data is presented in two sets of vectors in n-dimensional space, a separate hyper-plane is constructed in space due to which margin between two data sets maximize. There are many hyper-plane exist for classify data but we have to find that hyper-plane which provide maximize margin between two data sets. Due to set of support vectors, risk for structure is minimizes. This is n-dimensional hyper-plane where define n is number of features of input vectors, that is necessary to define boundary of classes. Binary classes are required to classify training data. Main goal of performance for SVM is to minimize risk of structure. By a training example as given (a1, b1), (a2, b2) …. (an, bn), positive and negative examples separated by hyper-plane. If a point a1 exists on hyper-plane then it satisfies: (w. a1) + d = 0 where d represents distance from origin and w is normal to hyper-plane. There is shortest distance between negative and positive examples define by margin of hyper-plane. A kernel function is used to fit data on hyper-plane. We cannot directly fit data on hyper-plane without SVM mechanism. User provides a function like a line, polynomial which select support vector along surface of this function. "Curse of dimensionality" is main property that is used to avoid upper bound on VC-dimension.

III. LOCAL BINARY PATTERNS (LBP) – FEATURES

The original LBP operator was introduced by Ojala et al. [22], and was proved a powerful means of texture description. The operator labels the pixels of an image by thresholding a 3 x 3 neighborhood of each pixel with the center value and considering the results as a binary number (see Fig. 3.5 for an illustration), and the256-bin histogram of the LBP labels computed over a region is used as a texture descriptor. The derived binary numbers (called Local Binary Patterns or LBP codes) codify local primitives including different types of curved edges, spots, flat areas, etc (as shown in Fig. 3.6), so each LBP code can be regarded as a micro-texton [23]. The limitation of the basic LBP operator is its small 3 x 3 neighborhood which cannot capture dominant features with large scale.

In many texture analysis applications it is desirable to have features that are invariant or robust to rotations of the input image. As the LBPP, R patterns are obtained by circularly sampling around the center pixel, rotation of the input image has two effects: each local neighborhood is rotated into other pixel location, and within each neighborhood, the sampling points on the circle surrounding the center point are rotated into a different orientation. Another extension to the original operator uses so called uniform patterns [22].

For this, a uniformity measure of a pattern is used: U ("pattern") is the number of bitwise transitions from 0 to 1 or vice versa when the bit pattern is considered circular. A local binary pattern is called uniform if its uniformity measure is at most 2.

IV. PROBLEM STATEMENT

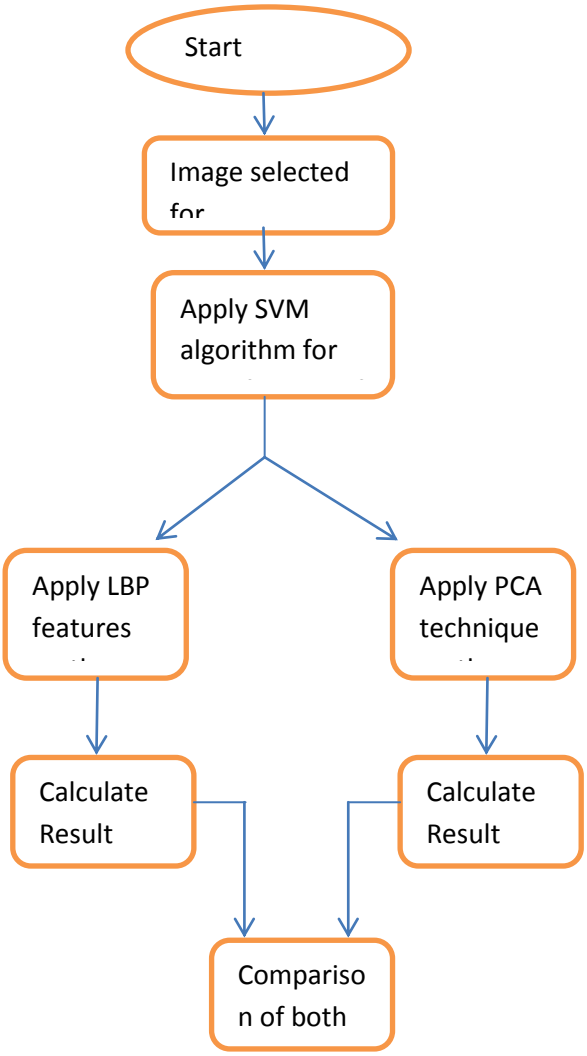
Among the different biometric techniques facial expression recognition may not be the most reliable and efficient but it has several advantages over the others: it is natural, easy to use and does not require aid from the test subject. Properly designed systems installed in airports, multiplexes, and other public places can detect presence of criminals among the crowd. Other biometrics like fingerprints, iris, and speech recognition cannot perform this kind of mass scanning. However, questions have been raised on the effectiveness of facial expression recognition software in cases of railway and airport security. Critics of the technology complain that the London Borough of Newham scheme has never recognized a single criminal,

despite several criminals in the system's database living in the Borough and the system having been running for several years. "Not once, as far as the police know, has Newham's automatic facial recognition system spotted a live target." Despite the successes of many systems, many issues remain to be addressed. Among those issues, the following are prominent for most systems: the illumination problem, the pose problem, scale variability, images taken years apart, glasses, moustaches, beards, low quality image acquisition, partially occluded faces etc. An additional important problem, on top of the images to be recognized, is how different face expression recognition systems are compared.

V. PROPOSED METHODOLOGY

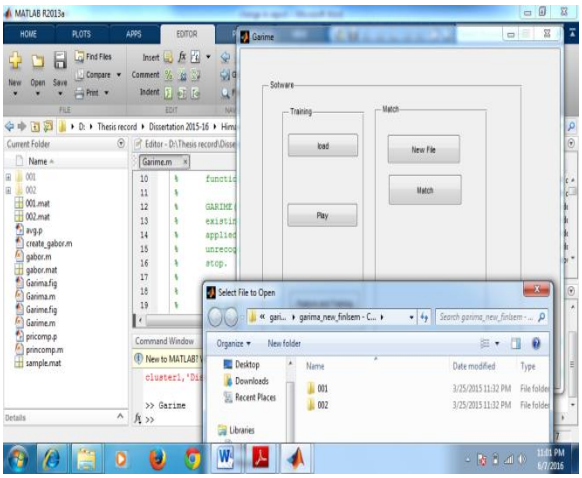
1. First of all we need database of images on which we are going to implement. So upload image in MATLAB tool.
2. Image is classified in small regions for further process. Classification is performed by SVM technique.
3. LBP feature are applied on classified regions for extraction.
4. Now expression for face image is detected as like sad or happy etc. performance is measured by graph.
5. Now an existing technique PCA is implemented on same image for recognition of face expression.
6. A graph represented performance of this technique.
7. A final graph is generated that represent the comparison of both proposed technique and existing technique.
8. In the final step we will come to conclusion that SVM+LBP results are better than PCA results that is existing technique.

VI. FLOW OF PROPOSED WORK

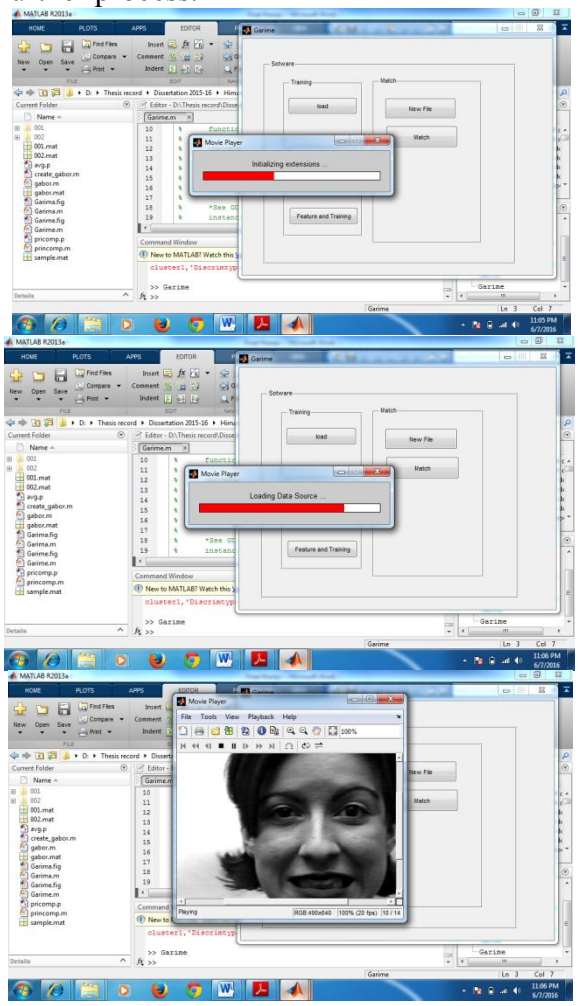


VII. RESULTS

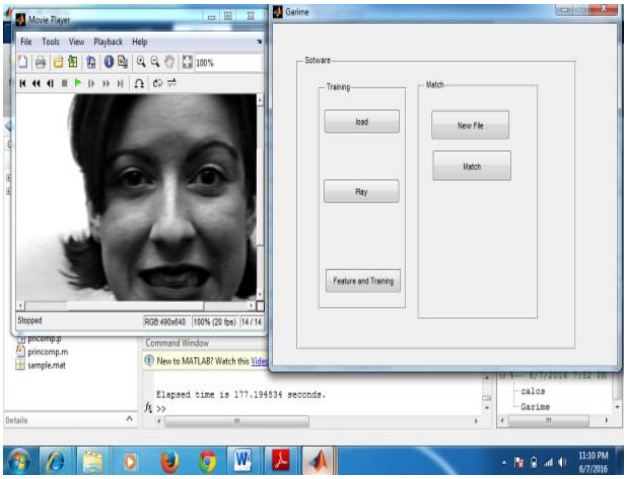
Step 1:- Database of images work as input in our proposed work. So in following window with name 'select file to open' is used to provide path of images for implementation.



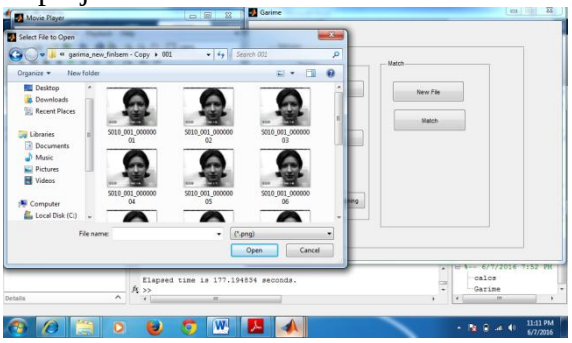
Step 2: features of face images on which base we detect the expression. Following window with name 'Grime' shows some button for further process.



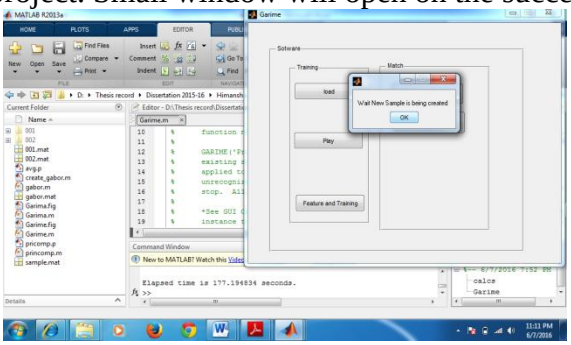
Step 3: A training button shows in window provide the function of training data and a way by follow which results of detection are achieved.



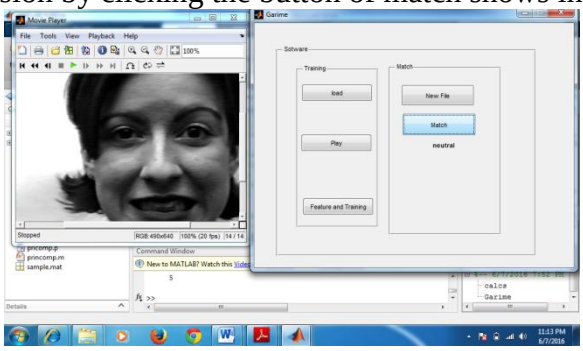
Step 4 Select new files for input of project.



Step 5: Loading of new files in project. Small window will open on the successful loading of images.



Step 6: Detection of face expression by clicking the button of match shows in following snapshot.



VIII. CONCLUSION

As our results represents that face of person is provided as input in system and after applying the both process we find an image that recognized as corresponding to input image. The recognition process with the combination of both techniques is providing better results as compared to existing technique for facial expression recognition. Hence it is proved in result section that we compare performance of proposed technique with existing technique PCA.We will explore temporal information in our future work. Recently volume LBP and LBP from three orthogonal planes have been introduced for dynamic texture recognition, showing promising performance on facial expression recognition in video sequences. Another limitation of the current work is that we do not consider head pose variations and occlusions, which will be addressed in our future work. We will also study the effect of imprecise face location on expression recognition results.

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