

# International Journal of Innovative Research in Science, Engineering and Technology

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## A Face Recognition System Using SIFT and DRLBP Algorithm

Abhishek Kumawat, Rahul Sharama

Research Scholar (DC), RIET, Jaipur, India

Assistant Professor, RIET, Jaipur, India

**ABSTRACT:** A face recognition system is a computer application that recognizes people from digital images or video frames from a video source. One method is by associating images with specific facial features in the face database. Recently, face recognition has received wide attention in the areas of biometrics, computer vision and online multimedia information. Various methods have been used for this purpose. Several people have made comparisons of different facial recognition technologies. But so far, no technology has shown satisfactory results in all conditions. The system proposes a new extension method that uses a local binary state called DRLBP for expansion. Using these methods, a category recognition system is developed that is used for image retrieval. Category recognition is the classification of an object into one of several predefined categories. Discriminant Robust Local Binary Pattern (DRLBP) is used for various object structures and edge contour function extraction processes. It only takes into account the signs of pixel differences and is therefore robust to changes in illumination and contrast. The proposed feature preserves the contrast information for the image pattern. They contain edge and texture information which is ideal for object recognition. Simulation results show that compared to existing methods, the discriminating robust local binary pattern has better discrimination ability and recognition accuracy.

**KEYWORDS:** SIFT, DRLBP, Feature Descriptors, Feature Detectors

### I. INTRODUCTION

Computer vision and image processing have been one of the most exciting and important research areas of the last three decades. A comprehensive review of all face recognition systems is not an easy task. Therefore, this article discusses only the most useful system clusters. The reasons come from the need for automatic recognition and monitoring systems, interest in human vision systems for face recognition, and design of interfaces between humans and machines. Face recognition can be used for authentication and recognition. In the face

recognition system, it automatically recognizes the faces in photos and videos. It falls into two categories. Face Verification or Face Verification b. Face Recognition or FaceRecognition For face verification or identity verification, there is a one-to-one similarity, and a query face image is associated with a template face image that requires protection of its identity. In face recognition or recognition, there is a similarity-to-many similarity that associates a query face image with all template face images in a database to determine the identity of the query face image. Another facial recognition scheme involves checking watchlists where a query page is matched with a list of suspicious objects. Since the development of the first automatic face recognition system, the performance of the face recognition system has improved significantly [1]. Recognition of a person through their facial image can be accomplished in several ways, e.g. By capturing an image of a face in the visible spectrum using a cheap camera or an infrared mode that emits heat from the face. Visible light face recognition typically uses various cameras in the visible light system to model key features of the central part of the face image, extract features that do not change over time from the recorded image, and avoid surface features such as facial expressions or hair. Several methods for modeling face images in the visible spectrum are Principle Component Analysis (PCA) [2], Local Property Analysis, Neural Networks [3], Multi-

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Resolution Survey, and so on. Challenges in face recognition in the visible spectrum include reducing effects of variables. Lightning and discover mask or photo. Some face recognition systems may require stationary or posing users to capture images through many systems, although many systems use a real-time process to detect a person's head and automatically locate the face. The main benefits of face recognition are that it is non-invasive, hands-free, continuous and accepted by most users

Access to restricted systems is mostly controlled by knowledge-based (password, password) or token-based (ID card) security. However, these traditional identity management techniques can easily fail when passwords are stolen or briefly lost. There is an urgent need for biometrics to tackle these issues. Biometrics uses physical or behavioral characteristics to identify individuals. These characteristics are what you have, not what you know, and therefore provide a natural, reliable and user-friendly identity management solution [33, 45]. Face recognition is one of the most widely used biometric systems due to its non-invasive, natural and user-friendly properties. Many advanced facial recognition technologies and commercial systems have been developed. These are summarized in

**Face recognition system** The face recognition system can be a verification system or a recognition system depending on different applications. In the authentication system, there is a set of pre-registered templates. Given a query image, the goal is to determine if the query image is from the same person represented by the alleged target template. It performs a one-to-one comparison to determine if the person showing up for the system is who she / he claims to be. For the face recognition task, we use the Kepenekci method based on SIFT, which combines an effective SIFT algorithm and an adaptive algorithm. Kepenekci kampe. This algorithm was chosen because, as mentioned earlier, it is significantly better than other methods, especially for real, lower quality data. Note that the above changes do not affect the applicability of the original Kepenekci method. Furthermore, this method is not limited by image resolution

The face Recognition System is mainly used for major security measures and user authentication. Faces are easy to recognize, but automatic recognition of faces by machines is a difficult and complex task. Furthermore, humans may not always convey the same expression. The expression of his face changed coincidentally with his mood. Therefore, it becomes more challenging to compare facial expressions under different emotions with neutral facial expressions stored only in the database. Many methods for face recognition have been proposed. SIFT has properties that match different images and objects [1]. The SIFT algorithm extracts interesting key points from images to generate feature descriptions. These extant functions are constant for orientation, scaling, light changes and refining transformations. Therefore, they are very suitable for facial descriptions [2].

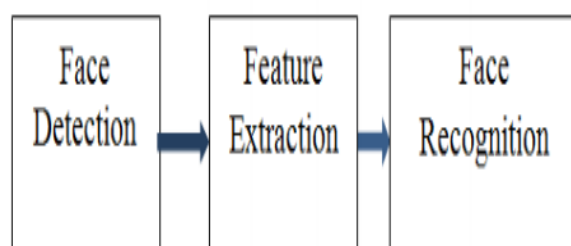


Fig.1 SIFT Block Diagram

Face detection is defined as the process of extracting faces from a scene so that the system can positively recognize a particular image area as a face. It has many applications, such as face tracking, expense estimation or compression. Feature extraction, on the other hand, is often used to retrieve relevant facial features from the data, such as facial regions, changes, angles, or sizes. There are other applications at this stage, such as facial feature tracking or emotion recognition. Choosing appropriate features plays a crucial role in the performance of face recognition algorithms [82]. In the end, the system recognized faces. This phase involves comparison methods, classification algorithms and accuracy measures.

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## II LITERATURE REVIEW

Many prior imaging methods discard low-frequency components in images to extract illumination variance for face recognition. However, this method can cause distortion of the processed image and does not work well under normal lighting. Although 3D face imaging is becoming more and more popular, many 3D face imaging systems have significant noise components. If meaningful recognition results are needed, these noise components must be reduced through post-processing. Biometric image recognition is the process of examining the closest matching area between images. Identify the spatial pixels (pixels) in the image. Attempts to identify two different biological properties, fingerprints and facial images. One of the biggest challenges facing the current face recognition technology (FR) is the difficulty of handling different positions and lighting. In this article, we propose three new techniques, namely. Face recognition (FR) under changing lighting conditions and positions is extremely challenging. This article proposes a new method to improve the performance of the FR system. It uses a unique combination of active lighting equalization (AIE) and image grinding (IS). As the background, posture and lighting change, the appearance of the face will be sharp. change. Changes to these conditions make face recognition (FR)

**E.Rajinikanth et.al** The detection of human face from images plays a vital role in Computer vision, cognitive science and Forensic Science. The various computational and mathematical models, for classifying face including Scale Invariant Feature Transform (SIFT) and Dominant Rotated Local Binary Pattern (DRLBP) have been proposed to yield better performance. This paper proposes a novel method of classifying the human face using Artificial Neural Network. This is done by pre-processing the face image at first and then extracting the face features using SIFT. Then the detection of human faces is done using Back Propagation Network (BPN). The process of combining

**Kishore et.al** The choice of a face database should solemnly depend on the problem to be solved. In this research work, we use the Face Recognition Technology (FERET) database to address the challenge of face pose variations. The Scale Invariant Feature Transform (SIFT) is used to represent these face images in the database. SIFT has been proven to be a robust and a powerful method for general object detection in the past years. This method is now popular in the field of face recognition for purposes of extracting key points which are scale and orientation invariant from the face image. This work demonstrates that through extracting SIFT features from different face image patches and at different sigma  $\sigma$  values, a face pose can be classified towards better pose invariant face recognition.

**W. Sylvia et.al** In recent days, a number of face recognition and authentication mechanisms are developed in the computer vision applications. The human faces may be obstructed by other object that makes the acquisition of fully holistic image processing as a complex task. To overcome this problem, a new partial face recognition system is introduced in this paper. This work includes the pre-processing, face detection, feature extraction and classification tasks. At first, the given face image is pre-processed by using the Gaussian filtering technique, which efficiently removes the noise and smoothens the image. Then, the Viola Jones algorithm is implemented to detect the face from the filtered image. Here, the Scale Invariant Feature Transformation (SIFT) technique is employed to extract the features for better classification. After that, the Robust Point Set Matching (RPSM) technique is used to align the probe partial face to gallery facial images even with the presence of occlusion, random partial crop and exaggerated facial expression. Finally, the Probabilistic Neural Network (PNN) classification technique is developed to classify the given face image. The experimental results evaluate the performance of the proposed face recognition system in terms of sensitivity, specificity, accuracy, precision and recall.

**T. Kamalaharidharini et.al** In recent days, there has been increasing need for recognition of unconstrained face images, such as those collected from the web or captured by mobile devices and video surveillance cameras. In such real world scenarios, human faces could be easily occluded by other objects that make the face recognition task as a complex one. Satisfactory performance has been achieved earlier but often only in the controlled environments. But it is very tedious to obtain holistic face images for unconstrained face recognition. Thus, in order to avoid the degradation of face images and the huge variations due to illumination, pose, occlusion and expression, a new Robust Face

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Recognition approach is proposed. In this approach, the partial face recognition using Scale Invariant Feature Transform (SIFT) technique is combined with Multi-directional Multi-level Dual Cross Patterns (DCP) technique that makes the recognition task as a robust one when compared to other face recognition approaches. Then,

the Robust Point Set Matching (RPSM) is used to match the corresponding stable keypoints from both the gallery image and probe face image. Finally, PNN and K-NN classification are used to classify the face images even with the presence of occlusion, random partial crop, illumination, pose and exaggerated facial expression. The proposed robust face recognition system is evaluated based on the performance parameters such as sensitivity, specificity, accuracy, precision and recall.

**S. R. Khot et.al** An image matching algorithm is present in this paper. A set of interest points known as SIFT features are computed for a pair of images. Every key point has a descriptor based on histogram of magnitude and direction of gradients. These descriptors are the primary input for the image correspondence algorithm. Initial probabilities are assigned for categories considering a feature point assignment to one of the category as a classification problem. For selecting the neighbours for the left key point, a fixed number of pixels around the key point, considered as a window, are selected. The neighbours of the right key point are based on inspection of pair of images and the disparity range. The probabilistic estimates are iteratively improved by a relaxation labelling technique. The neighbour key points which will contribute to improve the probability is based on consistency property.

### III. PROPOSED APPROACH

The SIFT algorithm can be divided into two main modules, which are a key point detection module and a descriptor generation module. The SIFT algorithm is mainly divided into four main steps:

Key point Descriptor

Scale-Space Extrema Detection

Key point Localization

Orientation Assignment

This is the first phase of detecting points of interest (ie key points in the SIFT framework). In this step, different values are applied to the Gaussian filter, and then successive Gaussian blurred images are differentiated. Then, the largest or smallest keyboard appears on multiple scales. Specifically, DoG for the image is expressed as

$$D(x, y, \sigma) = D(x, y, k_1\sigma) - D(x, y, k_2\sigma) \quad (1)$$

Where  $L(x, y, k\sigma)$  is the convolution of the image and the image is represented as  $I(x, y)$  and its Gaussian blur is  $G(x, y, k\sigma)$  at scale, i.e;

$$L(x, y, k\sigma) = G(x, y, k\sigma) * I(x, y) \quad (2)$$

Hence a Dog image between scales  $k_1\sigma$  and  $k_2\sigma$  is the difference of the Gaussian blurred images at scales  $k_1\sigma$  and  $k_2\sigma$ . The Gaussian blur is applied at different scales and the convolved images are grouped by octave. Fixed number of convolved images is obtained and DOG is calculated from that images.

**Key point Localization** The selected key points have high contrast. The DOG scale space feature and the Taylor expansion of the candidate's key points is the origin. Representations and modules M4 and M5 are used for identification purposes only. The last point is that each module should be used separately to create a different facial treatment system

The SIFT algorithm locates points in the image that have constant scaling and motion. These points are represented by direction-invariant function vectors. An efficient algorithm can extract a large number of functions from typical images. These features are very distinctive. Therefore, the probability that a single function matches a large feature

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database is correct . The SIFT function is usually used for object recognition, but is hardly used for face recognition. The SIFT function is constant for changes of zoom, rotation, translation and lighting. The SIFT algorithm consists of four steps: detection of extreme value, removal of key contrasts of key points, direction assignment and descriptor calculation

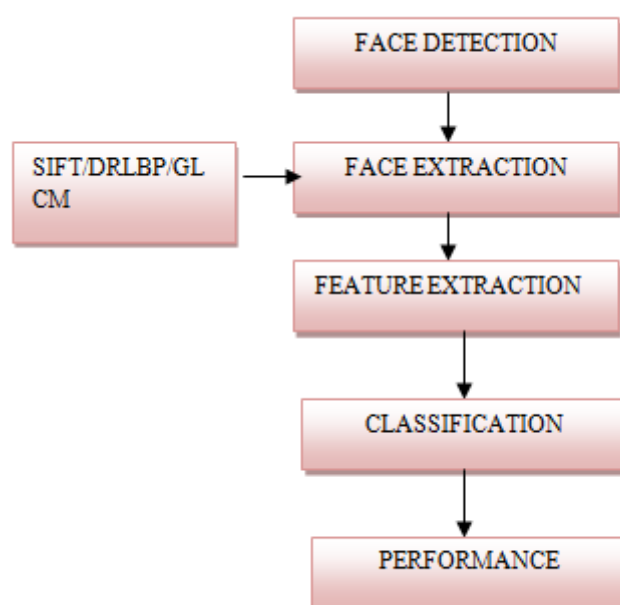


Fig2 proposed flow chart

## iv. CONCLUSION

In this paper we introduced a method to Face Use extraction of DRLBP and SIFT function for recognition. This feature is available for ATMs and multiple home military services. The idea comes through the investigation of criminals, which can help police identify criminal faces. This article is used to find the number of right faces and identify the number of wrong faces. Therefore, they found that the accuracy of the image was 99%. We propose a framework that can use the dominant rotating local binary pattern and scale-invariant facial recognition extraction to detect whether the person is real or unapproved. Therefore, with the help of parameters such as sensitivity, specificity and accuracy it can be done by matlab simulation

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