

A  
Dissertation  
On  
**Illumination Invariant Adaptive Face Recognition using SIFT**

Submitted in Partial fulfilment of the requirement  
For the award of the degree of

**MASTER OF TECHNOLOGY**

**In**

**(Signal Processing and Digital Design)**



Submitted by

**Kritika Choudhary**

**Roll No. 2k11/spd/08**

Under the Guidance of

**Dr. Nidhi Goel**

**(Assistant Professor)**

**DEPARTMENT OF ELECTRONICS & COMMUNICATION  
ENGINEERING**

**DELHI TECHNOLOGICAL UNIVERSITY**

**BAWANA ROAD, DELHI- 110042**

**July 2012**

## DECLARATION BY THE CANDIDATE

Date: \_\_\_\_\_

I hereby declare that the work presented in this dissertation entitled “**Illumination Invariant Adaptive Face Recognition using SIFT**” has been carried out by me under the guidance of **Dr. Nidhi Goel**, Assistant Professor, Department of Electronics & Communication Engineering, Delhi Technological University, Delhi and hereby submitted for the partial fulfillment for the award of degree of Master of Technology in Signal Processing & Digital Design at Electronics & Communication Department, Delhi Technological University, Delhi.

I further undertake that the work embodied in this major project has not been submitted for the award of any other degree elsewhere.

**Kritika Choudhary**

DTU/M.Tech/08

M.Tech (SP&DD)

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## CERTIFICATE

It is to certify that the above statement made by the candidate is true to the best of my knowledge and belief.

**Dr. Nidhi Goel**

Assistant Professor

Electronics & Communication Department

Delhi Technological University, Delhi-42

**Dated:**\_\_\_\_\_

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**Kritika Choudhary**

2k11/SPD/08

M.Tech (SPDD)

## ABSTRACT

Face Recognition has become an active area of research by computer vision research community. Research in this field has been fuelled by the need for convenient, reliable, efficient, and universal person identification methods as proof of entitlement to services, to counter identity theft, crime, and international terrorism and in forensic investigations. By advancing the feature extraction methods and dimensionality reduction techniques in the pattern recognition applications, number of facial recognition systems has been produced with distinctive degrees of success. Although the existing methods perform well under certain controlled environmental conditions but illumination, occlusion, pose, structural components, facial expression and quality of images are still the challenging problems. Due to such uncontrolled environment, face recognition is still a tough task and there is a need of robust algorithms of face recognition for accurate recognition. Illumination variation greatly reduce recognition rate of automatic recognition system which is identified as intraclass variation between enrolment and identification stages. The effect of variation in the illumination conditions causes dramatic changes in the face appearance, is one of the major challenging problems encountered by a practical face recognition systems. The varying direction and energy distribution of the ambient illumination, together with the 3D structure of the human face, can lead to major differences in the shading and shadows on the face. Approaches to address the effects of varying lighting conditions include pre-processing of face images to normalize intra-class variations and the use of illumination invariant face descriptors. Histogram equalization is a widely used technique in face recognition to normalize variations in illumination. However, normalizing well-lit face images could lead to a decrease in recognition accuracy. The multi-resolution property of wavelet transforms is used in face recognition to extract facial feature descriptors at different scales and frequencies. Motivated by the present scenario, presents an adaptive approach to face recognition to overcome the adverse effects of varying lighting conditions. Image quality measure will be used as the base for adapting the application of global and region illumination normalization procedures. Further SIFT and classifier automated face recognition will be performed.

*Keywords:-* Face Recognition, Histogram Equalization, SIFT, LQ index, GLQ index.

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