

**D. Y. Patil College of Engineering, Akurdi, Pune 411044**

## **Instrumentation & Control Department**

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### **Vision of the Institute:**

Empowerment through Knowledge

### **Mission of the Institute:**

To educate the students to transform them as professionally competent and quality conscious engineers by providing conducive environment for teaching, learning, and overall personality development, culminating the institute into an international seat of excellence.

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### **Vision of the Department:**

**Vision:** Strive for excellence in the multidisciplinary field of Instrumentation and Control Engineering.

### **Mission of the Department:**

#### **Mission:**

- To prepare competent professionals to meet current and future demands of industry, academia and society of multidisciplinary fields of automation.
  - To strengthen collaboration with reputed industries and institutes of global insight.
  - To inculcate the spirit of research and entrepreneurship amongst the students.
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### **Program Specific outcomes of the Department:**

At the end of BE Instrumentation & Control program, students shall be able to:

- Students will have the ability to explore the design, installation & operation of the instrumentation and automation systems used in industries
- Work effectively in a team, carry out multidisciplinary projects, and demonstrate leadership qualities.
- Students should have the capability to comprehend the technological advancements in the usage of modern design tools to analyze and design automation processes for a variety of applications

### **Program Educational Objectives:**

- Core competency in the multidisciplinary field of automation to cater to the industry and research needs.
  - Multi-disciplinary skills, team spirit and leadership qualities with professional ethics, to excel in professional career and/or higher studies in Instrumentation and Control Engineering.
  - Foster lifelong learning skills by exploring technological updates in the automation fields.
  - Prepared to learn and apply contemporary technologies for addressing impending challenges for the benefit of organization/society.
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# **A MINIPROJECT REPORT**

**SUBMITTED BY**

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*in partial fulfilment for project based learning*

*of*

**SECOND YEAR OF ENGINEERING**

*in*

**INSTRUMENTATION AND CONTROL**



**APRIL 2022**

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**in**

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**APRIL 2022**

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We thanks all our staff for kind co-operation for completing mini-project. We also thank our beloved and our friends for this non-stop encouragement.

## **ABSTRACT**

This paper reports the low contrast problem of medical images. The low contrast medical images are incapable to process efficiently. This problem can be overcome by using the image processing and statistical techniques. Contrast stretching and standard logistic is used to stretch the intensity values and to adjust the contrast of the medical image. A logarithmic image processing is used to combine the features of these two techniques. To control the stretching process two parameters are measured and enhancement is processed. To enhance the medical images with better quality linear combination is applied. Finally, parameters like accuracy, PSNR and Brisque are measured. This implementation gives the better results for enhanced medical images compared with other methods.

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# **1.Introduction to Image Processing Using MATLAB**

Image processing is the technique to convert an image into digital format and perform operations on it to get an enhanced image or extract some useful information from it. Image processing is a multidisciplinary field, with contributions from different branches of science including mathematics, physics, optical and electrical engineering. The need to extract information from images and interpret their content has been the driving factor in the development of image processing. MATLAB provides a comprehensive set of reference-standard algorithms and workflow applications for image processing, analysis, visualisation and algorithm development.

**Keywords** — Contrast Enhancement, Medical Images, Image Processing, Statistics.

## **1.1 Existing System:**

The purpose of image enhancement is to process an acquired image for better contrast and visibility of features of interest for visual examination as well as subsequent computer aided analysis and diagnosis. Therefore, we have proposed an algorithm for medical images enhancement. In the study, we used top-hat transform, contrast limited histogram equalization and anisotropic diffusion filter methods. The system results are quite satisfactory for many different medical images like lung, breast, brain, knee and etc. Experiments were performed using NTIMIT corpus, using GMM based SI system accuracies were 70.1% and using hybrid GMM-SVM system the accuracies were increased to 72.4%. In the proposed algorithm, we have implemented the methods; mathematical morphology, anisotropic diffusion filter and CLAHE

respectively. The enhancement process is a preprocessing step for the decision systems. Therefore, in the future the system can be improved for medical detection and diagnosis systems. We are developing this implementation for all medical images.

## **1.2Disadvantages:**

- Low quality of enhanced images
- MATLAB is interpreted language and hence it takes more time to execute than other compiled languages such as C, C++
- It is expensive than regular C or Fortran compiler. Individuals find it expensive to purchase
- It requires fast computer with sufficient amount of memory. This adds to the cost for individuals willing to use it for programming.
- It is difficult to develop real time applications using MATLAB as it sits "on top" of windows.

## **1.3Proposed System:**

Based on the image processing techniques and statistical methods medical images are enhanced. First, we convert the RGB into grayscale image and contrast stretching transformation is applied by stretching the intensity values of the image. Further enhancing process standard logistic is applied. To perform the logarithmic image processing these both techniques are combined and image is processed. Two parameters are calculated to control the stretching process. To improve the enhancement more, a linear combination is utilized. Finally, accuracy, PSNR and Brisque values are calculated. The Brisque value is calculated to check the quality of the enhanced image.



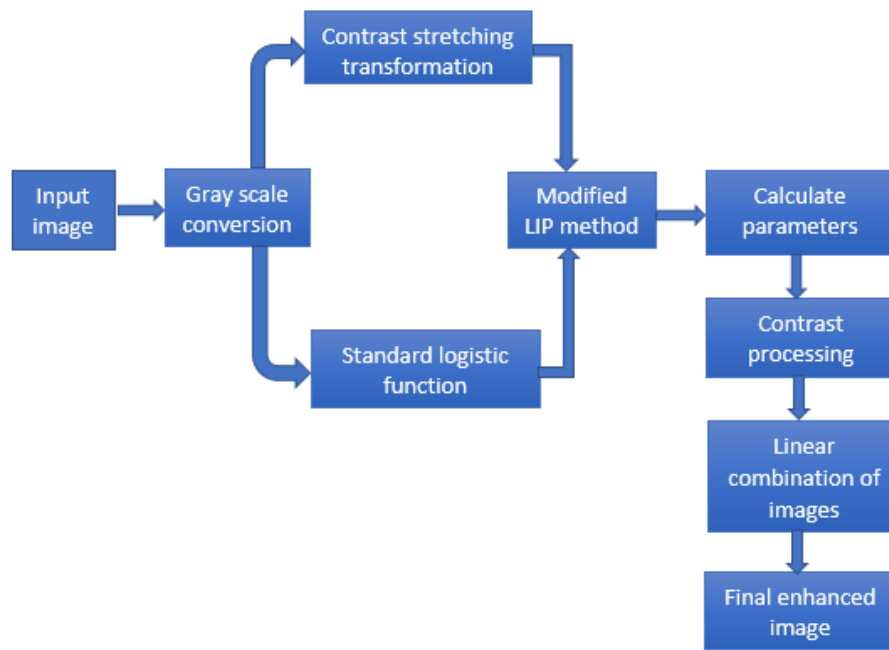


Figure: Block diagram for proposed method.

### 1.3.1 Advantages:

- Gives better enhancement results.
- Quality is more.
- Develop the computational codes easily.
- Debug easily.
- Symbolic computation can be easily done.
- In this GUI Programming is used ,which is faster than normal programming

## 2.Module :

The module used in IMAGE PROCESSING is “ IMAGE PROCESSING TOOLBOX ” which is directly provided by Matlab.

### 2.1 Module Description :

Image Processing Toolbox™ provides a comprehensive set of reference-standard algorithms and workflow apps for image processing,

analysis, visualization, and algorithm development. You can perform image segmentation, image enhancement, noise reduction, geometric transformations, and image registration using deep learning and traditional image processing techniques. The toolbox supports processing of 2D, 3D, and arbitrarily large images.

Image Processing Toolbox apps let you automate common image processing workflows. You can interactively segment image data, compare image registration techniques, and batch-process large datasets. Visualization functions and apps let you explore images, 3D volumes, and videos; adjust contrast; create histograms; and manipulate regions of interest (ROIs).

Many toolbox functions support C/C++ code generation for desktop prototyping and embedded vision system deployment.

## **2.2Applications:**

- Medical applications.
- Space Image Analysis
- Microscopic Biological Tests
- Genetic Variation Detection

## **3.Hardware & Software Requirements:**

### **3.1Software:**

Matlab R2018a or above.

### **3.2Hardware:**

#### **Operating Systems:**

- Windows 10
- Windows 7 Service Pack 1
- Windows Server 2019

- Windows Server 2016

**Processors:**

Minimum: Any Intel or AMD x86-64 processor

Recommended: Any Intel or AMD x86-64 processor with four logical cores and AVX2 instruction set support

**Disk:**

Minimum: 2.9 GB of HDD space for MATLAB only, 5-8 GB for a typical installation

Recommended: An SSD is recommended a full installation of all Math Works products may take up to 29 GB of disk space.

**RAM:**

Minimum: 4 GB

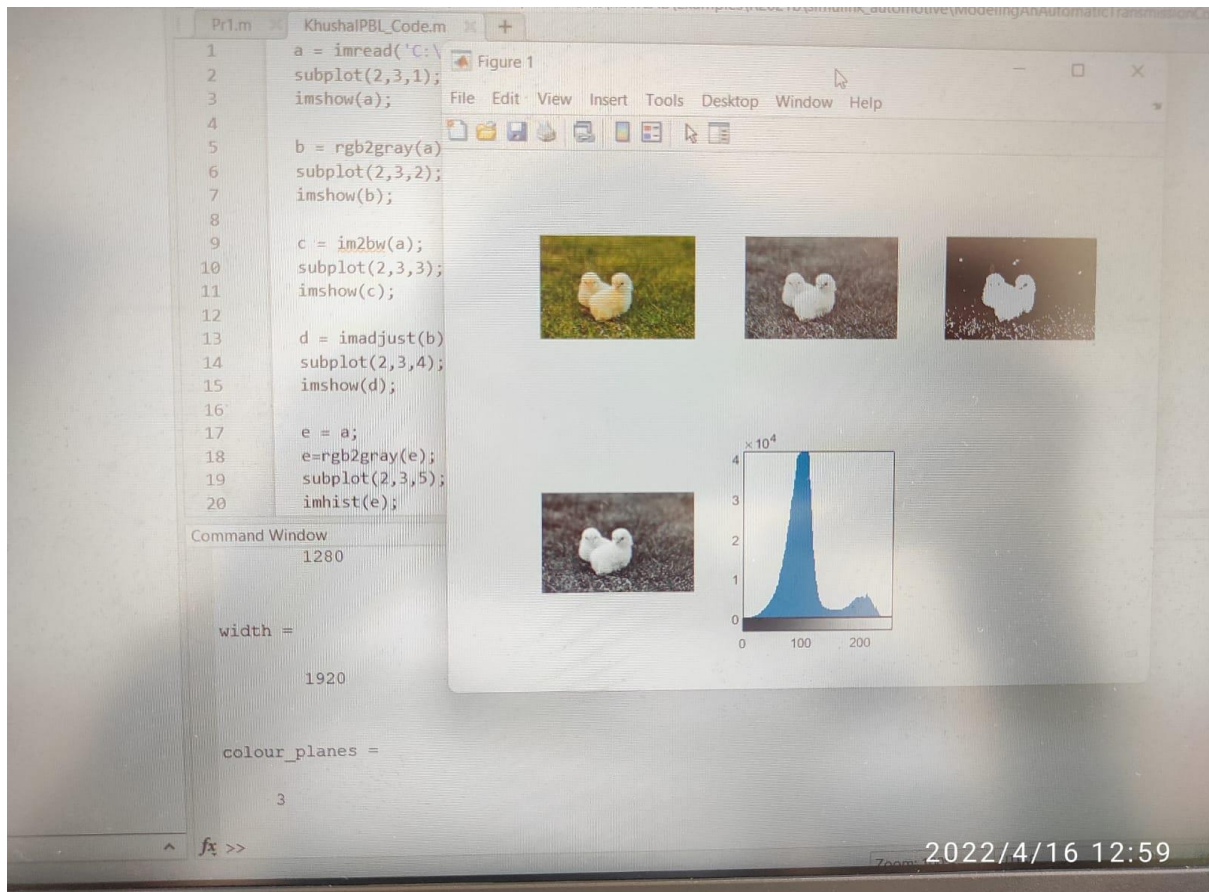
Recommended: 8 GB

**LEARNING OUTCOMES:**

- Introduction to Matlab
- What is EISPACK & LINPACK
- How to start with MATLAB
- About Matlab language
- Matlab coding skills
- About tools & libraries
- Application Program Interface in Matlab
- About Matlab desktop
- How to use Matlab editor to create M-Files
- Features of Matlab
- Basics on Matlab

- What is an Image/pixel?
- About image formats
- Introduction to Image Processing
- How digital image is formed
- Importing the image via image acquisition tools
- Analyzing and manipulation of image.
- Phases of image processing:
  - Acquisition
  - Image enhancement
  - Image restoration
  - Color image processing
  - Image compression
  - Morphological processing
  - Segmentation etc.,
- How to find the contrast problem using Image Processing
- How to extend our work to another real time applications
- Project development Skills
  - Problem analyzing skills
  - Problem solving skills
  - Creativity and imaginary skills
  - Programming skills
  - Deployment
  - Testing skills
  - Debugging skills
  - Project presentation skills
  - Thesis writing skills

### 3.3 Screen Shot/Photo



## 4. Conclusion :

Matlab provides a perfect environment for image processing, as the commands and snippets are easy to follow and apply.

Image processing has a wide range of application areas, such as;

- Photography.
- Geographical analysis of images for data.
- Decorations.
- Understanding biological structures.
- Machine vision, and entertainment.

The accuracy of information extracted from an image depends on the quality of the tool used to process the image, and Matlab provides better tools for image processing.

## 5 .REFERENCE

- S. K. Dewangan, "Importance & Applications of Digital Image Processing," *International Journal of Computer Science & Engineering Technology (IJCSET)*, vol. 7, no. 7, pp. 316-320, 2016
- J. Nagi, S. K. Ahmed, and F. Nagi, "A MATLAB based face recognition system using image processing and neural networks," in *4th International Colloquium on Signal Processing and its Applications*, vol. 2, pp. 83-8, March 2008.08:56 PM