

GE-103

Image Enhancement

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Abstract— The main aim of the image enhancement project is to refine blur images and produce a more precise and sharper image. The main idea behind the project is to obtain more clear images from their blurred version using python. Through it, one can get a clear picture which in turn can be used in various other fields including Crime Investigation- obtain clear images from CCTV, or in the field of medicine to obtain clearer X-Ray images/images of internal organs, or in the field of astrophotography, etc. In other words, it provides an opening to a whole new research/development algorithm.

Keywords—

OpenCV, Image Enhancement, Blurring, Deblurring, Optimization of images, Sharpening images, Image Processing

I. INTRODUCTION

Image Enhancement as the title suggests the project takes blur images as input and then sharpens the given input image using functions from the libraries like open-cv and NumPy to obtain a clearer, sharper and blurless image. Then it also enhances the brightness and contrast of the resultant image. It also uses the Matplotlib library to plot the graph of the histogram of the frequency of pixel V/S intensity of its brightness to give an idea about what exactly is going on in the project.

II. LITERATURE REVIEW

There are many articles, books, and journals available everywhere that define what image processing and open cv and their functions can be used to play around with image processing. Some journals explain image processing-

A. *Journal of Real-Time Image Processing (JRTIP)*

JRTIP bridges the gap between the theory and practice of image processing, it covers real-time image processing systems and algorithms for industrial, medical, embedded, and portable device applications, and it also presents a way for low cost and real-time architectures for image processing. It deals with the topics of real-time image and video processing of the already existing images or videos and of on-time taken images or videos using a camera module. Not just the software or algorithms part is that it covers, its domain also includes the hardware and architectural part of image processing. Also, it includes real-time image processing using machine vision, surveillance and security, industrial inspection, biomedical imaging, etc.

B. *International Journal of Image Processing (IJIP)*

IJIP publishes good quality applied and theoretical research in the domain of Image Processing. IJIP focuses on new image processing technologies that are efficient and effective. They provide a deeper understanding by encouraging quantitative comparison and evaluation of the performance of emerging components of image processing. IJIP publishes journals in the field of architecture of imaging, and computer vision two very vast domains. Along with that it also publishes works on newer and more efficient technology of handwritten text recognition, color imaging, image generation, image permanence, and remote image sensing. IJIP targets researchers and engineers working in the field of image processing, image coding, etc. Providing them with a platform to share their experiences, learnings, and knowledge in the vast ocean of image processing. Alongside appreciating new developments, innovations, and discoveries for the new algorithms in the field of machine learning in image processing.

C. *Indian Journal of Image Processing and Recognition (IJIPR)*

IJIPR is an Indian journal that includes many research papers that explain the work of scientists in image processing and text recognition. Basically, it focuses on the idea of Active vision, text recognition, and image processing. It deals with reading images

from the source, coloring the image, image capturing using a camera module, image manipulation, image permanence, displaying and printing images on different windows, optimizing images (i.e. enhancing their brightness, contrast, and color grading), object recognition in an image that can be used for face recognition, visual operators, etc.

III. OBJECTIVE

This project aims at presenting a linear algorithm to resolve the issue of image blurring and develop an efficient way to enhance an image. Also, this method is quite helpful in removing noise in a snap.

Image enhancement is nowadays widely used in recreating a better version of our old album pictures. It can also be used to remaster old movies like Sholay, Ramayana, etc. Similarly, this can be used in astronomy to clear the images of space bodies that increase the detailing of the image so that maximum information can be extracted from the image.

With the help of this, we can build an app that can be used to beautify and optimize images. Basically, with its help, we can play with images by deblurring, refining, or even forming canny images. We can form black and white or colored images of a particular image and can even increase or decrease the edges of an image. In simple words, it can be used as a basic approach for making filter-based mobile applications like Snapchat, Instagram, and even filters available in Camera. One can easily create filters according to their requirements using a similar approach.

This method is beneficial to selectively enhance the resolution of a small region when the whole image cannot be resolved due to a small motion blur. Also, one can get rid of a small imperfect blur that makes an incredibly good picture look bad.

IV. CONCLUSIONS

We can conclude that this project has a vast implementation in various other fields and has a greater scope in the field of Machine Learning and Image processing. This project can also be easily modified to make filter-based apps.

In short, we can say that we can easily deblur and optimize blurred images using our project code. Not just that, we can even create many different filters to beautify an image, blur a whole image or a specific part of that image, change any color of the image, resize any image, change the resolution of images, and many more.

ACKNOWLEDGMENT

We wish to express our deep gratitude and sincere thanks to my guide Mr. Sudarshan Iyenger (Course Coordinator), and Mr. Sushil Ghildiyal (Project mentor) for guiding us immensely throughout the course and throughout this project named “IMAGE ENHANCEMENT”.

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