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NOISE- INSENSITIVE AND EDGE PRESERVING RESOLUTION USING SGAR MODEL

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***Abstract*-This paper establishes a deep learning and image-based model for air quality gauging the fog, haze and smoke. Nowadays, these are the major reason for road accidents, plane crash, etc. The fog has less contrast level of image and also affects the visual quality. The air light and attenuation phenomena affect the visual quality of image. Air speck, which present in atmosphere that affects the visibility level of image also it is called as noise or unwanted signal. So, we are improving the visible level of image and bring down the various fog image filtering method that are used. For improving the visual quality level, we are using 4 crucial steps. First step is image pre-processing in this we are using median filter, haze removal, image enhancement, RGB extraction, grey scale image and so on. Secondly, we are using histogram process for that we use adaptive histogram equalization. Then next step is image segmentation used to divide a digital image into multiple image section. Finally, we are using classification to label the set of pixels. Our main motive is to review the improved quality of image which give a clear image in poor atmosphere.**

***Index*-Image Enhancement, Image Segmentation, Convolutional Neural Network algorithm, MATLAB.**

I. INTRODUCTION

Design of fog removal are used to improve the visual quality of image. This image qualities capture the outdoor image that are debase due to poor atmospheric condition and it will reduce the contrast and visibility level. In this paper, we have categorized a fog in three level that is, low, moderate and high. One of the major reasons for road accidents and plane crash is visibility level. To reduce the accidents occur we have increased a visual quality of image by using CNN algorithm.

The input haze image in any standard image order is bmp, jpg, etc., then the source code is implemented in MATLAB. First, to remove haze form image which is caused by atmospheric particles we are using median filter. It is generally used in Digital Image Processing under certain condition to conserve edges while removing noise. Median filter run through the signal entry replacing each entry by neighbouring entries and modify it is called "window". Second, haze removal algorithm is a simple way to increase the visual quality of image while collate with other novel image dimness to produce the better results and the image enhancement is a process of foreground certain information of image and also remove unnecessary noise in accord with specific needs.

There are eight pre-processing algorithms. They are grey scale image, sharpening filter, median filter, smooth filter, binary mask, RGB extraction, and histogram and Sobel operator. After pre-processing method, then comes a histogram to increase a contrast level of image. The main advantage in Adaptive Histogram Equalisation is to compute the Histogram Equalisation of well-defined section of the image and it preserves edges in particular region and also enhance the contrast to avert variant of adaptive histogram equalisation called contrast limited adaptive histogram equalisation.

Image Segmentation is typically used to locate objects and boundaries in image. It is a process to allocate a label to every pixel with same label. In image segmentation we use Fuzzy-C means clustering, active contour method, BWAREOPEN and added feature like entropy, kurtosis and skewness. In existing method, they had used Support Vector Machine (SVM). But in proposed system we are using Convolutional Neural Network Because CNN has higher precision and is considered better in perceive object. After segmentation process, next is classification. Classification image is compared with trained dataset. This method is used to estimate the accuracy of model and its called train, because, it split the data set into a training set for 80% training. Finally, all this process is done in MATLAB. Figure 1.1 is a system module for block diagram.

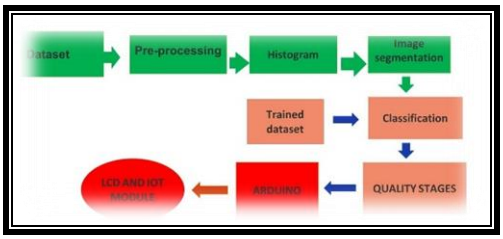

Figure 1.1 block diagram

II. PROPOSED SYSTEM

In order to improve the accuracy of feature extraction, eight different pre-processing algorithms were used. The algorithms used were converting to grey scale image, sharpening filter, median filter, smooth filter, binary mask, RGB extraction, and histogram and Sobel operator. The RGB values of the images are extracted before converting it into a gray scale image.

Sharpening filter is applied to the gray scale image in order to sharpen the details of the infected region. Advanced feature will be added such as Entropy, kurtosis, Skewness and implemented CNN algorithm to automatically detect the important features without any human supervision. It also works in backend process and shows the detail about frequency, variations and loss of errors. And finally, it compares with the trained dataset to remove the fog or unwanted noise from image. This system provides an easier and faster access to fog removal and the data has been stored in the webpage by using IOT module. In order to improve the accuracy of feature extraction, eight different pre-processing algorithms were used. The algorithms used were converting to grey scale image, sharpening filter, median filter, smooth filter, binary mask, RGB extraction, and histogram and Sobel operator. The RGB values of the images are extracted before converting it into a gray scale image.

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A. DATASET:

An image is an array or a matrix of square pixels it arranged in columns and rows.

B. PREPROCESSING:

In order to improve the accuracy of feature eight different pre-processing algorithms has been used. The algorithms were converting to grey scale image, sharpening filter, median filter, smooth filter, binary mask, RGB extraction, histogram and Sobel operator. Also, we use an image enhancement and haze removal for the better quality.

C. ADAPTIVE HISTOGRAM EQUALIZATION:

Adaptive histogram equalization is a digital image processing technique used to enhance the contrast of images. It differs from normal histogram equalization in the respect that the adaptive method enhances the contrast locally. Adaptive histogram equalization (AHE) is a computer image processing technique used to improve contrast in images. It differs from ordinary histogram equalization to adaptive method computes several histograms, each corresponding to a distinct section of the image, and uses them to redistribute the lightness values of the image. It is therefore suitable for improving the local contrast and enhancing image edges. Figure 2.1 shows adaptive histogram.

Figure 2.1 Histogram Adaptive

D. IMAGE SEGMENTATION

Image segment divides from one part into multiple part. In this, we had added extra features like Fuzzy C means clustering, active contour method and BWAREOPEN.

E. FUZZY C MEANS CLUSTERING

Fuzzy C means clustering is better compared to the k-means clustering. The data point can fix to more than one cluster. Fuzzy clustering is a form of clustering which each data point belongs more than one. Active contour method improved by fuzzy c means clustering. Figure 2.2 shows up to 800 iterations.

Figure 2.2 Iterations

F. BWAREOPEN

It removes small objects from binary image.

Syntax:

BW2 = Bwareopen (BW, P)

BW2 = Bwareopen (BW, P, conn) the image. Figure 2.3 shows bwareopen perform area opening.

Figure 2.3 Bwareopen

III. NODE MCU

Node MCU is a low rate open-source internet of thing platform which as SRAM 64 KB, flash memory 4MB, operating voltage in 3.3 v and input voltage of 7-12 V, Digital I/O pins has 16 and analog input pins has 1, UART 1, SPI is 1, 80 MHz of clock speed which has a PCB antenna and it's a small size module.

The Node MCU board can easily programmed with Arduino IDE and also it fixes objects and transfer the data's using Wi-Fi protocol and it work through the internet. Node MCU works with the support of WIFI network and it has less energy consumption and the board size is reduced.

Node MCU is an open-source firm ware, it has 3.3v device so it may not be compatible. Its storage may be in 4 Mbytes and it's a single board microcontroller type and the GPIO16 is only used to read and write. It does not support open interrupt.

Node MCU used in various applications like internet smoked alarms, ESP lamp, home automation and so on. Now we are using it in fog removal method. Once the result shown in software it connected with Node MCU to LCD display by using USB port, it displays whether fog is low, high or moderate. Figure 3.1 NODE MCU kit.

IV. RESULT

The proposed algorithm of fog removal which give clear quality of picture compared to existing method. In proposed system, a spatial general auto-regressive [SGAR] model and GSAA based scheme has been used. It outperforms technique by using SGAR model to accurately build the structure of noisy image windows. To improve eight pre-processing algorithm and add extra features like entropy, kurtosis, skewness, etc., we mainly use CNN algorithm for better performance and also, we use hardware to store the data's in IOT module shown in figure 4.3 and also display the fog in LCD whether it is low, high or moderate. Figure 4.1and 4.2 shows input and output image.

Figure 4.1 Input Image

Figure 4.2 Output Image

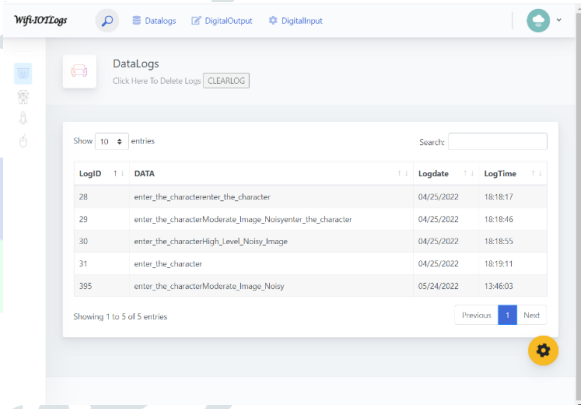

Figure 4.3 IOT Webpage

Further in existing method, they had used k-means clustering. But in proposed system we use Fuzzy C means clustering. In existing they used Support Vector machine [SVM] but here we have used Convolutional Neural Network [CNN] algorithm and also, we are using active contour method and Bwareopen. Then the output of existing method is in textural feature, structural features and fused combination of both or some of them done a simulation report. But here in proposed system we increased the contrast level of image and reduce the unwanted noise. Figure 4.4 shows the output of existing system.

Figure 4.4 Result for the existing system

V. CONCLUSION

The purpose of implementing this system is to increase visual quality of image and to reduce unwanted noise. This system shows the better usage of algorithm and provides haze free image. By using CNN algorithm, it automatically detects the important features without any human supervision and also it works in backend process. It compares with trained dataset finally remove fog or unwanted noise from image. and Then Arduino board is connected to a computer via USB, where it connects with the Arduino IDE. The user writes the Arduino code in the IDE, then uploads it to the microcontroller which executes the code, it displays result in LCD display which is inbuilt in Arduino Uno, finally fog removal data stored in webpage with data and time.

The future scope of the system, we can use camera and GSM module, where fix camera in front of cars and aircraft for real time application or else to fix a voice module whether it says obstacle in 10 meter and so on, GSM module used to send message for authorized person.

VI. APPLICATION

- It removes both outdoor and indoor unwanted noise.
- It mostly used in tracking, long range object detection and also for navigation process.

VII. ADVANTAGE

- High resolution value
- Luminance value is high
- Attenuation value is high

VIII. ACKNOWLEDGEMENT

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