Design and Analysis of new Framework for Enhanced the Image Visibility which is Degraded due to Fog and Weather Condition

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Abstract- Images of outside scenes capture in poor weather suffer from poor contrast. In bad weather conditions, the light attainment a camera is cruelly scattered by the impression. So the image is getting highly degraded due to additive light. Additive light are form from smattering of light by fog constituent part. Additive light is created by mixing the visible light that is emitted from not the same light source. This additive light is called air light. Air light is not uniformly distributed in the image. Bad weather decreases instinctive conspicuousness. Poor visibility degrades perceptual image quality and presentation of the computer vision algorithms such as surveillance, tracking, and navigation. From the atmospheric point of view, weather conditions differ mostly in the types and sizes of the constituent part present in the space. We recommend a contrast enhancement procedure for fog degraded images using relative depth estimation by incorporating time difference.

Keywords: Spatio temporal, Histogram, MATLAB, Photometric, Image Enhancement.

I. INTRODUCTION

Now-a-days digital camera is the most usually used devices to capture images. They are used all over the place, including mobile phone, personal digital assistant (PDAs), robots, watch and home security system. Few years back, the value of the images obtain from digital camera was not good. But in early days, there is no doubt that the value of the images has improved significantly. Part of this improvement is suitable to the higher dispensation capability of the system they are fixed and memory ease of use. The quality of image usually suffers from poor image quality, mainly lack of contrast and occurrence of shading and artifact, due to lack in focusing, lighting, specimen staining and other factor. Among these, contrast is one of factor. The research work aims at improving the contrast of images. They are many methods available for image enhancement but we have concentrated on contrast enhancement techniques in my work. We find that the need for contrast enhancement increases. Histogram Equalization is one of the method, this method is simple and comparative better than other. The contrast of an image is a feature which determines how image looks better visually. The Contrast enhancement is considered as one of the mainly important issue in image processing.

1.1 Image Enhancement:-

The main purpose of image enhancement is to method a certain image so that the effect is more proper than the original image for inexact application. The enhancement doesn't raise the inherent information import of the data, but it increases the active range of the select feature so that they can be detecting easily. The greatest complexity in image enhancement quantifying the principle for enhancement and so a large number of image enhancement technique are observed and require interactive procedures to obtain suitable results.

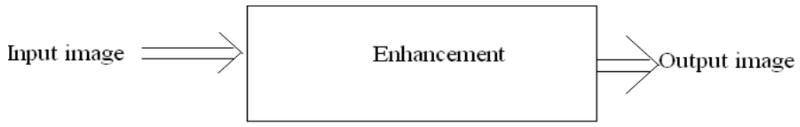

Figure 1.1 Image Enhancement

There is no common assumption of image enhancement. When an image is processed for visual version, the viewer is the ultimate evaluator of how well a particular method work. Visual evaluation of image quality is a highly subjective process, thus making the meaning of a "good image" an elusive model by which to balance algorithm routine. Figure 1.1 shows the simple process of enhancement. Image enhancement refer to individuals image processing operations that progress the value of enter image in order to beat the weak point of human visual system.
Image enhancement technique can be divided into two broad categories:-

- Spatial domain method, which operate straight on pixel, and
- Frequency domain method, which work on the Fourier transform of an image.

Application area of image enhancement:-

In this section, Applications of image enhancement are given below:-

- Health sciences, Enhance biomedical/medical image qualities (dental , chromosome images, magnetic resonance images, chest radiography and mammography images and others)
- Diagnostic imaging capability
- Robotic surgery.
- Low vision reading with electronic display.
- Satellite Imaging.
- Digital photography and LCD display processing.

1.2 Contrast Enhancement:-

Contrast enhancement of an image is main challenge in the area of digital picture processing which is well-defined as the part between the bright and the dark pixel intensities of images. High contrast images contain much color and gray scale information as compare low contrast images. Contrast enhancement play an main function in image processing application, such like medical image processing, digital photography, satellite imaging, and LCD display processing. There are several descriptions for an image to have poor contrast: due to the poor quality of the used imaging device. As a result, such images and videos may not expose all the details in the captured scene.
Contrast enhancement method can be divided into two main classes:

- Intensity-based technique
- Feature-based technique.

1.3 Histogram Equalization:-

Histogram manipulation mostly modify the histogram of input image so as to recover the visual value of the image, in order to understand histogram manipulation, it is necessary Histogram procedure which consists of generates an output image by an even histogram (*i.e.*, consistent sharing). In image processing, the plan of equalize a histogram is to make longer or reallocate the unique histogram by the complete range of separate level of the image, in a method to an enhancement of image differences achieve. This technique is normally working used for image enhancement because of its simplicity and comparatively.

Normally, Histogram Equalization is able to be characterized two main processes: **global histogram equalization (GHE)** and **local histogram equalization (LHE).** In GHE, the histogram of the full input image is used to compute a histogram transformation function. Since a result, the active range of the image histogram is compress and stretch, by which the largely contrast is better. The computational difficulty of GHE is relatively less. The major drawback of GHE is that it cannot adjust the limited in order of the images and protect the clarity of the unique image. Where LHE use a downhill window method, in this local histogram are intended from the window area to produce a local intensities remapping for each pixels. The strength of the pixel at the middle of the area is

enhanced according to the local strength remapping that pixel. LHE is able of produce good contrast result but is from time to time held to over-enhance image. It as well requires more addition than other method since a local histogram have to be made and deal with each image pixels.

1.4 Objective:-

In this dissertation, reported algorithms for fog and rain removal are review. Fog reduce the visibility of picture and therefore routine of a range of computer algorithms which use quality information structure of the fog is the role of the intensity opinion of depth information is below constraints difficulty if only one image is presented. The algorithm helps to devise the system which removes rain from images and videos and to improve the various vision-based algorithms. Rain is a noise that damages videos and images. Such weather situations will affect stereo correspondence, feature detection, segmentation, and object tracking and recognition. In we do video surveillance in this environment then if any problem is found due to weather conditions the object cannot be tracked well.

1.5 Concept Adopted:-

For a lot of application of computer visualization, reduce visibility in bad climate is a main difficulty. The input images have. In the literature review, a few previous proposed methods have been proposed. The first approach is to use polarizing filters or more images of the same scene that have different degrees of polarization (DOP).The main idea of this approach is to define the numbers of macromolecule units of images .and we are using 2 other filters like median and wiener filter. it is use to filtering images and clean rain and fog of these images clear visibility, mainly usual systems used for observation, able vehicle, outside object detection etc., suppose. Unfortunately, this is not always right in several conditions, so attractive visibility unavoidable job. Optically, reduced visibility in bad climate is owed near the large presence of moody particle to have major size and allocation in the participated medium. Brightness starting the mood and brightness reflect from scattered by those particles and object are absorbed, because the visibility of a picture to exist corrupted. In the fiction, a little approach has been projected. The primary approach is to use polarizing filter or extra image of the equal view to have multiple degrees of polarization (DOP).The major plan of this advance to describe numbers of macromolecule units of images and we are using 2 other filters like median and wiener filter. It is use to filtering images and clean rain and fog of these images.

1.6 What Is Fog?

Fog is actually water droplet that has packed in from the air. When air has been warm and humid during the day, dematerialize water molecules are spread throughout it (figure 1.2). Fog is a physical incident cause in small dusts or drop of water in the sky. Such environment causes poorer performance on vision based surveillance system than normal condition. Then, when the temperatures godown, the cooling air causes the water molecules to turn from a fog (a gas) into liquid droplet. These droplets are so tiny they can hang in the air. But they are heavy enough to lie low near the ground. Reduced visibility in bad climate owed to the sub- spatial incidence of impressive particle that have significant range and delivery in the participate medium. Brightness of the mood and light reflect from an object are immersed and scattered by those particle, cause the visibility of a picture to be despoiled.

A) What Cause Fog?

Fog because by small water droplet undecided into the atmosphere. The thickest fog tend towards arise in manufacturing area anywhere around lot of smog particle on which water droplet be able to produce. Fog is also a terrible weather, because it will affect road transportation, aviation and navigation, power systems, industrial and agricultural production as well as people's everyday lives in different degrees.

B) Types Of Fog:-

A fog which be collected mostly before completely of water dropletbe normally classify according towards the physical procedure which produce dispersion or near-saturation of the atmosphere. The major type of fog is: wavesFog, Advection Fog, Upslope Fog, Freezing Fog, Evaporation or Mixing Fog, Ice fog e.g.

Figure 1.2 An Image Of Fog

C) What Is Rain?

Rain is a procedure of precipitation, a product of the density of imposing water vapor that is deposit on the earth's surface. It is forms when separate drop of water fall to the earth's face from clouds not all rain reach the surface; some evaporate while declining during dry atmosphere, When nonentity of it reach the land. It is called threshold, an occurrence commonly seen in hot dry waste regions. Rain is the main factor of the energetic bad climate. Individual rain drop acts as spherical lens. Intensities formed with rain contain tough spatial formation and it depend powerfully scheduled environment clarity. When light passes through it get refracted and reflected which make them brighter than background. But when it falls at high velocity, it gets motion blurred. Thus the intensity of the rain smudge depends on top of the clarity of the plunge, environment view radiances and the addition point of the camera. Analysis of rain and snow particles is more difficult.

Figure 1.3 An Image Of Rain

1.7 Motivation:-

This research is extension of Image of outsides scene capture in bad climate go through from reduced gap. Below bad climate condition, the brightness success a camera is cruelly spread by the environment. So the image is getting highly degraded due to additive light. Bad weather reduces impressive visibility. Reduced visibility degrade perceptual images value and presentation of the computer algorithm such when observation, track, and steering. so,

it is especially essential towards build these vision algorithm strong to climate change. From the atmospheric point of view, weather condition change mostly into the type and size of the particle present in the gap. A large attempt has left into measure the size of these particles. Based schedule the form of the optical effect, bad climate condition broadly classify two categories, fixed and forceful. In fixed bad climate, essential droplet is extremely small and gradually floating into the atmosphere. Fog, mist, and haze are examples of steady weather. In forceful bad climate, element droplet are 1000 period tubby than individuals of the stable climate. Rain and snow represent dynamic weather conditions. Around have been several famous efforts to return image ruined with fog. The mainly ordinary scheme identified to improve sullied image histogram equalization. Though, still although global histogram equalization be easy and quick, it be not appropriate since the fog's result going on an image be a purpose of the reserve among the camera and purpose. Another effective method is to restore degraded images is scene depth method but here required two images which are taken under different whether condition for comparing the image quality. When using the wavelet method also required several images to accomplish the enhancement. In all previous work consider the air light is uniformly distributed in the image. But originally the air light is not equally distributed. Another method is atmospheric model. This method use substantial

Model to calculate the model of picture degradation with after that return image difference by suitable compensation. They gives superior picture version except typically need added in order propos the image scheme and the image situation. It is known that under fog climate condition, the gap and color character of the image are severely despoiled. Clear day image have more distinction than foggy images. Hence, a fog removal algorithm should enhance the scene contrast. Enhancement of foggy image is a challenge due to the complexity in recovering luminance and chrominance while maintaining the color fidelity. During enhancement of foggy images, it should be kept in mind that over enhancement leads to saturation of pixel value. Thus, enhancement should be bounded by some constraints to avoid saturation of image and preserve appropriate color fidelity. The result ant molder inside contrast vary crosswise the sight and exponential inside the depth of sight point. Sousualbreak invariant image processing techniqueis not enoughtowardstake awayclimate effect from image. Here recommendedaneasyalteration method of fog beating in hazy image, in commandtowardsestimation the air light since a colour image, a chargepurpose use for the RGB path. But, it assumeto air light beconsistentmore the entire images. Within this existing method is improved to create it validstillas the air light sharingis not even over the picture. In directtowardsestimation the air light; a chargepurposetobebaseresting on the creatureoptical model is used into the luminance reflection.

1.8 Literature survey:-

Manoj Alwani and Anil Kumar Tiwaria present a"contrast enhancement based algorithm to improve visibility of colored foggy images" in which they obtainable adivergence enhancement algorithm for degraded colour images. To restore both contrast and colour, here propose four steps. The RGB component of the input image is first converted into HIS space to get brightness constituent. Because of section depth varies differently over whole image. The global enhancement method does not reproduce depth alteration. So to take care of local scene depth changes, Process the image on a block by block basis, assuming that the pixels in the block are now of similar seen depth. Then enhance the block according to pixel intensities in it. Basically this unkind that if the assumed image has many objects with varying seen depth, global enhancement techniques are predictable to do average kind of enrichment of various object. On the other hand, processing on a block-by-block foundation will improve the object effectively."Visibility enhancement using an image filtering approach" by Yong-Qin Zhang, Yu Ding (2012), they define the cloudy, misty, or obscure climate condition guide to images colour twist , ease motion and the difference of experimental entity inside open-air picture gaining. Within charge towards sense and eliminate fog, this point propose story effectual algorithms for visibility improvement a only gray or colour image. As it preserve subsist consider to the mist essentially concentrate into single element of the multilayer figure, the haze-free image be reform during haze level assessment base scheduled image filtering advance use equally low-rank method with the overlie averaging system."Perceptibility in Bad Weather from a Single Image" by Robby T. Tan proposed an automated approach which only requires single input image. The method is based on two basic observations: first, images with enhanced visibility (or clear-day images) have more contrast than images plagued by bad weather; second, air light whose variation mainly be subject to on the f distantness of objects to the viewer tends to be smooth. Relying on these two observations, we develop a cost purpose in the framework of Markov random fields (MRFs), which can be efficiently optimized by various techniques, such as graph-cuts or belief promulgation. The method is appropriate for both colour and gray images.

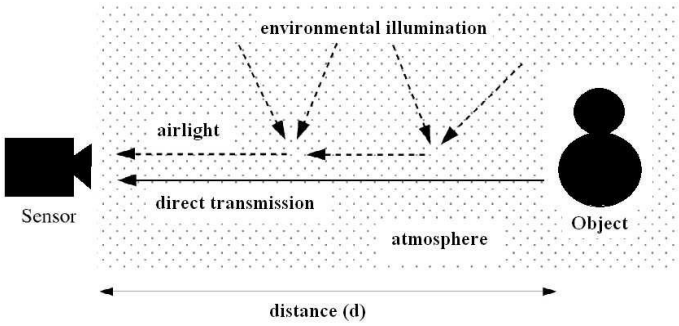

Fig 2.1 The pictorial description of the optical mode

"Fog-degraded Image Enhancement With Two Images of Similar Scene with Time Difference" by Changwon Jeon, Dubok Park, Hanseok Ko they propose a contrast enhancement procedure for fog degraded images using relative depth estimation by combining time difference. Representative experimental result proves that the future algorithm is effective for contrast enhancement of fog-degraded images.

1.9 Research Methodology:-

We analyze with evaluate the new result within optical effect, and idea estimate criteria. Although compare the result, we show the benefit and difficulty of these method. We contain planned easy but commanding algorithms base on average filter using low-rank techniques for visibility improvement as of a single foggy images.. While the computational difficulty of the low-rank techniques is small, it is exposed to the planned advance used for fog deletion is hasty, also can even attain improved result than the high-tech method into an only image debasing. Though, the planned advance may be not works fine for the distant scenes with heavy fog and great depth jump. The restore images have the halo or lasting mist at strength discontinuities to tin is practical in this experimental result. With one more inadequacy is not capable to get the real values of universal tone beam. To conquer this constraint of our present methods, we mean to slot in improved edge-preserving images filtering methods by small difficulty and other technique. We propose a contrast enhancement procedure for fog degraded images using relative depth approximation by incorporating time difference. Representative experimental results show to the future algorithms is useful for gap improvement of fog-degraded image. Based on the physical properties there are two kinds of weather conditions: steady and dynamic. Fig 3.1 and 3.2 show the steady and dynamic weather conditions respectively. The steady weather conditions are fog, mist and haze etc. The size of those particles is about 1-10μm. The dynamic weather conditions are rain, snow and hail etc. Its size is 1000 times larger than that of steady conditions i.e., about 0.1-10mm. The strength of a specific pixel will be the aggregate effect of a large number of particles in case of steady weather conditions. In this scenario the dynamic weather conditions, since the droplets have larger size, the objects will get motion blurred.

Figure 3.1: The visual appearance of steady weather

Figure 3.2: The visual appearance of dynamic weather conditions

1.10 Rain Analysis:-

Properties of Rain:-

A) Spatio-temporal Property:-

Rain erratically allocate into gap and drop at elevated speeds as they reach at the earth. Due to high speed some pixels may not forever enclosed by rainfall inside two successive frames. The pixel which be enclosed with rain contain like strength sharing.

B) Chromatic Property:-

An inactive fall is similar to spherical lens, so once light passes through the drop it becomes some internal reflections and thus the drop becomes brighter than contextual. The upsurge in chrominance values is reliant on on the background. The difference in three planes between two successive frames will be nearly same. These variations are bound by a small threshold.

C) Photometric Constraints:-

The photometry deals with the substantial property of the rainfall. The intensity of the rainfall line depends on the brightness of the drop, environment sight radiances also the combination times of the camera. Photometric model supposed to raindrop contain about the equal range with speed. It be too supposed to pixel to recline scheduled the similar rainfall line contain similar irradiance since the clarity of the drops is faintly precious with the setting.

Fog Analysis:-

Two obvious basic facts which reason defeat of visibility be decrease and air light. Brightness smile impending as of a entity points get attenuated owed to spreading with impressive particle. This occurrence is term as decrease which reduces difference inside the view. Beam next as of the basis be spread toward camera with lead towards the adjust in colour. This fact is termed when air light. Air light increase by the space as of the point.

II. PROPOSED ALGORITHM

Main foundation of complications when processing outside images is the existence of the noise, haze, fog or rain which reduces the quality of image by decreasing the contrast of the captured objects. This dissertation proposes a new improved algorithm and alternatives used in favor of visibility restoration from a foggy or low density images. The proposed algorithm will mix dark path former, CLAHE and adaptive gamma modification towards achieve the objective of this research work.

The main advantage is the probability to grip both colour images and gray point images since the mistiness among the occurrence of fog and the matter with short color dispersion is resolve by arrogant only little substance can contain colors with low strength.

In order to performance comparison, different metrics of images and complexity theory will be considered. An appropriate comparison will be drawn among proposed technique and previous well known techniques.

III. PROPOSED ALGORITHM

Step I. Read all images in MTLAB.

Step II. Now CLAHE on L*a*b colourgapoperation is calculate and it will be applied to equilibrium to the outcome of thebrightness and colours of the image.

Step III. Now we calculated Dark channel and it will prior resolve come in action to decrease the consequence of fog from digital image?

Step IV. Now adaptive gamma improvement will be applied as a post dispensation operation to enhance the brightness of the system.

Step V. Here we will get the final image which has been visibly restored from the system.

Step 1: Let input degraded foggy image $I(x, y)$ be of size $M \times N$. Convert this input image to HIS space. Take Intensity component as $I1(x, y)$.Take pixels in a Block $B_l(x, y)$ (mask) of size $m \times n$.

Step 2: Let output image be $O(x, y)$. Take two matrices *SUM* and *COUNT* of size $M \times N$.

Initialize them to zero. *SUM* stores the sum of altered pixel at location (x, *y)* every time block passes through it due to overlapping. Similarly *COUNT* stores number of times block pass through a pixel location (x, *y)*. Take three variables

A, B and *Stepsize* and set A=1, B=1 and Stepsize=1.

Step 3: Find the pixel of highest gray level in the I component. $P = \max(I1(x, y))$;

$$x \in [1.....M], y \in [1.....N];$$

Step 4: Get the Higher region of the image $HR = P - TH$;

Where *TH* =Threshold.

The criterion of selecting the threshold is as follows:

If $220 < P < 255$ *, then TH =25;.*

elseif $150 < P \leq 220$,

then TH =15; else TH =10.

These thresholds were arrived at after extensive Experimentation with a large set of test images.

Step5: Get a block of pixels B_l , with x = A and y = B from the image $I1(x, y)$.

Step 6: Find the minimum intensity value in the block.

$$L = \min(B_l(x, y));$$

Step 7: Based on *L*, identify the block and apply contrast enhancement accordingly.

If $L \geq HR$; *//All pixels are in Higher region*

Apply contrast enhancement on image from L to 255.

Else // Mix intensity block

Apply contrast enhancement on image from 0 to 255

Step 8: $SUM(K, L) = SUM(K, L) + B_l$ **;**

$$COUNT(K, L) = COUNT(K, L) + 1; \quad \text{where}$$

$$K \in [1 \square A + m - 1] , L \in [1 \square B + n - 1];$$

Step 9: Move the block now in raster order (Left to Right and top to bottom) to cover whole image.

if $(B < N)$

$B = B +$ *step size;*

Goto Step 5;

elseif $(A < M)$

$A = A +$ *Stepsize*; $B = 1$;

Goto Step 5; *elseEND*

For *Stepsize* >1,

the complexity of the algorithm is reduced without any significant loss in the enhancement of the visibility. But increasing it more produces blocking effects.

Step 10: Take the average of the values altered at location (x, y) and obtain the enhanced output image.

$$O(x, y) = SUM(x, y)/COUNT(x, y)$$

So in this way we get *O* as output image of vector I of input image.

*A) CLAHE On L*A*B Colour Gap:-*

Contrast partial adaptive histogram equalization short form is CLAHE. This method does not need any predicted weather information for the processing of hazed image. Firstly, the image capturein the camera insidemistyconditionistransformedas of RGB (red, green and blue) colour space bechangedtowards LAB coloursgap. A Lab coloursgapbe a colour opponent gapbymeasurement L used forprecisionwith (a,b) intended for the shadeopponent size, basescheduled nonlinearly compacted CIE XYZ colour spacescoordinate.

B) Dark Channel Prior: -

Dark channel prior be used for estimation of impressive beam in the dehazed images towards find more proper result. This technique is mostly used for non-sky patches, as at smallest amount single color path have extremely short strength at several pixels. Because the outside image be typically filled of bright, the sinister channel of these image will be actually shady. Suitable towards fog (air-light),fog images be brighter than its image without fog. so we can say dark channels of fog images resolve have high strength in region by higher haze. So, visually the amount of shady channels is a forceful estimate of the width of fog.

*C) **Adaptive Gamma Correction**:-*

A nonlinear process used code and decode and tri stimulus value in video or at rest image system. Gamma alteration defined by the following power law expression:

$$V_{OUT} = A\, V_{IN}^{\gamma}$$

WHERE **A** IS A STABLEWITH THE EFFORT AND PRODUCTIONVALUEBE NON-NEGATIVE ACTUAL VALUE;

WITHIN THE ORDINARYCONTAINER OF **A = 1**, INPUT AND OUTPUTBECLASSICALLYINTO THE SERIES 0 – 1.

A GAMMA VALUES Γ< 1 BEAT TIMESCALL AN TRAINING GAMMA, WITH THE METHOD OF TRAININGAMONG THIS COMPRESSIVE POWER-LAW NONLINEARITY BE CALLED GAMMA DENSITY;

EQUALLY A GAMMA VALUES Γ> 1 IS CALLED A DECODE GAMMA WITH THE REQUEST OF THE FRIENDLY POWER-LAW NONLINEARITY BE CALLED GAMMA DEVELOPMENT.

IV. EXPERIMENT AND RESULT

Experimental Set-Up:-

In instruct to execute the prospect algorithms; plan with performance have been complete in MATLAB with image processing toolbox. Inside command towards act cross support we contain too implement the non linear enhancement technique. Table 4.1 is show the various images which be use inside this study effort. Image be known beside by their format. Every image are of changed kinds and every images have changed type of the beam i.e. extra or fewer inside a few image.

Table 4.1: Experimental images

NAME	FORMAT	SIZE(KB)
Fog	.jpg	172
Rain	.png	511

Simulation and Result:-

For the function of fractious support we contain occupied 2 changed image single of fog with second of rain with conceded towards the projected algorithms. Following part contain an effect of single of the image towards explain the improvisation of the projected algorithms more the previous techniques.

After applying our algorithm we found that the images are free from fog and rain. The same process is applied for videos and the results are obtained. The image containing the rain falling to the pool. The image is taken in static background.

After that applying proposed algorithm for foggy and rainy images and we got many restored images and each image size will be change. Show the table 4.2 and table 4.3 is defining each restored image change size.

Figure 4.1 (a) An Image Plagued By Fog ,(b) Restored image ,(c) Restored Image ,(d) Restored Image, (e) The Result Of Fog Removal Image.

Table 4.2 Results

IMAGES	FORMAT	SIZE(KB)
Original image (a)	.jpg	172
Restored image (b)	.jpg	357
Restored image(c)	.jpg	344
Restored image (d)	.jpg	252
Final result (e)	.jpg	813

Figure 4.2 (a) An image plagued by rain. (b) The result of enhancing visibility of rain image.

Table 4.3 Results

IMAGES	FORMAT	SIZE(KB)
Original image (a)	.png	511
Fimal result image (b)	.png	452

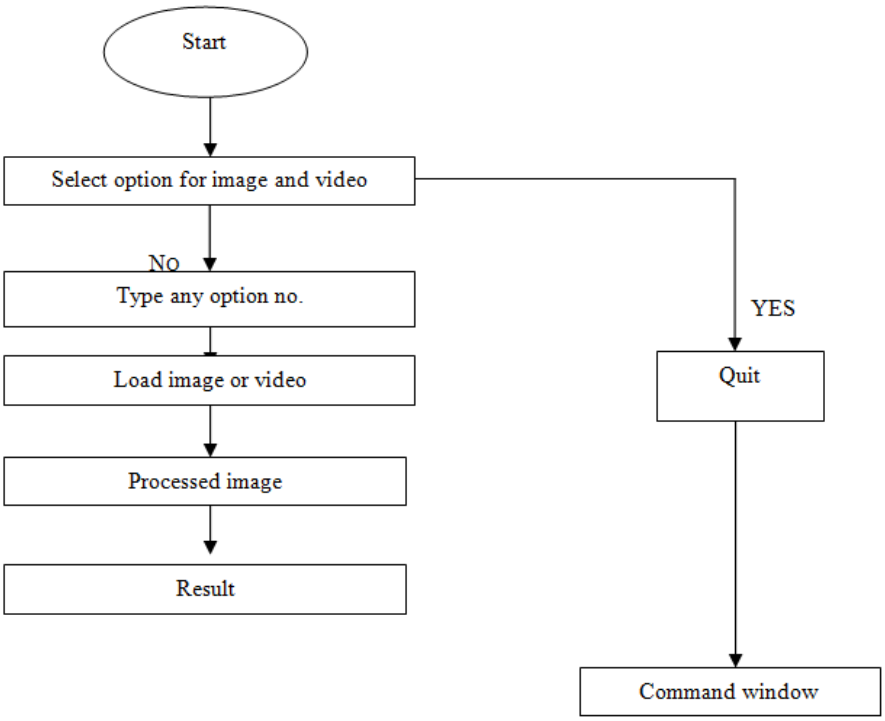

Figure 4.3:- Flow Chart Diagram

IV.CONCLUSION AND FUTURE WORK

We analyze and evaluate the new result in optical property, with object estimate criterion. We contain projected easy except great algorithms base on median filtering using low-rank techniques used for visibility improvement since a single misty images. Though comparing results, we demonstrate the advantage and disadvantage of these methods. While the computational difficulty of the low rank techniques is small, it be exposed to the projected move to used for fog deletion be quick, with can constant reach superior result than the high-tech method inside a only image dehazing. The planned work does not assume size, shape and orientation of the rain drops. It works in any fog and rain conditions and also in case of reflected rain drop and scene containing text information.

1. Incorporation of additional method to deal with more dynamic degration sources like rain or snow.
2. Improving time or space complexity of existing methods.
3. Application of algorithms on video stream.
4. Improvement older methods global histogram equalization or scene depth method or wavelet method.
5. Images degraded by fog.

In future, there is a lot of possibility for research issues are as follows:-

1. Integration of artificial intelligence algorithms with self bearing for automatic approximation of various filter parameters.
2. Applications of biologically inspired algorithms to image processing efficiency and yield better result.
3. Implementation of video processing by linked frame approach so as individual frame processing may be reduced.

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