

# A Comprehensive Study on Image Defogging Techniques

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**Abstract** - A Defogging in visibility is often introduced to images captured in poor weather conditions, such as haze, rain, fog, pollutants particles. To remove haze and other pollutants from the image many algorithms are used, here mainly used is Gaussian based dark channel. The essential goal of this survey paper is to give an organized framework of some outstanding dimness evacuation strategies. This paper additionally centers around the techniques which can relegate ideal qualities to picture dehazing properties. The survey has uncovered that the meta-heuristic systems can achieve hopeful cloudiness evacuation parameters and furthermore simultaneously builds up an idealistic target capacity to assess the profundity map effectively. At last, this paper portrays the different issues and difficulties of picture dehazing procedures, which are required to be additionally considered. All the images taken in a poor weather has a flickering effect, to remove flickering effect a flicker free module is formulated. So overall the image is enhanced to get quality image.

**Key Words:** (Defogging, haze, rain, pollution, dark channel, enhancement, Confidence-encoded, Context Modeling, Contrast Restoration, polarization, interactive, image restoration).

## 1. INTRODUCTION

The pictures taken by cameras in foggy climate are brought into the world with poor perceivability and low complexity, which raises bunches of hell to picture division and target discovery in video reconnaissance framework and makes different outside checking frameworks, for example, video observation framework, unfit to work dependably in awful climate. Therefore, it is an important research topic to improve the reliability and robustness of the outdoor observing framework with basic and viable picture defogging calculation. Numerous specialists have made broad examinations and accomplished a progression of hypothetical and application results [1- 19]. Picture defogging strategies fall into two classes [20, 21]: picture improvement and physical model-based reclamation. The picture improvement technique does not think about the

reason for picture debasement in foggy climate, just managing the characteristics of the foggy image with high precision what's more, low difference. This can debilitate the mist impact on pictures, improve the perceivability of scenes, and upgrade the differentiation of pictures. The most normally utilized strategy in picture upgrade is histogram leveling, which can viably improve the difference of pictures, yet inferable from the uneven profundity of scenes in foggy pictures, to be specific, distinctive scenes are influenced by mist in fluctuating degree, worldwide histogram evening out can't completely expel the mist impact, while a few subtleties are as yet obscured. In writing [22], the sky is first isolated by nearby histogram leveling, and after that profundity data coordinating is gotten skillfully in the non-sky zone by a moving format. This calculation defeats the inadequacy of the worldwide histogram even in out for the detail processing and avoids the influence of the sky noise. Be that as it may, when this calculation is connected sub image selection effectively prompts square impact and subsequently can't improve the special visualization extensively. In this paper we investigate a few different ways to diminish the cloudiness from the pictures that are shot either in foggy climate conditions or some other hindrances noticeable all around which pulverizes the lucidity of picture. This issue for the most part happens on account of bigger far off pictures and particularly on account of aeronautical symbolism. The fundamental rule point here is to discover different approaches to isolate the murkiness content from the genuine picture substance and after that subtract that cloudiness part so as to finish up with an unmistakable picture. One approach to discover the murkiness content is by utilizing a polarization channel before a camera and adjusts the introduction of it by various points and accumulate every one of those pictures. This technique is extremely exact in finding and evacuating the dimness which makes it conceivable to get a much more clear picture toward the end.

## 2. GENERAL FRAMEWORK AND MATHEMATICAL FORMULATION

The current picture improvement and rebuilding strategies are not all that helpful to diminish the impact of dimness from murky pictures. As known an earlier, murkiness lessens

the optical data and accordingly diminishes the precision of information examination. Remotely detected, submerged and street side pictures are basically defenseless to climate impacts [22]. The impact of murkiness increments with the separation, which makes picture dehazing a difficult issue.

## 2.1 Depth map estimation

The cloudiness evacuation strategies request the estimation of a profundity map. The assessed profundity guide can be utilized to assess the airlight and transmission map. Many created techniques have anticipated the profundity map by utilizing the scene qualities. These highlights can be shading method, human visual capacity, or light up based capacity. Following are some notable strategies which have been utilized so far by analysts to evaluate the profundity.

### 2.1.1 Optical Model

The traditional murky picture development model i.e., optical model is proposed by Cozman and Krotkov [8] and given as in (1):

$$I_{mg}(k) = I_{sr}(k)M_{tx}(k) + G_{al}(1 - M_{tx}(k)) \quad (1)$$

Where  $I_{mg}$  is the observed image intensity,  $J_{sr}$  is the scene radiance,  $G_{al}$  is the global atmospheric light and  $k$  is the pixel position.

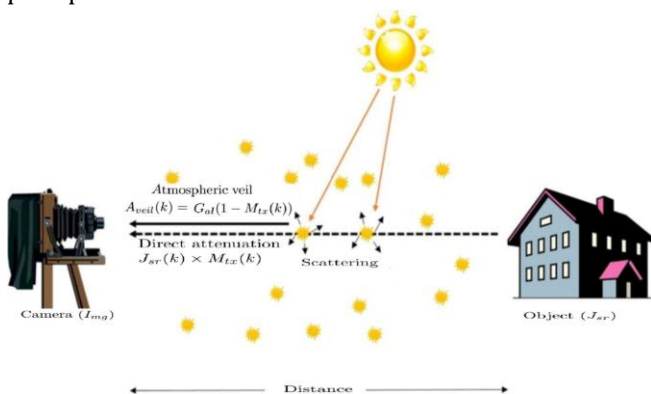


Fig. 2 Haze imaging model

### 2.1.2 Refined Optical Model

The ambiguities looked by conventional single picture de-preliminaries techniques, were understood via hunting down an answer, in which the resultant shading and transmission capacities are not comparative with one another. Utilizing a similar standard, the air light can be evaluated.

### 2.1.3 Visibility Restoration

These two variables, which are not constantly conceivable to figure, impact the transmission. In this way, the picture development model can be changed. White parity was at first received to set airlight.

### 2.1.4 Dark Channel Prior

The DCP presumption proposed [8] depends on perceptions nearby dimness permitted pictures, that is no less than 1 shading channel with certain pixels whose powers are low or near zero. In dim channel earlier based methodologies, the picture arrangement model utilized conventional 1 & dull channel  $J_{dc}$  is calculated as follows:

$$J_{sr}(k) = \frac{I_{mg}(k) - G_{al}}{\max(M_{tx}(k), L_b)} + G_{al} \quad (2)$$

Where  $cc$  is a color channel of  $J_{sr}$  and  $O(k)$  is a local patch centered at  $k$ . The two minimum operators are commutative. Both transmission  $M_{tx}$  and atmospheric light  $G_{al}$  can be obtained through the dark channel prior based method.

### 2.1.5 Learning Based Color Attenuation Prior

Instead of searching for the transmission  $M_{tx}(k)$ , Zhu [9] introduced novel color attenuation prior to obtaining the scene depth  $I_{depth}(k)$ . A linear model was employed to related  $I_{depth}(k)$  with scene brightness  $S_{bt}(k)$  and saturation  $I_{st}(k)$ , which can be mathematically written as follows:

$$I_{depth}(k) = LC_0 + LC_1 S_b(x) + LC_2 I_{st}(k) + R_r(k) \quad (3)$$

where  $LC_0$ ,  $LC_1$  and  $LC_2$  are three obscure direct coefficients, to be acquired through the administered learning technique,  $R_r$  is the irregular blunder of this model and  $R_r$  can be viewed as an arbitrary picture.

## 2.2. Restoring the Murkiness Free Picture

Subsequent to refining the profundity map, it is simply required to reestablish the murky picture utilizing cloudiness evacuation rebuilding capacity. In the wake of refining the transmission map, the scene brilliance can be scientifically recuperated as pursues:

$$t(x) = e^{\beta d(x)} \quad (4)$$

is a lower bound whose run of the mill esteem is 0.1 that is acquainted with make this calculation progressively powerful to clamor.

### 3. HAZE REMOVAL TECHNIQUES

This segment contains exhaustive survey on existing surely understood murkiness expulsion procedures. The order of these strategies is additionally done. The classifications of picture dehazing systems. Fog evacuation strategies are separated into seven general classifications for example (1) Depth estimation based fog expulsion, (2) Wavelet based fog evacuation, (3) Enhancement based cloudiness evacuation (4) Filtering based murkiness evacuation, (5) Supervised learning based fog expulsion, (6) Fusion based dimness expulsion and (7) Meta-heuristic systems based fog expulsion. The resulting area contains the subtleties of different cloudiness expulsion strategies alongside their qualities and shortcomings. This segment contains far reaching audit on existing understood murkiness evacuation methods. The arrangement of these methods is additionally done as pursue:

#### 3.1 Depth Estimation Based Murkiness Evacuation

The multi-scale tone methodology is used to assess the environmental shroud in a hopeful manner. Therefore, it can control the quality and enlighten of an info picture at different scales. A super pixel strategy is intended for assessing the transmission on sky just as non-sky zones, to reduce the impact of corona ancient rarities around edges and the reductions the shading twisting in the sky region.

#### 3.2 Wavelet Based Cloudiness Expulsion

The improved wavelet changes strategy for capable picture fog expulsion. This strategy at first uses wavelet change for expelling the fog from picture, and after that retinex system is used to improve the shading execution and to upgrade the shading impact subsequent to actualizing the wavelet change for picture fog expulsion.

#### 3.3 Enhancement Based Murkiness Evacuation

In this area, different dimness expulsion methods are examined which depend on a few picture upgrade procedures. The dim channel earlier uses delicate tangling strategy that requires more memory and time. Therefore, dim channel earlier is effective for little size pictures as it were. To beat this issue, delicate tangling is supplanted by adaptively subdivided quad trees worked in picture space. [9].

#### 3.4 Filtering Based Fog Expulsion

The gamma amendment and middle separating by using look into table that can decide the fog free pictures in capable manner. This strategy has least calculation time than existing strategies without losing the splendor of the fog free picture [10]. The transmission map is assessed utilizing the base layer, and it is used to recoup cloudiness free picture. Yet, this strategy has poor calculation time than dominant part of existing strategies.

#### 3.5 Supervised Learning Based Dimness Expulsion

By building up a direct model with administered learning method, profundity of murkiness picture can be assessed in more predictable manner than a large portion of existing strategies. By utilizing this profundity data one can without much of a stretch assess the transmission map and subsequently recoup the scene splendor by using the barometrical dissipating strategy. At that point reclamation model comes in real life to expel the impact of murkiness from the picture [10].

#### 3.6 Fusion Based Murkiness Evacuation

A multiscale profundity combination system is depicted for expelling the dimness from single picture. The aftereffects of multiscale sifting are probabilistically consolidated into an intertwined profundity map contingent on the model. The combination is formulated as a vitality minimization issue that incorporates spatial Markov reliance. The multiscale profundity combination procedure can assess the profundity map in increasingly steady manner and furthermore can save the edges of cloudiness free picture with sharp subtleties.

#### 3.7 Meta-Heuristic Systems Based Dimness Expulsion

The vast majority of existing dimness expulsion procedure is unfit to choose best parameters for better murkiness evacuation. The utilization of hereditary calculation for dimness evacuation is that the parameter determination and capacity augmentation can be unequivocally related issues. The hereditary calculation can achieve the hopeful murkiness evacuation parameters by utilizing contrast gain as wellness work [11]. The goal work, in this work, is to augment the immersion of yield picture.

### 3.8 Variational Picture Dehazing

Existing dehazing approaches gauge profundity guide to expel the dimness from pictures. Consequently, these systems are powerless against disappointment at whatever point the physical suppositions are damaged. Picture upgrade systems don't assess the profundity map. Subsequently, these systems don't experience the ill effects of this issue. Luckily, variational picture dehazing procedure can beat the physical suspicions disappointment issue and over-improvement issue. Succeeding segment portrays some outstanding variational picture dehazing strategies [12].

#### Difficulties

In foggy climate, water beads glide in the environment. Hence, picture light up created at a pixel is the coordinated impact of the greatest quantities of water beads inside the pixels strong point. Nature of the caught picture isn't so huge as in cloudiness free picture.

- ✓ Atmospheric light observing: The barometrical light is dependably observed by utilizing the dull channel earlier, especially when the dim channel is assessed by using an expansive neighborhood cover.
- ✓ Over upgrade: Upgrade of the murky picture is observed to be basic errand in light of the intricacy in reestablishing the enlighten and shading while at the same time holding the shading dependability.
- ✓ Large murkiness inclinations: The essential disadvantage of lion's share of existing strategies is that they may lose noteworthy subtleties of reestablished pictures with expansive cloudiness inclinations.
- ✓ Adaptive parameters determination: By and large these parameters are fixed measure, reclamation esteem, lower bound and white equalization factor. These confines the execution of cloudiness expulsion as rebuilding esteem should be versatile as the impact of fog on given picture shifts scene to scene and barometrical cloak.

### 4. HAZE FORMATION MODEL

Under terrible climate, for example, haze, murkiness, fog or brown haze, the difference and the shade of the pictures are radically diminished. In PC vision, the condition underneath is typically used to portray the development of foggy or

murky pictures [13].

$$I(x) = J(x) * t(x) + A * (1 - t(x)) \quad (5)$$

Where,  $I(x)$  indicate the observed hazy image.  $J(x)$  is the scene radiance which is the reconstructed haze free image.  $A$  is the airlight,  $t(x)$  is the transmission function.  $x$  indicate the position of the pixel. The  $t(x)$  is the known portion of the light which does not scattered and reached the camera.

## 5. DEHAZING TECHNIQUES

The nature of the picture taken under terrible perceivability is constantly corrupted by the nearness of the mist, cloudiness, brown haze, fog. Since the climate was influenced, the complexity of the picture is significantly decreased. Dehazing is the way toward expelling the fog from a caught picture. So as to take care of the issue of how to acquire an astounding fog free picture.

### 5.1 Fattal technique

Rannan Fattal thinks about that the shading and transmission signals are un-related [14]. In view of this supposition, the airlight-albedo uncertainty can likewise be settled. The technique performs very well for cloudiness, yet decays with scenes including mist. This technique is physically substantial and fit to reestablish the differentiations of complex cloudy scene.



(a)

(b)

In the above **fig-3**, (a) speaks to the info picture to the lethal strategy and (b) speaks to the yield in the wake of applying the deadly technique.

### 5.2 Polarization sifting

Schechner in [15] paper recommended that generally airlight dispersed by the climatic particles is halfway spellbound. Polarization channel alone can't evacuate the dimness impact. The pictures taken through a polarizer utilizes polarization separating. The polarization sifting and the introduction of the polarization channel improve the

complexity of the single info picture. So as to take care of the issue of the fogginess, polarization sifting is utilized to decide the dimness substance of the picture and after that this cloudiness substance are disposed of from the picture to get the reasonable picture.

### 5.3 Dark Channel Prior

These dim pixels are utilized to gauge the cloudiness transmission. At that point by applying the dull channel earlier technique proposed by the He et al [16] over the portioned picture so as to assess the climatic light. After that utilizing the Algorithm and evaluating the expense of the transmission map.



(a)

(b)

(c)

**Fig-4** Haze removal using dark channel prior.

In the above fig-4, (a) speaks to the info murky picture, (b) speaks to the yield picture subsequent to applying dim channel earlier technique and (c) speaks to the recouped profundity map.

### 5.4 Dehazing by Fusion

Schaal in [17] concentrated on the way that in open air photography, the separation object are seemed obscured and loses its shading and perceivability because of the corruption level influenced by the air cloudiness. Pixel level combinations criteria are utilized to augment the difference to improve the areas those contain the cloudiness.

## 6. LITERATURE

Trung Minh Bui et.al (2018). In this research, the factual heartiness built up utilizing normal qualities to build the ellipsoid, the base shading part makes it workable for the technique to amplify the difference of dehazed pixels at any murkiness or clamor level and significantly decrease over-immersed pixels and unnatural ancient rarities. Besides, a very unpredictable refinement procedure to diminish corona

or unnatural antiquities, we install a fluffy division process into the development of the shading ellipsoid with the goal that the strategy all the while executes the transmission count and the refinement procedure. The technique builds shading ellipsoids that are factually fitted to fog pixel bunches in RGB space and after that ascertains the transmission esteems through shading ellipsoid geometry [23].

Xiaoping Jiang et.al (2018). In this examination, they utilize the repetitive neural system to actualize test preparing procedure, and we acquire the mapping connection between surface structure highlights and shading highlights and scene profundity, and after that we gauge the scene profound guide of mist pictures. At that point, we utilize repetitive neural system to execute test preparing procedure, and we acquire the mapping connection between surface structure highlights and shading highlights and scene profundity, and after that we gauge the scene profound guide of mist pictures. At present, the standard picture de-misting calculation basically utilizes an assortment of mist related shading highlights, be that as it may, distinctive shading earlier learning frequently has its very own scene constraint. Right off the bat, we utilize meager programmed coding machine to separate the surface highlights of the picture, and concentrate a wide range of the mist related shading highlights. They utilize meager programmed coding machine to separate the surface highlights of the picture, and concentrate a wide range of mist related shading features [24].

Riqiang Gao et.al (2018). In this research, a novel misfortune work, named edge misfortune, to grow separations of interclass and decrease intraclass varieties all the while. In this examination, edge misfortune depends on the Euclidean separation, and verification task-based Euclidean separation achieves the peak when Softmax is surrendered in the later stage. Unique in relation to Softmax misfortune, edge misfortune depends on Euclidean separations that can legitimately gauge face similitude. The fundamental point is to build up a general adaptation of edge misfortune to fit various types of separations and systems in future work. In this misfortune work, we broaden the interclass removes and lessen intraclass varieties in a similar time [25].

Surasak Tangsakul et.al (2018). In this research, the cell automata principle to refine the force of picture pixel in a dim channel. Right off the bat, the dull channel refinement process utilized the standard of cell automata to improve the power of the DCP. In this paper, a novel strategy utilizing cell automata for the single picture dimness evacuation. For execution assessment, this paper utilized the most prevalent picture assets comprises of benchmark pictures, high goals pictures, ground truth pictures and realized transmission pictures in the test contrasted and the notable strategies. At last, the cell automata standard to develop the transmission map and reestablished the murkiness free picture. This paper improves single picture murkiness evacuation

utilizing cell automata model. The technique improved power, shading immersion quality, and maintain a strategic distance from radiance antique with no post-preparing when contrasted and the best in class strategies [26].

Yan-Tsung Peng et.al (2018). So as to improve and reestablish such pictures, they first gauge surrounding light utilizing the profundity subordinate shading change. At that point, through figuring the contrast between the watched force and the surrounding light, that can section encompassing light differential, scene transmission can be assessed. Furthermore, versatile shading remedy is consolidated into the picture arrangement model (IFM) for expelling shading throws while reestablishing contrast. Trial results on different corrupted pictures exhibit the new technique beat other IFM based strategies emotionally & equitably. The methodology which contain deciphered on behalf of speculation of normal DCP way to deal with picture rebuilding, and our technique diminishes to a few DCP variations for various uncommon instances of surrounding lighting and turbid medium conditions [27].

Vivek Maik et.al (2018). In this paper, we present a novel and successful defogging calculation. Our technique gauges the environmental light utilizing mist free reference picture about same scene and mist line vectors. So as to gauge transmission, we connected triangle fluffy enrollment work. The weighted L1-Norm based relevant regularization is utilized to decrease transmission estimation mistake, for example, unexpected profundity hop. Trial results demonstrate that we can obtain haze free pictures with less shading contortion than the ordinary strategies. This strategy can be utilized preprocessing methods aimed at different video investigation application, for example, propelled driver help frameworks (ADAS), self-driving vehicle and reconnaissance framework [28].

Bowen Yao et.al (2018). In this paper, the different absorption of light by water, the traditional DCP cannot be everyday to underwater images directly. The characteristics of underwater images, this method improves the accuracy of estimation of the ambient light and three channels' transmissions. In this paper, an algorithm based on modified DCP & color correction obtain recovery picture. In this paper, a modified method for images restoration based on the dark channel prior (DCP) offered. They carried out at last demonstrate the good performance of this method for improving the visibility of underwater images [29].

Tianyu Zhang et.al (2018). In this paper, an instinctive nature safeguarded quick dehazing calculation utilizing HSV shading space. Not with standing this, our calculation is as yet unfit to recoup the outwardly satisfied shading for pictures caught in complex climate conditions like dust storm. This calculation can successfully stifle radiance impacts by applying the modified opening task to appraise the transmission map. In the first place, we process cloudy

pictures in HSV shading space rather than RGB so as to save tint and diminish computational multifaceted nature. It is reliable with watched conditions to upgrade the perceivability of murky pictures in HSV shading space. In addition, the computational multifaceted nature has been to a great extent diminished, in this manner making our calculation fitting for ongoing applications. In this paper, an expectation safeguarded quick calculation for single picture dehazing [30].

Ma Xiao et.al (2018). In this examination, the strategy used to improves the customary K-implies grouping calculation, thinking about the relationship between's the examples & run time is calculated, utilizing the improved K-implies bunching calculation to perceive foggy pictures; The conventional defogging calculation dependent on dull channel earlier is upgraded from the edge of improving the flexibility and proficiency of the calculation, just as improving the defogging impact, the clearness of the foggy pictures is acknowledged dependent continuously improved defogging calculation. Savvy defogging strategy has high foggy pictures acknowledgment precision and is appropriate for huge scale information preparing, the defogging pictures yielded by the proposed keen defogging technique have high clearness and differentiate, and the picture reclamation impact of the proposed technique is great, which can be utilized to improve the working unwavering quality of outside vision framework. This technique can consequently perceive and process foggy pictures, the acknowledgment exactness of the foggy pictures is high and the defogging impact is great, which advantageously recover unwavering quality of the outside vision framework. In perspective on the foggy pictures gathered by open air vision framework are obscured, a smart defogging strategy dependent on bunching and dull channel earlier. Right off the bat, it utilizes the improved K-implies bunching calculation to understand the acknowledgment of foggy pictures; at that point, utilizing the improved defogging calculation dependent on dull channel before procedure the perceived foggy images [31].

Mrs.W. Sylvia Lilly Jebarani et.al (2017). In this exploration, the halfway face acknowledgment utilizing Scale Invariant Feature Transform (SIFT) system joined with Multi-directional Multi-level Dual Cross Patterns (DCP) procedure that makes acknowledgment task as vigorous 1 when contrasted with other face acknowledgment approaches. After face location process, component conveyances are removed from the display picture and test face fix utilizing SIFT keypoint indicator and DCP strategy. Within this research, another Robust Face Recognition approach is proposed utilizing SIFT and DCP methods. A strong face acknowledgment framework is assessed dependent on the execution parameters, for example, affectability, explicitness, exactness, accuracy and review [32].

Bokun Xu et.al (2017). In this paper, we present the Large Margin Nearest Neighbor (LMNN), which learns Mahalanobis

remove metric which connect, to SRC and CRC territory imperative. Next, an area LMNN Weighted Sparse Representation based Classification (LMNN-WSRC) and a territory LMNN Weighted Collaborative Representation based Classification (LMNNWCRC) are proposed. They got the strategies for both linearity & information area. Question relate to face picture, there objective to misuse the proper separation metric as the region requirement that could concentrate more on individuals really related pictures in the code book. Exploratory outcomes on the Extended Yale B database & AR database demonstrate the techniques are extra powerful than SRC, Weighted SRC (WSRC) & CRC [33].

Xiongbiao Luo et.al (2017). In this examination, the structure coarsely reestablishes the shading perceivability and upgrades the differentiation of a foggy picture and after that refines the defogging picture by melding the shading reestablished and differentiates improved pictures in inclination and recurrence areas. Another perceivability driven combination defogging structure is proposed for careful endoscopic video handling. Hazed careful field representation that is a typical and conceivably unsafe issue can prompt improper gadget use and inaccurately focused on tissue and increment careful dangers in endoscopic medical procedure. This paper shows the investigation on carefully expelling mist or smoke in careful recordings to increase the perception of the working field in endoscopic methods. The system defogs endoscopic pictures more powerfully than as of now accessible strategies. This work expects to expel mist or smoke on endoscopic video arrangements to enlarge and keep up an immediate and clear perception of the working field [34].

Lei Yang et.al (2017). In this paper, an improved plan strategy is proposed to expel cloudiness from a solitary picture. In view of the environmental dispersing model, dim channel earlier is utilized to gauge the estimation of worldwide air light by an interim. At that point, to manage the invalid instance of the dull station, we abuse a plan to distinguish splendid region dependent on double edge and build up an approach to address transmission rate, which empowers the dim station preceding be increasingly appropriate. The technique can accomplish a quicker handling velocity, effectively improve the perceivability and difference of the reestablished picture, and get great shading effect [35].

Zhuohan Cheng et.al (2017). In this paper, a multi-goals defogging calculation for extricating closer view objects of enthusiasm from climate corrupted pictures, and improving the separated districts perceivability in the meantime. A methodology is productive and effective for closer view object location and perceivability upgrade under haze climate conditions. A picture rebuilding strategy is broadly utilized in applications like traffic observing and reconnaissance amid murky climate conditions, forecast and investigation of volcanic exercises, and so on. The procedure

deteriorates the given dim picture into its recurrence segments in which the most unmistakable element esteems are extricated utilizing a combination model. Additionally, it has been seen that this methodology beat the other single picture based de-preliminaries techniques [36].

**Table-1:** Algorithms used in Defogging

TITLE	AUTHOR	ALGORITHM
An Efficient Fusion-Based	Jing-Ming Guo, Jin-yuSyue,	Gaussian-based dark channel
Scene-Specific Pedestrian Detection for Static Video Surveillance	Xiaogang Wang, Meng Wang, and Wei Li	Confidence-encoded SVM
Quantifying and Transferring Contextual Information in Object Detection	Wei-Shi Zheng, Member, Shaogang Gong, and Tao Xiang	Context modelling, object detection
Vision in Bad Weather	Shree K. Nayar and Srinivasa G.	Chromatic Atmospheric Scattering
Contrast Restoration of Weather Degraded Images	Srinivasa G. Narasimhan and Shree	Fast algorithm
Towards Fog-Free In-Vehicle Vision	Nicolas Hautière, Jean-Philippe	Contrast Restoration
Single Image Haze Removal Using	Kaiming He, Jian Sun, Xiaoou Tang	Gaussian-based dark channel
Blind Haze Separation	Sarit Shwartz, Einav Namer and	Polarization
Interactive (De)Weathering of an Image using Physical Models	Srinivasa G. Narasimhan and Shree K. Nayar	Interactive algorithms
A Fast Single Image Haze Removal Algorithm Using Color Attenuation	Qingsong Zhu, Jiaming Mai, Ling Shao	Removal algorithms

## 7. CONCLUSION

In this paper gives a concise survey on different dehazing strategies. In this paper the dimness layer present in the pictures caught in the terrible climate conditions is subject to the profundity of the scene and now and again it is variation in nature. and furthermore in this paper we have talked about a few strategies in which the cloudiness can be evaluated from the caught dim pictures and in the wake of assessing the profundity map and different dehazing techniques, a superior and improved dimness free pictures can be recuperated. In this paper we have depicted that the cloudiness layer present in the caught info picture is subject to the scene profundity and it is variation in nature. Likewise

in this paper we have tended to various strategy in which the murkiness can be evaluated from the caught murky pictures and in the wake of assessing the profundity guide and utilizing the picture arrangement model a superior and improved dimness free picture can be recuperated. Sometimes channels are additionally utilized so as to get a decent quality murkiness free pictures without evaluating the profundity.

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