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Image Dehazing by using Laplacian Approach with Contrast Adjustment

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Abstract: Super high resolution (SISR) images are a very hot topic in the field of image processing to convert a single low resolution (LR) image into a super high resolution (SR) image. As part of the real-time imaging function, the softedge reconstruction network is a CNN model that is used to directly reconstruct soft-edge images from LR images. The edge network technology works independently to achieve smooth image edge reconstruction, or subnets are implanted in each SR model to provide smooth front-end image edges to achieve high-quality SR image reconstruction. For super resolution, early researchers used traditional image processing methods. The proposed system is used to improve image unevenness based on the contrast distribution of the object and the edge of the object's detailed description can be found in the picture.

Keywords: Image Dehazing, Contrast Adjustment, Laplacian approach, Deep neural network, High resolution.

I. INTRODUCTION

Underwater images are hampered by poor contrast, colour change, suspended and floating particles. Particularly with cameras mounted on ROV and AUV systems has widespread in civil and military applications. The processing and analysis of underwater images is nontrivial in ocean engineering and many other scientific applications. The eminence of submerged images is important in many applications such as inspection of plants; Sea based exploration, search of wrecks up to the exploration of natural sources and geological and biological fields. The broad topic in deep-sea engineering is acquiring the pure images in sunken environment. Capturing of underwater images is a great challenging task compared to terrestrial images, because of the haze caused by light that is reproduced from the outward and is deflected and also diverted by several water particles. Different wave lengths of light cause various degrees of attenuation and the most visible colour in the water is blue. Subsequently, with light scattering and deviation of colour leads to the contrast loss in the captured images. Images composed under smog, mist, and additional climate conditions often agonize from little dissimilarity, unclear sections, and big colour blunders, which are disposed to to unpleasantly disturb the tender of computer vision procedures such as target recognition and semantic segmentation. Therefore, the technique of dehazing a single-image unswervingly without using any a previous information is of great consequence to the arena of computer vision. At present-day, the usual dehazing approaches can be separated into three according to dissimilar principles: firstly, image enhancement practices. These approaches focus largely on the dissimilarity of the image itself and other data. Secondly, image restoration approaches are built on the representative physics representations; these approaches are principally through a priori familiarity and physics representations to complete the dehazing operation. Thirdly neural network-based dehazing approaches mainly practice neural networks to complete the haze feature abstraction, thereby confirming the dehazing technique. Image enhancement is a technique, used to increase the quality of an image by increasing the intensity levels of the image or parts of the image so that the resultant image should be clearer compared to the captured image and hence used for display or further image analysis,

Fig.1 represents the example of dehazed image (left corner: low-resolution image, right corner: high-resolution image)

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II. EXISTING SYSTEM

A soft edge reconstruction network is the CNN model used to reconstruct the image soft-edge directly from the LR image. The Edge Net can effort autonomously for the image soft-edge reconstruction, or be implanted as a subnet into any SR representative to deliver image soft-edge preceding for first-rate SR image rebuilding. Soft- edge assisted Network which is a well-designed network that introduces the Edge-Net to deliver image soft-edge prior. Maintaining the Integrity of the Specifications.

- Conventional methods are often sensitive to the parameter settings and those methods are expensive.
- It is difficult to reconstruct realistic high frequency details due to the lack of prior knowledge of natural images.

III.PROPOSED SYSTEM

In the proposed system we used to advance the perceptibility of images, early researchers use the traditional techniques of image processing. Founded on the learned cross domain relationships, the anticipated system can eliminate color distortion by using dehazing method. We proposed a dehazing algorithm based on the difference structure preservation prior, which can estimate the optimal transmission map and restore the actual scene. The technique of image dissimilarity enhancement on the base of the contrast distribution at the borders of objects and circumstantial on the image is proposed.

IV.ADVANTAGES OF THE PROPOSED SYSTEM

The image enhancement function uses the haze removal function to remove unwanted visual effects. However, it differs from conventional noise reduction and contrast enhancement technologies in that the deterioration of image pixels caused by fog depends on the distance between the object and the area. A device used to measure the density of haze. The blur effect of image pixels also suppresses the dynamic range of colors. Therefore, using the enhancement method, the image is clearly visible and accurate.

V.ARCHITECTURE DIAGRAM

The below diagram explains that to progress the distinguishability of pictures, early researchers use the traditional techniques of image processing. Based on the educated cross domain relationships, the planned technique can eliminate colour distortion by using dehazing method. We proposed a dehazing algorithm based on the difference structure preservation prior, which can estimate the optimal transmission map and restore the actual scene. A method to increase the contrast of the image based on the contrast distribution of the object boundary and the image background is proposed.Fig.2 represents the architecture diagram.

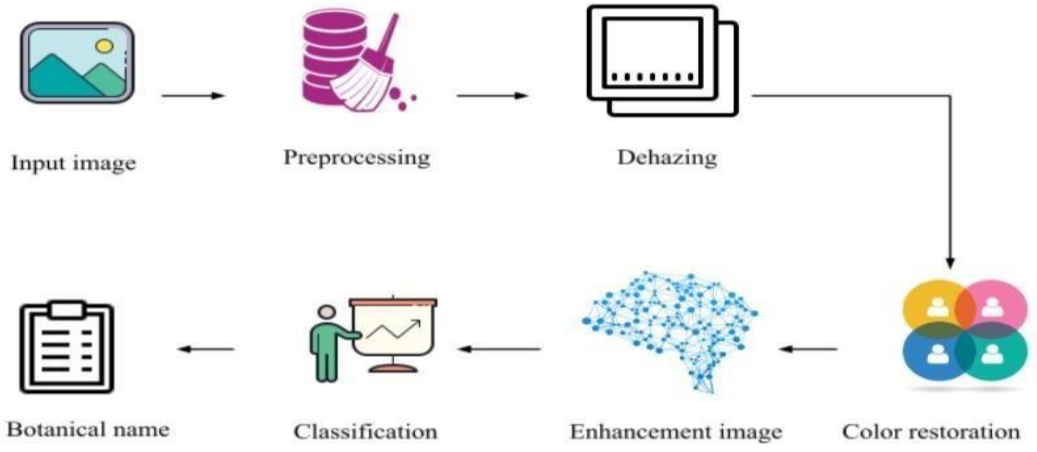

Fig.2 Represents the Architecture Diagram

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VI.SYSTEM DESIGN

UML Diagrams:

UML stands for Unified Modelling Language. UML is a consistent all-purpose modelling language in the arena of object-oriented software program engineering. The normal is succeeded, and was fashioned by, the Object the area is for UML to become a public language for forming models of object-oriented computer software program. In its present method UML is contained of two major mechanisms: a meta-model and a notation. In the forthcoming, some form of technique or procedure may also be supplementary to or linked with UML.The Unified Modelling Language is a ordinary language for postulating, Visualization, Constructing and authenticating the objects of software structure, as well as for professional displaying and other non-software schemes. The UML characterizes a gathering of finest engineering performs that have confirmed effective in the demonstrating of huge and composite systems. The UML is a self-same significant fragment of emerging object- oriented software and the software growth progression. The UML practices habitually graphical representations to prompt the strategy of software projects.UML can be useful to assorted application fields (e.g., investment, business, cyberspace, space, healthcare, etc.) It can be used with all main object and factor software development devices and for numerous application platforms.UML is not complete and it is not completely visual. For some UML diagrams, we cannot be sure whether we can understand **s**ome of the described behaviours or system behaviors based on the diagram alone. Some information may be omitted from the diagram intentiona**l**ly**, s**ome of the information di**spl**ayed in the diagram **c**an be interpreted in different **w**a**y**s, and some UML concepts have no graphical symb**o**l**s** at all, so the**y** cannot be r**e**presented in the diagram. For example, the semantics of multipl**e** topi**c**s and use cases **i**n the use case diagram are not precisely defined in the UML specification and may mean the simultan**e**ou**s** or sequenti**a**l use of the use cases.UML is a standard modelling language, not a software development process. UML Description described that development:

- Delivers guidance as to the command of a crew activities
- Requires what relics should be established
- Points the responsibilities of different designers and the crew as whole.

A. Use Case Diagrams

As the greatest recognized illustration type of the behavioural UML diagrams, use case illustrations give a graphic impression of the performers involved in a structure, different purposes needed by those performers and how these different purposes system. It's a great starting point for any project discussion because user can effortlessly categorize the main features involved and the main processes of the system. The user can create use case diagrams using our tool and/or get started instantly using our use case templates. Fig.A represents the user case diagram.

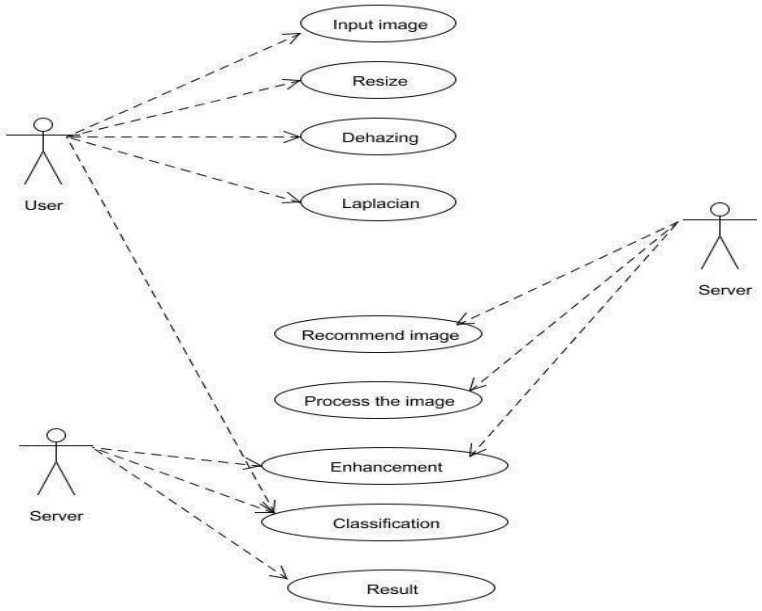

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Fig A..Use Case Diagram

B. Sequence Diagrams

The sequence diagram visually represents the flow of logic in the system so that you can record and verify the logic. It is widely used for analysis and design purposes. Sequence diagrams are the most popular UML artifacts used for modelling. Dynamic, the focus is on identifying the behaviour in the system. Fig.B represents the sequence diagarm.

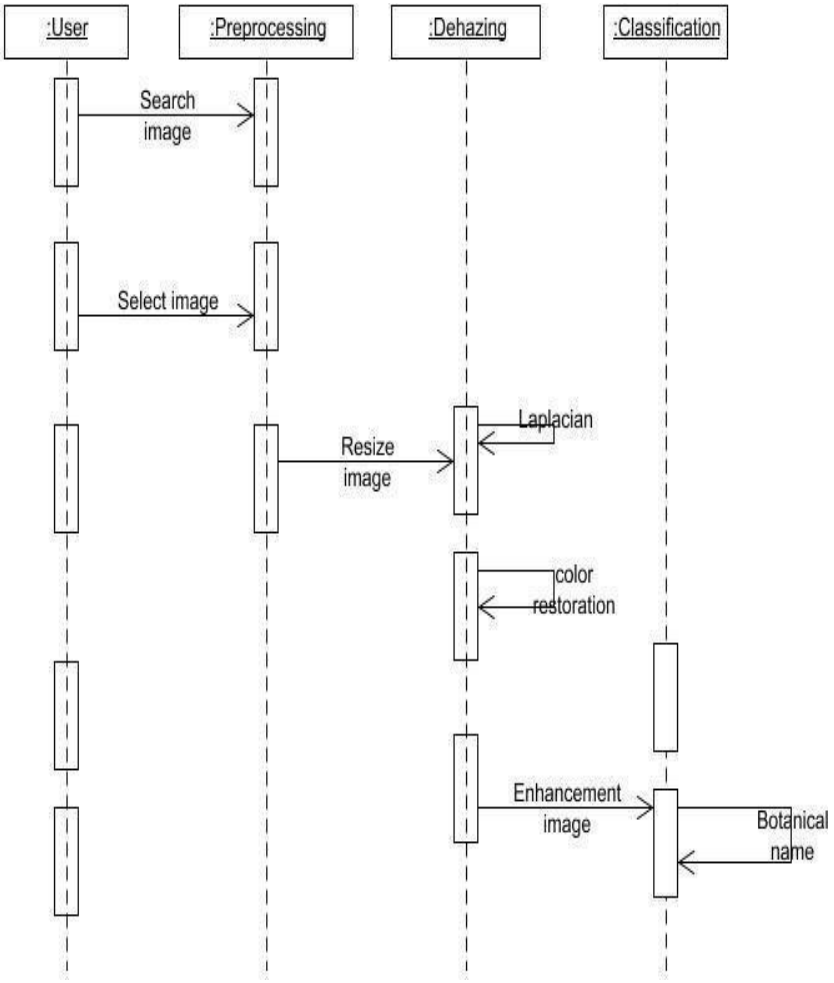

Fig.B. Sequence Diagram

C. Activity Diagram

Activity diagrams are graphical representations of multi-level activities and activity workflows, supporting selection, iteration, and parallelism. Activity diagrams can be used to describe the business processes and workflows of system components step by step. The program includes a start node, an end action node and intermediate actions. Fig.c represents the activity diagram.

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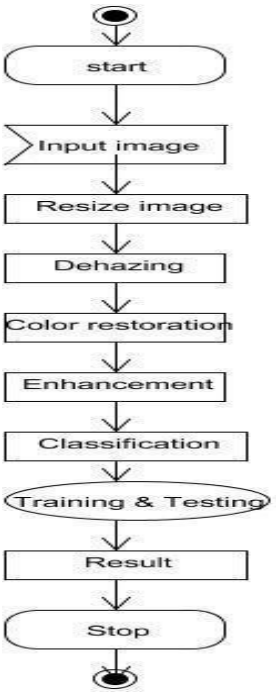

Fig.C. Activity Diagram

VII.MODULES

Module I: Pre-processing

The RGB panel is used to view the red, green and blue components of the image separately. It has already been mentioned that an RGB image is overlap of three two-dimensional matrixes. After the RGB method the image will get resized.

Module II: Normalization

Still there may be some presence of negative frequency components. It is made use of here to perform action on low frequency information. The region near zeros is to be highlighted for the enhancement and brightness preservation. Hence, after the application of this transform, the region around zeros is enhanced.

Module III: Enhancement & Classification

This is followed by grouping of pixels, where clustering is done to increase the high-resolution pixels. At this stage, the image pixels are converted back to RGB colour model and pixels highlighted to a certain level.By using the neural network finally, the botanical name of the plant is classified with the database created.

VIII.DEHAZING METHODS

It obtains scene information from the process information of a single image based on statistical assumptions**.** The various methods classified are explained as follows: -

a) Contrast maximization method: Since the haze reduces the contrast, removing the haze improve**s** the contrast of the image. However, the resulting image has a higher saturation value because this method does not physically improve brightness or depth**,** but can only improve visibility in some way. In addition**,** the results also include the halo effect on deep cracks**.**

b) Antistrophic Diffusion: This is a true technique that can minimize the haze of the image without removing edges, lines or other important parts useful for understanding the image (such as edges)**.** Its versatility combines smoothing characteristi**c**s and image enhancement characteristics. The anisotropic diffusion algorithm can improve the air light map of the dark channel earli**e**r**.** It is used to soften aeronauti**c**al charts and works well in dense fog.

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c) Atmospheric light*:* It is pre-calculated from the dark channel with a fixed window. If a window that is too small is used for minimal filtering, other light sources may be captured in the image, which will bias the estimate. In Figure 15 of the figure, the atmospheric light is distorted, and when it increases to 31, the atmospheric light between the pixels is correctly judged. An important interaction process needs to be developed to avoid making wrong assumptions about atmospheric lighting.

IX.DARK CHANNEL PROIR

This method is very useful for removing haze from a single image. It is used to measure the statistics of the external image without fog. Imagine that the color channel contains some of the lowest intensity pixels. These pixels are called dark pixels. Used to calculate the transition graph. The block diagram is used to completely eliminate certain effects. This image is used to reconstruct the fog image in order to accurately evaluate the transmission map. Usually, the amperage is very low. Calculate the minimum dark channel. According to the formula

$$Dark(x)=\min\{\min\{Jc(y)\}\}, \quad (1)$$

$$y\in\Omega(x)\,c\in\{r,g,b\} \quad (2)$$ Where J' is a colour channel of J and Q(x) is a local

X centre patch. Our observations show that, except for the sky area, the intensity of Jdark is low. When J is a fog- free external image, the intensity of Jdark tends to zero. We can say that Jdark is the dark channel J, we call it the previous statistical observations or earlier dark channel knowledge. Both transmittance t and atmospheric light A can be obtained using a DCP-based method. After perfecting the transmission, the transmission is discontinuous due to two discrete minimum operations, and the scene transmission can be restored from the following locations:

$$J(x) = I(x) - A / \max\{t(x), t_0\} + A \quad (3)$$

Where t 0, is the lower limit, and the typical value is 0.1. This value is introduced to make the algorithm more robust to noise. The low intensity of the dark channel is actually related to shadows or colored objects. The main steps are: estimating the atmospheric light, evaluating the transmission map, perfecting the transmission map and image reconstruction. Their interpretation is as follows: -

a) The estimated value of atmospheric light is calculated using a previously established dark channel with a fixed-point size.

b) Transmission map estimation: Estimated transmission map from input haze image is roughly good. It contains some blocky effect because transmission is not always constant in a patch. We can use soft matting algorithm for refine transmission.

c) Image restoration: -In this step, the value of image is restored. The value of t0 is range from 0.1 to 0.75 in order to make result satisfy the demand of SNR.

X.RESULTS AND DISCUSSION

The evaluation of the proposed method is tested in MATLAB R2018a on a PC with Pentium 4 processor, 2.4 GHz CPU and 4GB RAM. Initially underwater image with low resolution is given as the input. Fig.3 shows the input image needs to be reconstructed to obtain an enhanced image. Fig.4 represents the resized image in order to be dehazed and contrasted. Fig.5 represented contrast adjusted image. After that image is dehazed using dehazing algorithm. Fig.6 represents dehazed image,

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Fig.3

Fig.4

Fig.5

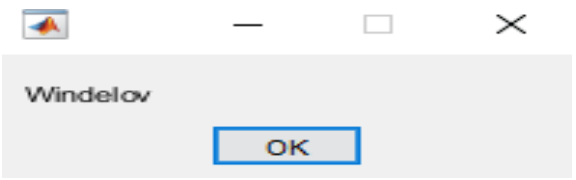
Fig.6

Fig. 7

Dehazed image is then restored and the objects and edges are enhanced. Fig.7 represents the resultant output image enhanced using dehazing method, which makes the image more natural. Fig.8 represents the neural network output. Deep Neural networks are typically organized in layers interconnected with nodes which contain an 'activation function'. Patterns are presented to the network through input layer which communicates to the hidden layer where the actual processing is done. The hidden layers are then linked to the output layer where the answer is output as graphic.Fig.9 represents the botanical name of the resultant image, which is obtained using deep neural network. The enhanced image is classified using deep learning technique to obtain the output.The development of image dehazing methods has been beneficial to many real-world applications, including video assisted transportation, outdoor video surveillance, analysis of remote sensing imagery, and driver assistance systems. These techniques can also be transferred to underwater image enhancement and images acquired in rain or snow.

XI.CONCLUSION

In this paper deep neural network grounded submerged image development network is designed. However, when the system is trained it is able to correctly dehaze images in real time with only a still raw image as input. A method to increase the contrast of the image based on the contrast distribution of the object boundary and the image background is proposed. The results show that the system is able to generalize and lean to dehaze with images from a location. By using the neural network finally, the botanical name of the plant is displayed with the database created.



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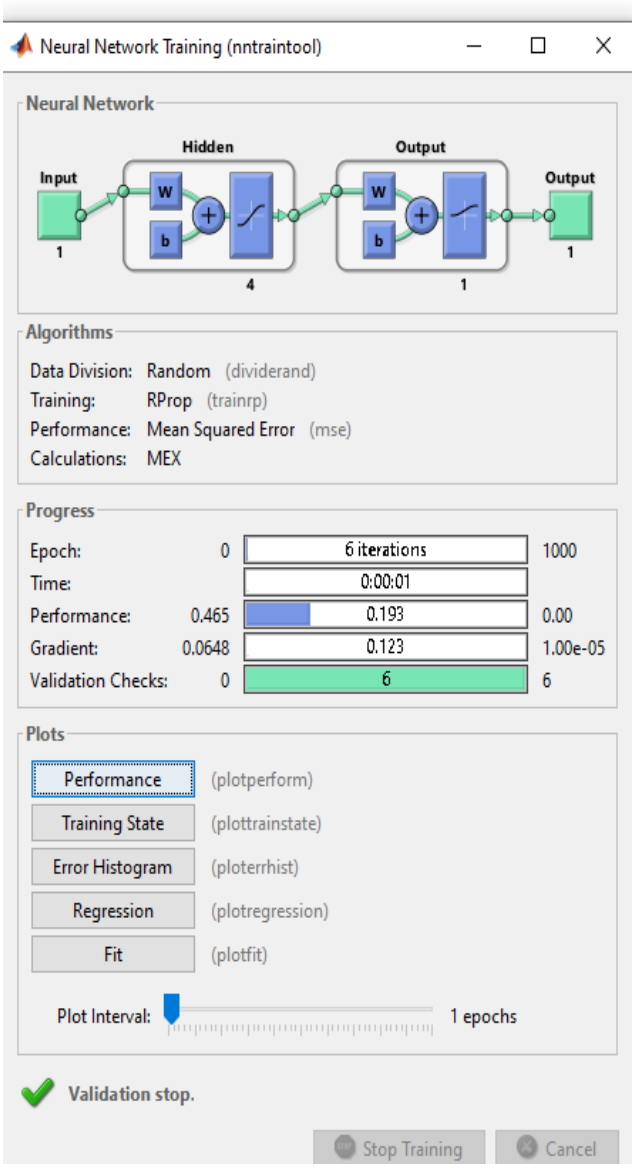

XII.FUTURE SCOPE

We can see that we have come a long way in improving underwater imaging standards and still there lies lot of scope for improvement. With the increasing pace of technology and growing fields(like ocean thermal energy, tidal energy, marine biology, etc), procedure implementation time will reduce drastically and in the future, these enhancement algorithms can find applications in underwater video enhancement too. The importance of underwater images becomes even more apparent and paves its way for future research and developments in this area.

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