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Degraded Factors Analysis in Multimedia Data using Deep Learning Algorithm

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A B S T R A C T

The visibility of a video is affected by many atmospheric interferences that degrade the quality of the video content. The video information is also affected by climatic events such as rain, fog and other details. The low visibility degrades the performance of subsequent video analysis or processing applied in computer vision techniques. This undesirable situation degrades the performance of several computer vision applications. Several computer vision techniques that employ feature information, such as object identification, tracking, segmentation, and recognition, will be harmed by these disturbances. Even if only a little portion of the object is obscured, the object cannot be accurately tracked. The attribute of a rain scene is that an image pixel is never completely covered by rain throughout the data. The dynamic adverse weather model is researched for restoration resolution. Rain is the most important component of the dynamic poor weather system. Rain-formed intensities have a strong spatial structure and are strongly influenced by background brightness. When light passes through, it is refracted and reflected, making them brighter than the surrounding area. When it falls at a high rate, though, the motion blurs. The intensity of the rain streak is thus determined by the brightness of the drop, the radiances of the background scene, and the camera's integration time. Rain and snow particles are more difficult to analyses. Rain-like spatial and temporal occurrences can be produced by some scene dynamics. In this work, we can implement the framework to analyse the degraded pixels and classify those pixels using guided filter and deep learning algorithm.

Keywords:Image dehaze, video dehaze, image deraining, video deraining

1. INTRODUCTION

An image is defined as a two-dimensional function, F(x,y), where x and y are spatial coordinates, and the amplitude of F at any pair of coordinates (x,y) is called the intensity of that image at that point. When x,y, and amplitude values of F are finite, we call it a digital image. In other words, an image can be defined by a two-dimensional array specifically arranged in rows and columns.Digital Image is composed of a finite number of elements, each of which elements have a particular value at a particular location. These elements are referred to as picture elements, image elements, and pixels. A Pixel is most widely used to denote the elements of a Digital Image.

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MODELING AND ANALYSIS

VIDEO ACQUISITION:

In this module, we can upload the videos with any size. Convert the videos into multiple frames. Frames are converted at each 0.5 seconds. Each frame is considered as single image. A video file format is a type of file format for storing digital video data on a computer system. Video is almost always stored in compressed form to reduce the file size. A video file normally consists of a container format containing video data in a video coding format alongside audio data in an audio coding format. The container format can also contain synchronization information, subtitles, and metadata such as title. A standardized (or in some cases de facto standard) video file type such as .webm is a profile specified by a restriction on which container format and which video and audio compression formats are allowed.

MODEL ANALYSIS:

In this module, we can implement this approach to convert the images into gray scale images. To *convert* a color from a colorspace based on an RGB color model to a *grayscale* representation of its luminance, weighted sums must be calculated in a linear RGB space, that is, after the gamma compression function has been removed first via gamma expansion. In this module convert the RGB image into gray scale images. Then remove the noises from images by using filter techniques. The goal of the filter is to filter out noise that has corrupted image. It is based on a statistical approach. Typical filters are designed for a desired frequency response. Filtering is a nonlinear operation often used in image processing to reduce salt and pepper noise. A median filter is more effective than convolution when the goal is to simultaneously reduce noise and preserve edges. This model is used to estimate the transmission map and Atmospheric transmission. These are referring to how well light radiating from a scene is preserved when it reaches an observer. It is a positive scalar quantity ranging from 0 to 1 where larger value indicate improved visibility

TRANSMISSION MAP:

In this module, can construct the initial transmission map based on geometric bound properties. It includes the scene radiance which is nonnegative and it is related to the neighboring pixels. Pixels in a local patch have similar depth values and consistent transmission maps. This effect occurs because the whole brick wall has the same scene depth and transmission map, but the elaborate estimation could reduce the contrast in the dehazed image.

REFINED TRANSMISSION MAP:

In this module we can design the local patch which can be approximated by a sparse linear combination of elements from a neighbor basis set. Need a set of neighboring training sample patches so that the transformation matrix can be calculated. First, we provide a method to measure the local depth consistency. In addition, to use the locally consistent depth as a regularizer, we assume that a local patch can be approximated by a sparse linear combination of elements from a neighbor basis set. More importantly, through building the difference-structure -preservation dictionary, the results have demonstrated that our approach is effective at restoring images.

DICTIONARY CONSTRAINTS:

In this module, build the difference-structure -preservation dictionary. If patches have the same structure, they may be successful in preserving a consistent transmission over the same object and can better reflect the structure of the image. From a statistical point of view, if the two samples are very close or similar, i.e., the distance between them is small or the similarity is high, they provide little information; on the contrary, the difference information should be great. On the premise of similarity, as far as it is possible to reflect the different state of similar samples, these samples provide many information models. In addition, since they are very sparse, the different samples can reflect more differences of information, and statistical attributes can also be estimated through samples.

RECONSTRUCTED FRAMES:

The use of robust statistics allows us to cope with complicated scenes containing different surface albedos and the use of an implicit graphical model makes it possible to extrapolate the solution to pixels where no reliable estimate is available. In its essence this method solves a non-linear inverse problem and therefore its performance greatly depends on the quality of the input data. We derive estimation for the noise present in the input and use statistical extrapolation to cope with large errors. In this module, haze or fog or rain fall are removed.

System Diagram

The below figure 1. describes the architecture of degraded factors analysis in multimedia data

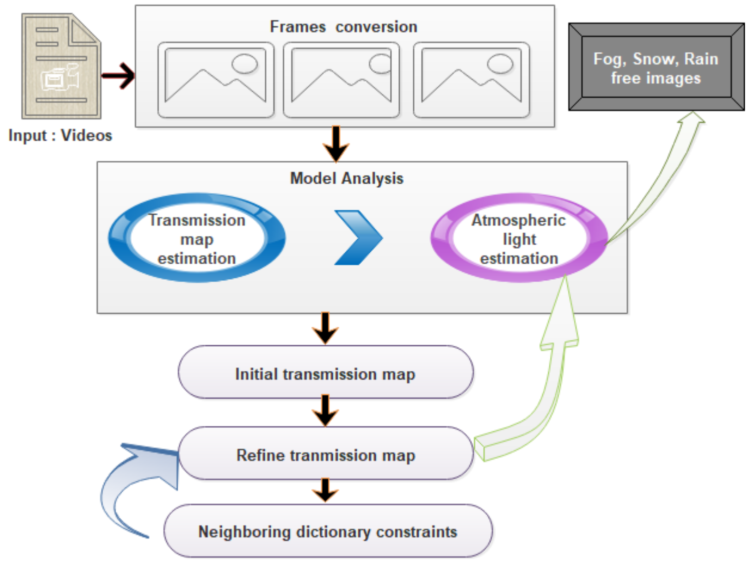

Figure 1. Architecture of degraded factors analysis in multimedia data

RESULTS AND DISCUSSION

Existing System

The quality of a captured image in bad weather is usually degraded by the presence of haze in the atmosphere, since the incident light to a camera is attenuated and the image contrast is reduced. Dehazing is the process to remove haze effects in captured images and reconstruct the original colors of natural scenes. Recently, lots of efforts have been made to develop efficient dehazing algorithms. In general, dehazing algorithms estimate scene depths and compute the thickness of haze accordingly. Recently, single image haze removal has made significant progresses. The success of these methods lies in using a stronger prior or assumption. Then observes that the haze-free image must have higher contrast compared with the input haze image and he removes the haze by maximizing the local contrast of the restored image. The results are visually compelling but may not be physically valid. Since the dark channel prior is a kind of statistic, it may not work for some particular images. When the scene objects are inherently similar to the atmospheric light and no shadow is cast on them, the dark channel prior is invalid. This work also shares the common limitation of most haze removal methods - the haze imaging model may be invalid. More advanced models can be used to describe complicated phenomena, such as the sun's influence on the sky region, and the blueish hue near the horizon. This method may fail in scenes where the airlight is significantly brighter than the scene. In such cases, most pixels will point in the same direction and it will be difficult to detect the haze lines.

Disadvantages

1. Image quality may be degraded
2. Provide rough estimate of the scene depth
3. Can lead to severe reconstruction artifacts.
4. Computational complexity is high

Proposed System

One of the main aims in image processing is to obtain an enhanced image. Outdoor multimedia data are degraded by the atmospheric phenomena like rain, fog, haze etc many applications such as consumer/computational photography and computer vision requires a vision enhanced image. Atmospheric particles absorb and scatter the light as it travels to the observer leads to cause haze, fog. These degraded images lose contrast and air-light shift the color of the image. Haze removal makes the image visually pleasant and corrects the color shift. Here we obtain the haze free image by deep learning method. By the process of deep learning method, the good information from each of the given images is fused together to form a resultant image whose quality is superior to any of the input data. This is achieved by applying laplacian on the input and Gaussian on the weighted inputs. The resultant image is formed by combining such magnified information from the input images into a single image. Aim behind deep learning-based technique is that we derive various layers such as convolutional, pooling and fully connected layer. For blending we require only important features of the images so we go for the weight maps. In this project we propose a new type of explicit image filter, called Gaussian filter. The filtering output is locally a linear transform of the guidance image. This filter has the edge-preserving smoothing property like the bilateral filter, but does not suffer from the gradient reversal artifacts. It is also related to the matting Laplacian matrix, so is a more generic concept and is applicable in other applications beyond the scope of "smoothing". Moreover, the Gaussian filter has an O(N) time (in the number of pixels N) exact algorithm for both gray-scale and color images.

Advantages

1. Restore the actual scene in images
2. Provide time efficiency to restore the multimedia
3. Estimation of air light is accurately.
4. Haze is removed from the large background and low contrast data.
5. Improved the contrast of the haze free data

Use case diagram

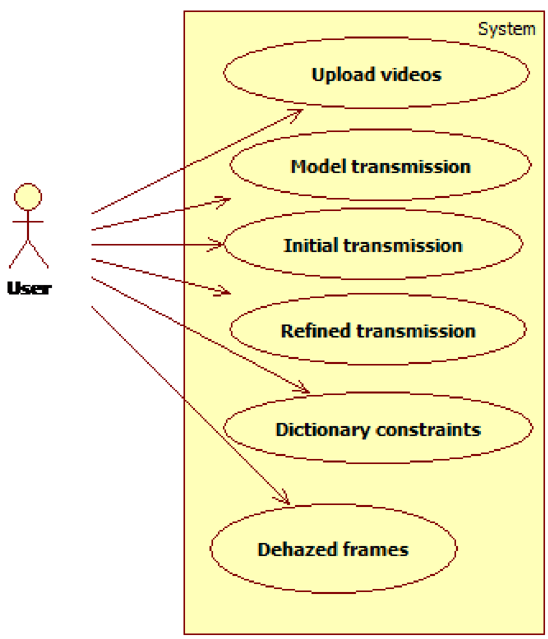

Figure 2. Use case diagram of degraded factors analysis in multimedia data

Algorithm
DEEP LEARNING ALGORITHM

Deep learning, a subset of machine learning, utilizes a hierarchical level of artificial neural networks to carry out the process of machine learning. The artificial neural networks are built like the human brain, with neuron nodes connected together like a web. While traditional programs build analysis with data in a linear way, the hierarchical function of deep learning systems enables machines to process data with a nonlinear approach. Artificial Intelligence and machine learning are the cornerstones of the next revolution in computing. These technologies hinge on the ability to recognize patterns then, based on data observed in the past, predict future outcomes. This explains the suggestions, Amazon offers as you shop online or how Netflix knows your penchant for bad 80s movies. Although machines utilizing AI principles are often referred to as “smart,” most of these systems don’t learn on their own; the intervention of human programming is necessary. Data scientists prepare the inputs, selecting the variables to be used for predictive analytics. Deep learning, on the other hand, can do this job automatically.

CONCLUSION

Haze due to dust, smoke and other dry particles reduces visibility for distant regions by causing a distinctive gray hue in the captured images. The hazy image is suffering from low contrast and resolution due to poor visibility conditions. One of the central problems in image processing in open air is the presence of cloud, fog or smoke which fades the colors and reduces the contrast of the observed things. Fog or Haze elimination is difficult because the fog is dependent on the indefinite depth information. Weather conditions reduce the operation range of most methods. In this project, a fast and effective method for real-time image and video dehazing is proposed. Using a newly presented image prior - dark channel prior, haze removal for a single image without using any extra information is formulated as a particular filtering problem and an improved filtering scheme is proposed based on guided filter. In the presented algorithm, the airlight and the down-sampled transmission can be estimated and extracted easily. Then using a guided filter, the transmission can be further refined and up-samlped. Results demonstrate the presented method abilities to remove the haze layer and achieve real-time performance. It is believed that many applications, such as outdoor surveillance systems, intelligent vehicle systems, remote sensing systems, graphics editors, etc., could benefit from the proposed method.

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