Classification of Clouds for Predication of Rainfall

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Abstract—Water is vital for livings creatures. Since all the living creatures are both straightforwardly or in a roundabout way relied upon water, forecast of precipitation winds up noticeably basic for us. Numerous businesses rely upon agrarian items like sugar industry, paper industry, tobacco industry, and so on. Water is required for substance and physiological development in the plants. Likewise for advancement reason water assumes imperative part. Estimation of precipitation is turning into a key worry because of expanding worldwide warming. Henceforth to get comprehension of precipitation we should know the cloud status and climate status. To discover cloud status, we are applying advanced picture preparing strategies. The computerized picture handling is utilized to upgrade pictures taken from an advanced camera. Mists can be of different thickness sizes and shapes. Contingent on their powers we are grouping them. For the anticipating the cloud status we have utilized the Cloud Mask Algorithm.

Index Terms—Cloud Status Digital Image Processing, Image Processing, Rainfall Forecasting, Cloud Status, Sky Status, Cloud Types, Classification

I. INTRODUCTION

Water is very important for livings beings. Since all the living beings are both directly or indirectly depended on water, prediction of rainfall becomes essential for us. Many industries depend on agricultural products like sugar industry, paper industry, tobacco industry, etc. Water is needed for chemical and physiological growth in the plants. Also for development purpose water plays important role. Estimation of rainfall is becoming a key concern due to increasing global warming. Hence to get understanding of rainfall we must know the cloud status and atmosphere status. To find cloud status, we are applying digital image processing techniques. The digital image processing is used to enhance images taken from a digital camera. Clouds can be of various thickness sizes and shapes. Depending upon their intensities we are classifying them. For the predicting the cloud status we have used the Cloud Mask Algorithm.Precipitation is nonlinear in nature so its exactness of determining is palatable in nature. Picture

handling is another and more propel kind of approach in expectation as it keeps an occasional tract of picture of sky.

Additionally it's savvy regarding both cash and preparing. Picture handling is effectively utilized as a part of different new innovations.

II. INTRODUCTION OF IMAGE PROCESSING

Picture handling is a technique to enhance natural pictures taken from camera, satellite, airplane, sensor or pictures taken in ordinary routine life for different applications. In Image preparing input is picture like photo or video casing and yield would be picture itself or attributes of that picture. A picture is a cluster or a network of pixels or little square specks which have its own particular splendor. A picture is characterized by f(x, y) where x and y are spatial co-ordinates and the sufficiency of is at any combine of co-ordinates at the specific point is called force. Dark scale picture has power in the vicinity of 0 and 255; it is for the most part called high contrast pictures. It is additionally called monochrome pictures. There are two regular gatherings of shading Images that are vector illustrations and bitmap designs. Shading Images are shaped of the quantity of pictures.

III. EASE OF USE

Precipitation is nonlinear in nature so its exactness of anticipating is attractive in nature. Picture preparing is another and more propel sort of approach in forecast as it keeps an intermittent tract of picture of sky. Likewise its financially savvy as far as both cash and handling. Picture handling is effectively utilized as a part of different new advancements.

IV. TYPES OF METHOD USED IN IMAGE PROCESSING

There are mainly two methods used in Image processing which are Analog Image Processing and Digital Image Processing.

A. Analog Image Processing

Simple picture preparing is taken a shot at simple signs. It does handling on two dimensional simple signs. In this procedure, pictures are changed over into electrical by changing in to the electrical flag. This preparing methods connected on to the printed versions like print outs, maps and photo. Its natural case is TV picture. The voltage level of the TV flag is shifts in adequacy. It speaks to shine of the picture. By changing in the flag, they showed picture appearance is changed. As per plentifulness changes picture brilliance, obscurity and complexity proportion will be changed.

B. Digital Image Processing

Digital image processing manipulates digital images. Digital computer processes on two-dimensional image. In digital image processing technique, image will be converted into numerical representation of object then these numbers will be given to any operation to find out desired result. Digital image is made up of number of components and those components have specific location and value. These components are generally known as pixels, image elements and picture elements.

V. PROCESSING TECHNIQUES OF IMAGE

- **Image Enhancement –** Image enhancement is a process which will convert image in to desire output which is suitable to specific application. Image enhancement techniques example is contrast and edge enhancement, pseudo coloring, noise removal, filtering and sharpening. This technique is useful in extracting feature or to take analysis based on image. This process does not add additional intrinsic detail. This process focuses only on certain specific detail of image.
- **Image Restoration –** Image restoration is a process in which image appearance will be changed. This process is based on mathematical and probabilistic model of Image degradation.
- **Image Compression –** Image compression is a process in which will reduce the size of image for the storing purpose.
- **Morphological processing –** In morphological process the desired object will be extract by using any tool. It is useful in representation and description of the shape. Morphological process has two operations that are erosion and dilation. In Erosion operation foreground pixels are removed without attaching background pixels. In dilation process any foreground pixels added without touches other background pixels.
- **Image Segmentation –** Image segmentation is a process in which image will subdivides into smaller parts or objects. Image thresholding techniques used in this process. After thresholding process binary image will be converted into black and white pixels. Black pixels are actually object and white pixels are the background.

VI. CLOUDS AND CLOUD TYPE

From the suns warm little drops of water moves from ground up to the air. At the point when water drops warm up it will be changed over in to gas and rise up into the air. This vanished water is called water vapor. This water vapor ascend up higher in to the air and it shapes a cloud. When these clouds are full of these small drops it becomes heavy and fallen on to the ground. Clouds are key element of water cycle. Clouds transports water from one place to another on the earth. They are also important to maintain sun's energy in to the atmosphere different types of clouds. The Fig. – 1 shows how different types of cloud are there in the sky. They categorized into highest level, middle level and lowest into the atmosphere..

A. The Highest Clouds

The highest cloud includes Cirrocumulus, Cirrus and Cirrostratus. Cirrocumulus: Cirrocumulus clouds are at high amplitude. They are composed of ice-crystal. They are in the series of white patches. They are formed as thin, sheet or layered of patches without shade. Cirrus: Cirrus clouds are very high in the sky. These clouds are made up of ice-crystal. It formed as white feather and thread like in the sky. These clouds forecast fair weather. Cirrostratus: These clouds are transparent in color. Their appearance is smooth and whitish cover. They are exceptionally broad, almost dependably closes by covering entire sky.SS

B. The Middle-Level Clouds

The center level mists incorporate Altocumulus and Altostratus. Altocumulus: The Altocumulus mists which are comprise of water drops. These mists are arranged in the vicinity of 6,000 and 20,000 feet at high elevation over the earth. These mists showed up as parallel strips or, then again adjusted masses. Altostratus: Altostratus mists are made out of ice gem and water drops. These are for the most part dark or blue-dim in shading. They are arranged in the vicinity of 6,000 and 20,000 feet (2,000 to 6,000 meters) over the earth. It for the most part covers entire sky..

C. The Lowest Cloud

The lowest level clouds include Stratocumulus, Stratus and Nimbostratus. Stratocumulus: Stratocumulus clouds are very low and they are in grey color. They are looks like cell and sometimes they are in a row and spread out in the sky. Stratus: Stratus clouds are very low. They are in grey color. It displays as the fog in an Environment. They don't reach at the ground. They generally cover.

Whole sky.Light mist or drizzle is occasionally linked with stratus cloud. Nimbostratus: Nimbostratus clouds are dark gray.Continuous snow or rain is linked with nimbostratus cloud. They generally cover whole sky and disappears its edges.
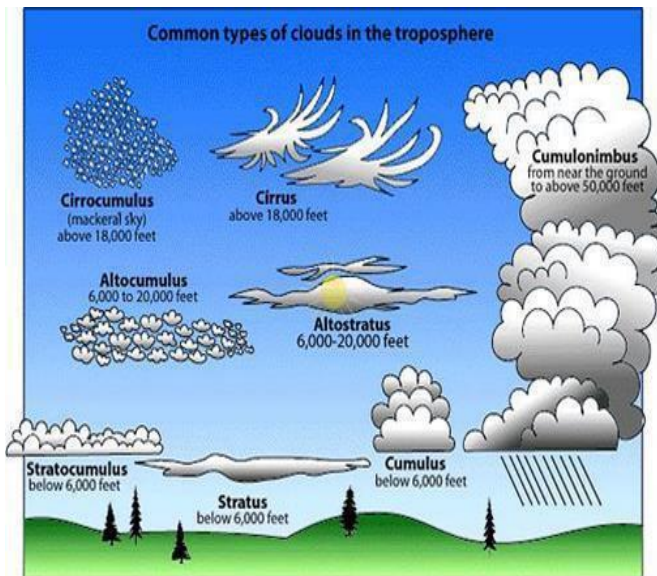
Fig. 1: Common types of clouds in the troposphere

VII. PROPOSED SYSTEM

- Our software will be based on the existing system. But our system will be enhanced version of existing system. It will be enhanced by using various enhanced and newly evolved algorithms.

- The implementation method will consists of six phases. In the first phase data is collected. In the second phase the status of sky is found. In the third phase the status of cloud is found. In the fourth phase the type of cloud is evolved. In the fifth phase the information about the cloud and the status of rain are displayed. In the sixth phase the analysis and measurement takes place.

- The implementation can be done using JAVA on Windows Operating System or Unix Flavoured Operating System or IOS Operating System. The digital cloud images used can obtained from Internet by Satellite or 10 Mega Pixel Digital Camera. The images are stored in the File System. The file format used to store the images is *.jpeg.

- The data collected is of the digital cloud images. We store these image in the file system. The digital cloud images used can obtained from Internet by Satellite or 10 Mega Pixel Digital Camera. The images are stored in the File System. The file format used to store the images is *.jpeg Any number of images can be added in the file system.

- The sky cover is discovered utilizing the laws surface depiction.Be that as it may, we utilize wavelet for finding the sky status. It isolates the point required for the group. In wavelet detachment focuses are utilized as a part of the ID of the mists or sky. Our application is cloud so the cloud will be the partition point. The wavelet limit for the mists is in the vicinity of 50 and 200

- In this progression the sky will be isolated from the given Especially K-Means clustering can be used to find the type of cloud.

- Cloud Information will be finally obtained in this stage. We call it the Cloud Information Stage. The information

about cloud consists of Altitude, Bandwidth, Frequency, Classifi-cation and Appearance.

- The rainfall information will be given according to the type of cloud and their precipitation. Every type of cloud is not a rainfall cloud. Among the type of clouds Nimbostratus and Cumulonimbus clouds are rainfall clouds and some other clouds like Cumulus produce rain at some rare case*s*.

VIII. ACKNOWLEDGMENT

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