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Analysis of High-Resolution Images By The Use of Fuzzy Histogram Equalization Usingann

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Abstract: -

Neural network basically works on the collection of the collected units which are called as neurons. For reorganization of satellite image most widely used technique is artificial neural network. The best advantage that ANN have is its strength to handle images with best error tolerance and less computational complexity. Testing and training is done through the ANN and the results are used to quantify its accuracy and error rate.
Keywords: -BPNN, ANN

Introduction: -

Image processing is the method used to extract or enhance some meaningful information from an image[1]. It can be said as a type of signal flow in which a given input and extracted output can be an image or characteristics or the feature related to it[2]. Nowadays, image processing is very fastdeveloping technique image processing can be done by image acquisition tool, analyzing and manipulating the image and result based on image analysis. Basically, image processing can be done in two ways analog and digital[3]. Hard copies such as printouts and photographs can be classified for the use of analogue processing. While using visual techniques image analysis uses various fundamentals of interpretation. Digital image processing techniques by the use of computers helps in the manipulation of the digital images[4]. Processing, enhancement, display and information extraction are the three general phases that all type of data have to undergo while using the digital techniques[5]. same time theof grey levelsdetermines the quantization level the amount in the digitized picture[6]. Digital value in image processing can be expressed as amode of the sampled digital image. Quantization can be related as the tmovement between regular value of the image and its logical equivalents[7].

A two-dimensional finite set of picture elements called as pixels represents digital image. Pixel is the smallest element of the image[8]. Number of the pixels in an image will describe the strength of the image. If the size of the pixel is greater than the size of object than the image strength in terms of resolution is called as the low-resolution image[9]. If the size of the pixel in a image equal to that of the object size than the image is called as the medium resolution image. If the size of the pixel is significantly smaller than the size of the object than it is called as the high resolution image[10]. Images taken from satellite are used as the one of the main tools by the metrologies. Satellite is the word which refers to machine which is present on space and moves around the earth e.g. Earth and moon are the naturel satellites[11]. Satellite images are the images of the different part of the earth taken using artificial satellite for the study and research purpose. Satellite images have different area of applications in the field of meteorology, regional planning, intelligence, agriculture, biodiversity conservation and warfare. Satellites are used for the global observation of the earth surface[12].Classification is the one of the important parameters when it come the extraction of information from an image, in other words we can say that classification is a

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complex information extraction method. Image classification is to find the similar features resembles in an image and group similar features of the image.

Image resolution using neural network:-

Neural networks, a delightful biologically-inspired modifying standard which empowers a computer should gain starting with observational information[13]. Neural networks a set about algorithms, demonstrated inexactly then afterward the mankind's network that are designed to recognize patterns[14]. They interpret data through a machine perception, clustering and labelling are raw inputs. For clustering and classifying neural network helps us.

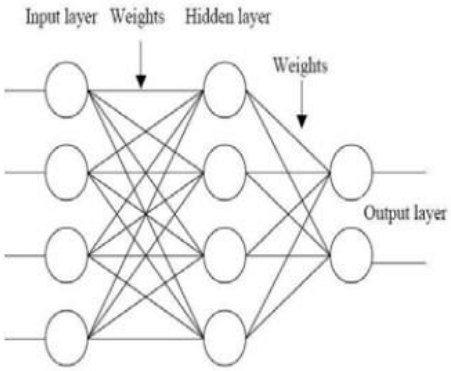

Fig. 1.1 Basic Neural Network Design

They advise to accumulate unlabeled abstracts according to similarities amid the archetype inputs, and they allocate abstracts back accept a labeled dataset for alternation neural network helps that how to correlate between label and dataset[15].

All classification depends upon labelled data set and how human transfer their knowledge with the use of neural networks. For classification most widely used parameter is Artificial Neural Network (ANN)[16].

, abounding studies accept apparent that ANNs can bigger archetypal heteroskedasticity i.e. abstracts with aerial animation and non-constant variance, accustomed its adeptness to apprentice hidden relationships in the abstracts after arty any anchored relationships in the data[17]. This is article actual advantageous in banking time alternation forecasting (e.g. banal prices) area abstracts animation is actual high[18]. Resultantly some of the matched result which are very similar to the physical representation of the image are placed in the category of true positive e.g. if one image from a data set look like a image as rural image or urban image it is in the category of the true positive[19]. Similarly, if the image result execution through the algorithm is not matching with the physical identity then it is placed in the category of false positive. Similarly, if the execution of the algorithm is very different in the physical identification than they are placed in the false negative or false positive[20]. The other category of the set of the images are in the physical interpretation of neither rural nor urban type of images[21]. It means they are either having very large part as the water bodies or it can be combination of deserts places or their combinations[22].

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Finally, the evaluation of the algorithm is performed in terms of accuracy error rate and noise sensitivity. These executions of the algorithm are performed on similar set of images by including noise[7].

2. Research methodology:-

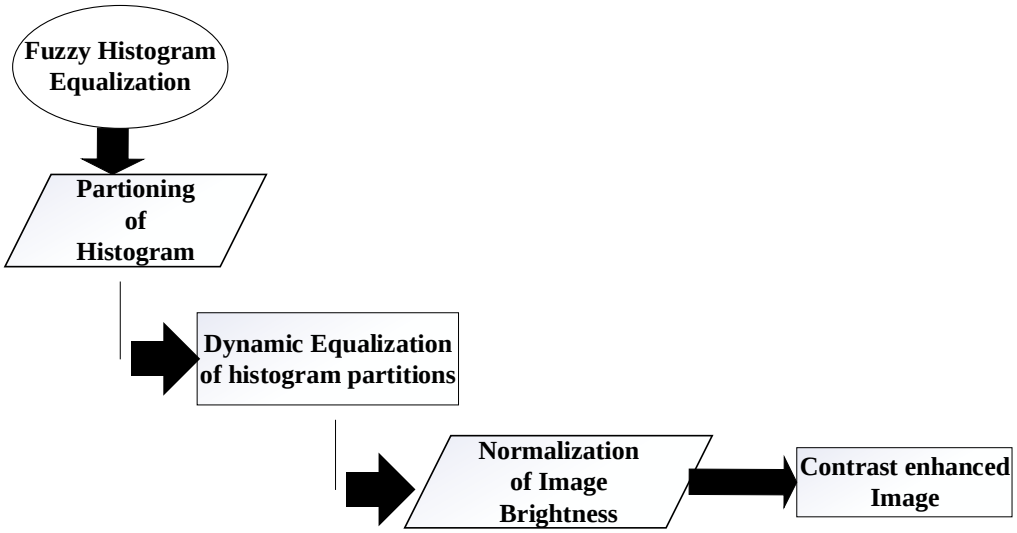

Fig.2. fuzzy histogram equalization algorithm

The purpose of doing image enhancement is to bring the hidden details of the images or to increase image in terms of contrast. Fuzzy histogram handles the contrast of original image and also preserves the image brightness. Fuzzy logic based *histogram* equalization works on two levels .Fuzzy histogram is computed to check the inequalities in the gray level values by the use of set theory. Exactness of the gray level value stages here for the image contrast enhancement. Fuzzy histogram equalization handles *the* inexactness *of* thegraylevelvalue *and* producesthesmooth *histogram.* Very first the fuzzy histogram computation is performed is performed with the help of eqn.2.1 given below

$$H(i) \leftarrow h(i) + \sum_x \sum_y \mu_{\iota\, i(x,y)i'} \; K \in \{a,b\} \text{ eqn.(2.1)}$$

$$\mu_{\iota\, i(x,y)i} = \max\left(0, 1 - \frac{|I(x,y) - i|}{4}\right) \text{ eqn.(2.2)}$$

2.1.1 Partitioning of the histogram

$$\text{Start}_i = \sum_{k=1}^{i-1} \text{range}_k + 1 \qquad \text{eqn.(2.3)}$$

$$\text{Stop}_i = \sum_{k=1}^{i} \text{range}_k \qquad \text{eqn.(2.4)}$$

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2.1.2Equalizing each sub histogram

Where y(j) represents to the fresh intensity pints to the j_{th} $i$ntensity point of the same digital image is calculated using eqn.(4.5)

$$Y(j) = Start_i + range_i \sum_{k=start_i}^{j} \frac{h(k)}{M_i} \qquad \text{eqn.(2.5)}$$

2.1.3 Normalization of image brightness

Input images which are having slightly different mean brightness are obtained after the dynamic histogram equalization of each sub histogram.

Where g is the output image than the gray level value at pixel location x and y for image g is given by eqn.(4.6)

$$g(x, y) = \frac{m_i}{m_o} f(x, y) \qquad \text{eqn.(2.6)}$$

3.2 Mean shift

Mean shift considers the feature space as a probability density function. If the input is a set of points If the set of points are present in the input then mean shift considers them as sampled from the underlying probability distribution function. Modes represent the dense region present in the probability density function. Mean shift corresponds to the highest peak of the probability density function. Mean shift treats those focuses in the characteristic space Concerning illustration an likelihood dissemination capacity..

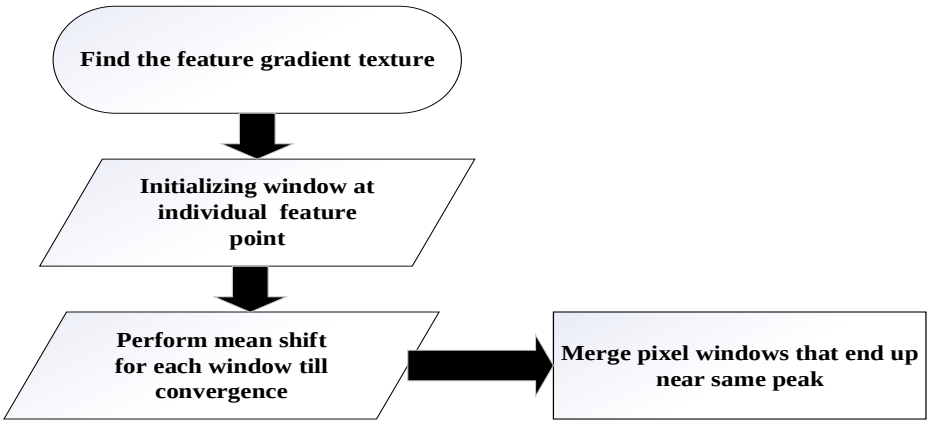

Fig.3.1 Mean Shift Clustering Algorithm

Non-parametric method to evaluate the density function of the arbitrary variable is Kernel density estimation is represented in eqn.(4.7)

$$\tilde{f}(x) = \frac{1}{nh^d} \sum_{i=1}^{n} k(x - x_i)/h \qquad \text{eqn.(3.1)}$$

Gradient is applied to the kernel density estimation and it takes the form of eqn.(4.8)

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$$\nabla \tilde{f}(x) = \frac{2c_k}{nh^{d+2}}\left(\sum_{i=1}^{n} g_i\left(\frac{\sum_{i=1}^{n} x_i g_i}{\sum_{i=1}^{n} g_i} - x\right)\right) \qquad \text{eqn.(3.2)}$$

3.4 Train a neural network

Electronic networks of "neurons" which is very similar to the neural structure of the brain are called as neural network.as the brain learn, records and compares. Similarly neural networks work by processing,

Result and discussion:-

Quantitative representation of the algorithm has been calculated in terms of accuracy, error rate and noise sensitivity. The algorithm behaves equally well for both the cases for noisy and noiseless scenario.

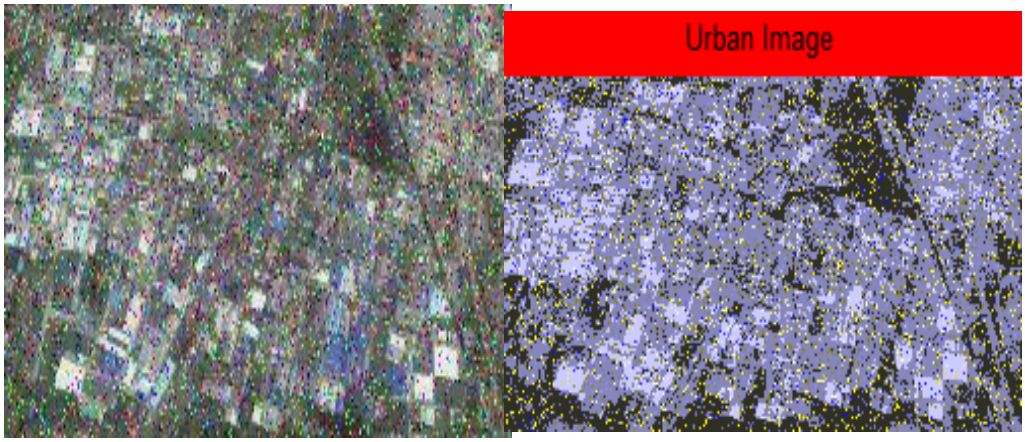

Fig 2.1(a) Test Input Image2Fig 2.2(b) Output Result

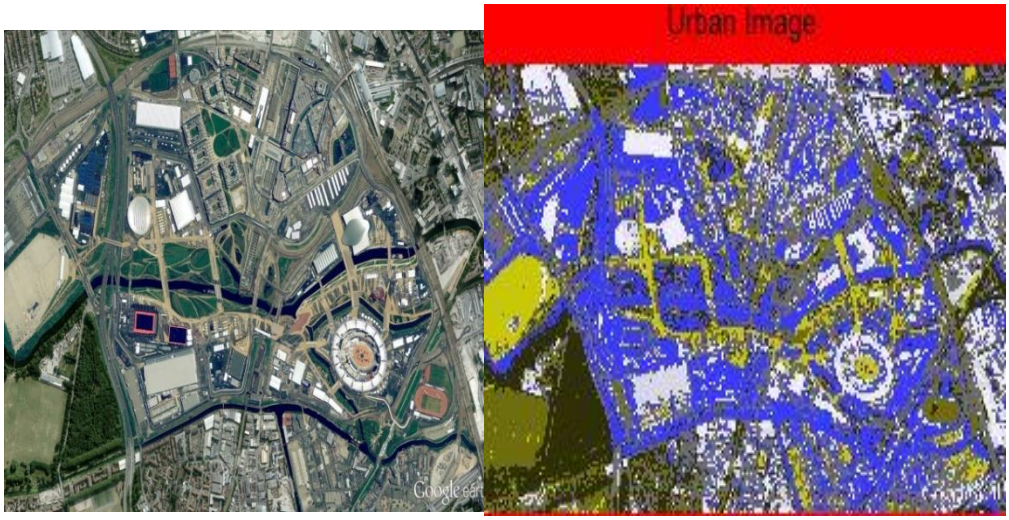

Fig 2.3(a) Test Input Image2Fig 2.4(a) Test output Image2

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Conclusion:

Result of the above algorithm is proved to be the satisfactory over the different cases of images. Both for noisy and noiseless cases. Further improvement is possible in the development of neural network in case of time accuracy.

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