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Enhancement of Video Performance by using Segmentation Algorithm with Deep Learning

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ABSTRACT

An Integration of video pre-processing and the improvement of frames plays a significant role in the field of image processing. Image segmentation is one of the most important in image analysis. This paper presents a Watershed based image segmentation technique with k-means bunch method and some enhancement design method for improvement of overall performance. Though the HSV color area was found to convey higher results compared to the RGB color area, in our experiments the RGB and HSV color areas were found to convey virtually equivalent results. Eventually, it had been set to use the HSV color area as a result of it gave higher results than the RGB color area just in case of “difficult Queries”. K-MEAN primarily based bunch rule has been projected and also the iterations taken was abundant less than that of K-MEAN and ANN based schemes. Moreover, K-MEAN based mostly schemes might discover all the peaks and hence, the categories accurately. The impact of the configuration, migration policy, rate of migration, and kind of migration on the speed convergence has been studied and it had been discovered that the migration policy and rate of migration greatly influence the convergence rate.

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I. INTRODUCTION

Digital video has become Associate in nursing essential locality of style and different image processing application. It is well-known that video enhancements is a vigorous concern in computer vision perception has got plenty of recognition in present years. The goal is to spice up the visible look of the video, or to produce a “better” retreat illustration for coming machine-controlled video method, like survey, identification, split, and recall. Moreover, it helps examine background data that is important to grasp object etiquette whereas it doesn't need overpriced human visual examination. There is unit varied applications where digital video is not any inheriting, managed and used, like investigation, general identification, felonious justice systems, civilian or military video method. Extra and extra video cameras unit wide deployed in many eventualities e.g. Public places, production Plants, domestic investigation systems etc. Most of the video cameras add the outside which suggests the quality of video depends on the atmospheric condition. The camera and video investigation unit expected, effective altogether, lighting and atmospheric condition, but the most of these cameras weren't made for slow-lighting, the poor capture quality of video camera makes the video unusable for many applications in unhealthy conditions e.g. dark night, soaking rain, vital snow and fog. Over many decades, there are significant capability enhancements in digital cameras moreover as resolutions and sensitivity. Regardless of these enhancements, however, modern digital cameras unit still restricted in capturing high strong vary footage in low-light conditions. These cameras sometimes place confidence in automatic exposure management to capture footage of high dynamic vary, but the longer exposure time sometimes results motion blur.

Additionally, image sequences captured in low-light conditions sometimes have low signal -to-noise quantitative relation (SNR). Once the illumination is very low, the extent of noise becomes relatively on the far side the signal, so customary De-Noising techniques can't be applied. Style AN economical and fast low lighting video improvement may be a troublesome downside. Many resemble unit made for improving low-light video although nearly all of them accept video from fairly dark conditions.

II. LITERATURE REVIEW

Henrik, Malm, Magnus Oskarsson, Eric J Warrant [5] conferred a technique for improvement and noise reduction technique really for very for extraordinary dark image string with terribly low vigorous image vary in step with dynamic object. The perspective is extraordinary general and shapes up to the spatiotemporal intensity structure on forestall motion blur and smoothing across essential structural edges and region of image enhancement. The maneuver put together carries a sharpening feature that forestalls the foremost essential object outlines from being over-smoothed.

Qing Xu¹, Hailin Jiang, Riccardo Scopigno, and Mateu Sbert [6] conferred novel 3 stage formula for very low-light video American state noising and improvement and improvement of video quality. A fresh system for very dark videos American state noising and improvement has been introduced and shown to for the foremost half improve current progressive results by in term of MSE parameter reduction.

Jinhui Hu, Ruimin Hu, Zhongyuan Wang, Yan Gong, Mang Duan [7] conferred methodology of kindest depth based totally method for low light-weight police investigation image improvement and image enhancement.

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Pre-processing for Kindest depth map, yankee stateph unnatural non-local suggests that First State noising and depth aware distinction stretching performed successively throughout this formula to promote the visual quality for low light-weight police investigation image and constituent primarily based. Scrutiny with the previous works, this system is prepared to enlarge the low dynamic vary and promote every globe and native depth perception for the low light-weight police investigation image meanwhile and interval.

Minjae Kim, Dubok Park, David K. Han, and Hanseok Ko [8] proposed novel framework for improvement of really low-light video. For noise reduction, motion adaptive temporal filtering supported the Kaman structured modification is conferred. Dynamic vary of Delaware noised video is exaggerated by adaptive adjustment of RGB histograms. Finally, remaining noise is removed exploitation Non-local suggests that (NLM) Delaware noising.

Mr.Gajanan L. Kirwale [9] the Super-Resolution is one in each of main topics in image method many applications in past, recent today's and future. This paper focuses on super resolution of images practice utterly totally different kind of improvement of Image Quality in MATLAB surroundings Super-Resolution algorithms. We've have improved the performance of involved stages like Registration, Interpolation, Reconstruction and Restoration and for numerous image quality measures.

III. K-MEAN

The algorithmic program could be a part of data processing. It is associated in Nursing Explorer knowledge analysis technique. It examines the knowledge, information set and explores complete data set. this is often one in all of the unsupervised clump algorithmic program want to classify the input file points into multiple categories supported their minimum distance from one another. The information options is kind of a vector house and tries to seek out natural clump in them. The k-means clump algorithmic program is given below: It determines the cluster center of mass exploitation Euclidean methodology for Distance calculation. K-Means Implements non-hierarchical methodology of grouping objects along [4].

Algorithm is as follows:

1. Create number of clusters k.
2. Centers are chosen randomly.
3. Calculate the distance between each pixel to each cluster of the center.
- 4.If the distance is near to the center then move to that cluster.
5. Otherwise move to next cluster.
6. Re-estimate the center.
7. Repeat the process until the center doesn't move.

IV. WATERSHED BASED SEGMENTATION

The Watershed work might be a particular technique for segmenting digital footage that uses a form of region growing technique supported by an image gradient. The thought of Watershed work relies on visualizing an image in three dimensions: a pair of special coordinates versus gray levels. In such a "topographic" interpretation [3], a bent is required under three sorts of points: A) Points that happens to be a regional minimum. B) Points that happen to be a drop of water, if placed at that location of any of those points, would fall with certainty to at least one minimum. C) Points that happens to be water would be likely to fall over one such minimum

V. PROPOSED METHOD

The steps concerned in planned methodology for the development of the performance is shown in following Fig.1. First, a raw video is taken as ANN input. The video supply may be a live camera, recorded file or other video capturing device. During this raw video, there'll be some blur or noise elements. To get rid of this blur or noise elements, preprocessing is completed on the video. A video may be picture or a collection of frames. To perform the preprocessing steps, frame square measure is extracted one by one from the video.

Frame Extraction: This methodology is also known as preprocessing. During this approach we extract frame from applied input video. Hence it offers number of sample images. Then we change image into special size format. Then we convert image into grey scale: during this step, the input sample image like colored image is changed to grey scale image. This process provides a color distinction input image sample.

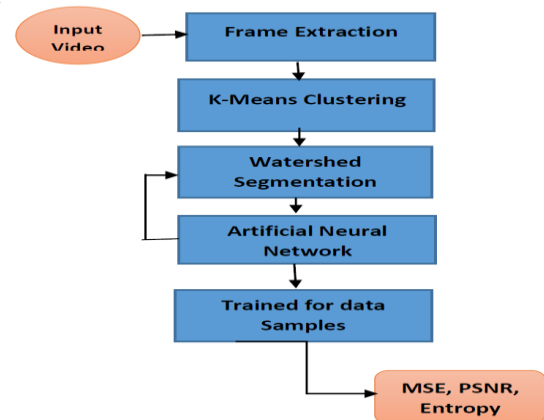


Fig 1. Block diagram of proposed method.

K-Mean agglomeration: By victimizing K-means Clustering methodology, modification to the input image into clustered output image is done. The clustered output image enhance image component quality which provides L*a*b type blue colored image. This approach provides a divided output in colored image.

Watershed segmentation: This method improves boundaries of the region with separate object and image surface contour. Currently basic segmentation techniques is used to distinguish image and colored based region for equal saturation RGB. Segmentation square measure is completely different, this kind of watershed segmentation is amongst the half to supply RGB based segmentation. Output of Segmentation image realize MSE parameter in terms of noise which collects different segmentation output and additionally establish different image parameter in tabulated type.

Artificial Neural Network: This methodology minimizes the MSE parameter by victimizing the iterations and trained knowledge or data set. ANN works on 3 input like as trained knowledge, Sample and target knowledge sample. Hence iteration adds the best terms. The hidden layer is to organize output in terms of validation and performance basis.

Multiple layers are used to minimize MSE and increase performance criteria. The performance criteria depends on performance parameter it ideally follows one-dimensional input and output knowledge sets.

During a sample image, results are provided in terms of MSE, PSNR, Entropy and Variance. As we know that MSE is inversely proportional to PSNR and directly proportional to Entropy and in our approach we decrease MSE with the help of Artificial Neural Network.

VI. IMPLEMENTATION

To analyze and to design the segmentation system it is required to use image of the object to be segmented and then each pixel of the image chosen for the segmentation is coded in three components that are represented respectively with the red, green and blue colors.

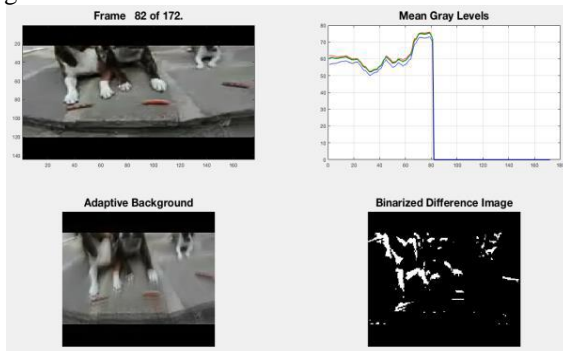


Fig 2. Frame extraction from video.

The segmentation for the k-Mean based system and an image processing system is implemented using MATLAB shown in Fig.3.



Fig 3. Selected frame for Segmentation.

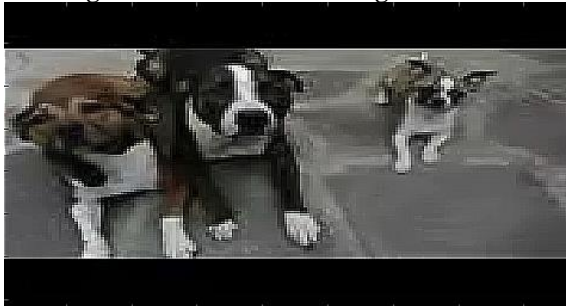


Fig 4. Frame after Segmentation.

The MSE, PSNR, Entropy and variance calculator are MATLAB functions block from user define function.

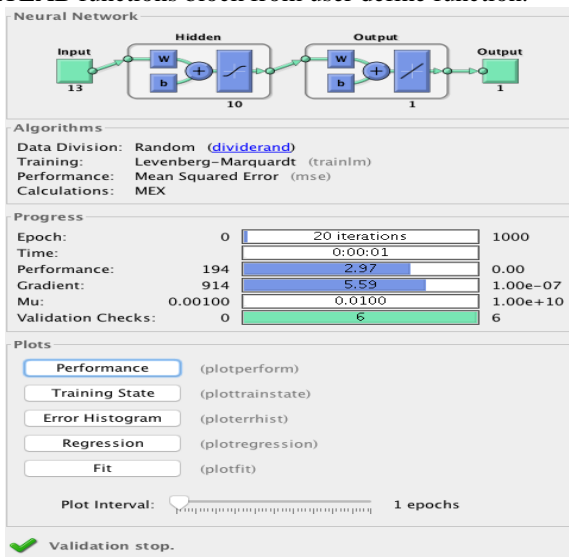


Fig 5. Artificial Neural Network Training state.

VII. RESULT AND ANALYSIS

The different techniques of image segmentation and deep learning algorithms are performed and the result is verified using watershed segmentation and K-Means algorithms. The graphical user interface for the design of frame segmentation is shown in the Fig.4. For further analysis, the quality factors like Mean Square Error (MSE), Peak Signal to Noise Ratio (PSNR) and Entropy are trained and shown in Fig.5 and also same validation stage is shown in Fig.6.

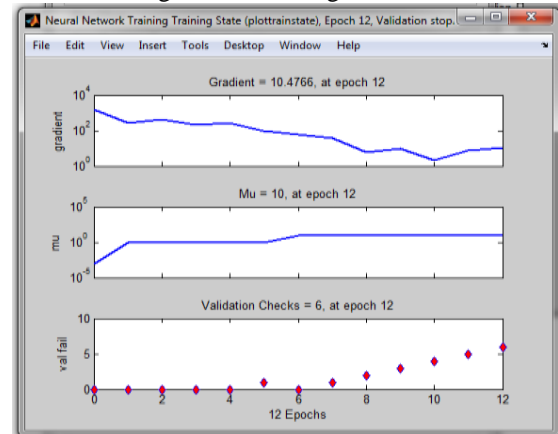


Fig 6. ANN Validation State.

The reduction of parameters is also obtained using the artificial neural network with error histogram equalization method is shown in Fig.7.

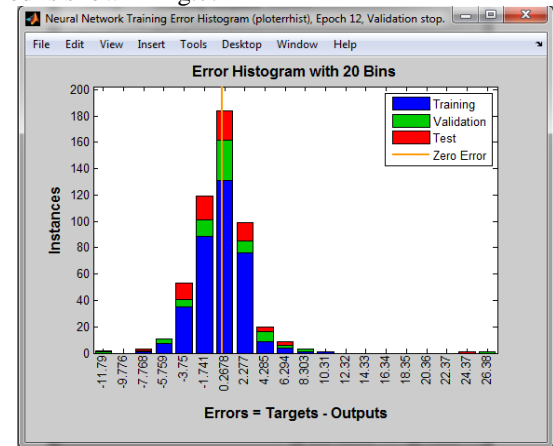


Fig 7. Error Histogram.

MSE Analysis represents histogram for multiple layer option. The irregular result provided to neural network. So 0.2678 Errors with 20 bins is the highest value of this graph represented is shown in Fig.8.

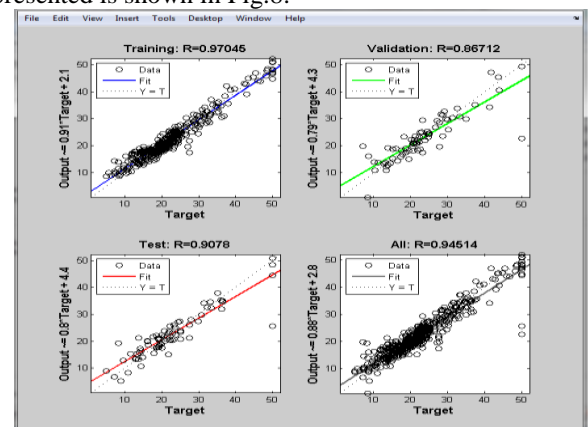


Fig 8. Output Error.

For further Analysis of MSE with Neural Network and MSE without Neural Network is shown in Fig.9.

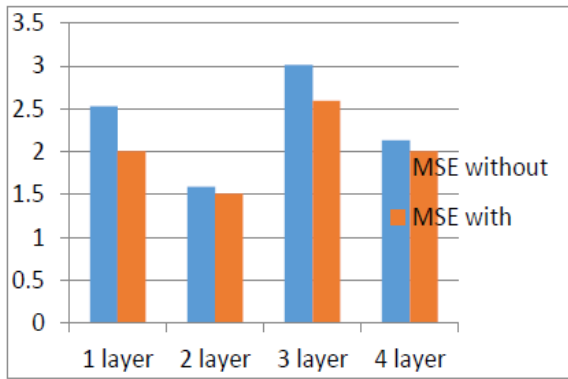


Fig 9. Analysis of Artificial Neural Network.

Table 1. MSE Analysis of Artificial Neural Network.

Layers	MSE Analysis Without Neural Network	MSE Analysis With Neural Network
1Layer	2.53x10	2.00x10
2Layer	1.59x10	1.5091x10
3Layer	3.01x10	2.59x10
4Layer	2.13x10	2.00x10

All the results are tested on the Windows 8 Professional operating system of PC using MATLAB 2014(a) and also on MAC Operating system using MATLAB 2016(a).

CONCLUSION

Completely unique Watershed Segmentation technique is developed. The Watershed work could be a well-established tool for the segmentation of pictures. From the experimental results obtained and tested on the different Frames, it is clear that the performance parameters of the watershed and K-Mean based segmentation techniques are improved with artificial neural network. The K-Mean based segmentation techniques provides better perception and improved performance characteristics. The experimental results demonstrate the prevalence of this method over k-mean.

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