Random Walker Segmentation based Contrast Enhancement of Dark Images with Canny Detection

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ABSTRACT
Contrast enhancement is a technique which enables images to improve the contrast level of images. Contrast enhancement of images requires filtering of regions where contrast level is high or where noise level is more. The techniques such as non-dynamic based stochastic resonance are implemented but the technique provides less accuracy of contrast improvement. Hence an efficient technique is implemented here by segmented the low contrast region of the image and then filtering is performed on the segmented region using transformation. The proposed methodology greatly improves the contrast enhancement of the images.

Keywords
DWT, Bilateral Filtering, Gaussian Noise, Segmentation, Mosiac images.

1. INTRODUCTION
Images play a vital role in various fields for the processing of various tasks such as in science and medicine and journalism as well as advertisement and design and education, entertainment. Hence the feature especially spatial features are necessary to extract such that it can be applied in various research fields.

Usually, the raw data of a set of images is investigated to gain just around the corner into what is come about with the images and how they can be used to extract aspiration information. There are certain images that are taken in extreme lighting condition and sometimes contrast enhancement of these images are necessary to obtain. The enhancements of these images are necessary for the processing in various tasks [1].

The contrast enhancement of images is very necessary for the processing especially in computer vision. The enhancements are necessary for various research and field areas such as speech recognition [2].

Many images have very low dynamic range of the intensity values due to inadequate enlightenment, and so consequently need to be processed before being demonstrated. Many techniques for contrast enhancement that operate in spatial domain subsist in literature [3], [4].

In the process of Image Processing noise in the images play a vital role [5, 6].

2. LITERATURE SURVEY
In this paper [7], has proposed a new and effective technique for improvement of shadowy and short contrast images a nonlinear non-dynamic stochastic resonance based method. By taking care of a low contrast image as a sub threshold signal and adding random noise-enhanced signal processing is functional to get better its contrast tracked by hard-thresholding and averaging Random noise is added frequently to an image and is consecutively hard-threshold followed by taken as a whole averaging. By show a discrepancy the noise intensities, noise induced resonance is get hold of at exacting optimum noise intensity. Here author [7] unearth out the concert of the planned practice has been considered for four types of noise distributions - Gaussian, uniform, Poisson and gamma was investigation and best concert was examined for Gaussian model. Quantitative assessments of their presentations have been done in expressions of contrast enhancement factor, color enhancement and perceptual quality compute showed that it reaches higher performance metrics as evaluated to existing spatial domain methods. Comparison with other be presenting spatial domain techniques give you an idea about that the proposed method gives significant enhancement while determining good perceptual quality.

In this paper [8] author has make use of a quantitative, strong calculation to estimate the spatial exposure of feature points in an image, intelligent to establish whether points are wide-ranging at manifold balance. When identical images for relevance's such as mosaicking and homography assessment, the giving out of facial appearance across the overlie section affects the accuracy of the result show that SFOP commences extensively less aggregation than the other detectors tested and it is measured by Ripley's K-function, to evaluate whether feature matches are clustered simultaneously or increase approximately the have common characteristics region. Based on this determine, an appraisal of a range of up to date feature detectors and then carried out using analysis of variance and a large image database was executed; the estimate method considered the imagery and the detector as the two self-determining variables have an effect on coverage, and consequence was evaluated using ANOVA. The results revealed that there is indeed statistical significance between the performances of detectors. When the detectors are rank-ordered by this act calculate, the order is generally comparable to those get hold of by other means, put it to some bodying that the arranging reveals authentic performance differences. SFOP was found to be better-quality to other detectors, while there are also some detectors whose performance differences were not statistically important. These findings are generally dependable with those get hold of by other investigators using unusual come within reach of, increasing our self-assurance that these concert differences are authentic. Researches were also try to get completed on stitching have common characteristics regions into landscapes, substantiating that enhanced reporting give ways a better quality consequence.

Most important intention of image enhancement is to process an image so that outcome is more appropriate than original image for explicit application. The existing contrast enhancement algorithms such as local, global, partial, bright and dark contrast stretching, Adaptive HE techniques infrequently consequence in manufactured articles such as circle of light effects in sharp boundaries or noise effects and also over enhancement which consequences a counterfeit aspects of the image and going against nature effects in the development images. These disadvantages enlarge for images taken under poor illumination circumstances.

In this paper [9] author struggle to get improve the image distinction based on force strait partition and section Channels a content-aware enhancement algorithm. The process examines the contents through contrast couples, which are grouped simultaneously according to their intensities. In an ideal world this process enlarges the enhancement and level of make known. At the end of the day the enhancement is to be determined to impersonate the human visual perception, which is bring about by adaptively merging different region channels. They suggest merging the channels with similar distinguishing in to region channels. The proposed method [9] is healthy since it adapt its alteration purpose which is Savitzky Golay filtered, to the contents of the image, which avoids the introduction of errors in the image. The combination of different region channels also augments the excellence of the output because it allows a distinctive enhancement for different parts of the image. This development keeps away from over enhancement troubles in areas with normal dynamic assortments.

Some other transformation functions center of attention on local information content to accurate image details, such as edges and texture. In this paper [10], the amount produced in the experimental consequences show that the proposed method participates and the data in the objective estimation based on AAMBE give you an idea about that the enhanced images have a show potential visual quality for display purpose in consumer electronic products and strength.

The existing contrast enhancement algorithms infrequently result in manufactured articles, over enhancement, and going against nature consequences in the progression images. These disadvantages enlarge for images taken under underprivileged explanation circumstances [11]. The algorithm makes an ad hoc transformation for each image thereby civilizing its enhancement capabilities while reducing the manufactured articles and other unnatural effects in the resulting images and adapting the mapping functions to each image's features to construct the most enhancements. The algorithm investigates the contents through contrast pairs, which are grouped together according to their intensities and they investigate the contrast of the image in the frontier and textured regions, and set the information with widespread attributes. These groups model the relatives within the image, from which they take out the transformation functions. In an ideal world, this process enlarges the enhancement and level of aspect make known us to enhance some characteristics, such as the details in dark and bright regions, while preserving others, such as the tones in smooth and flat regions. The proposed technique is vigorous because it become accustomed its transformation functions to the substances of the image, which avoids the preamble of errors in the image. The combination of different region channels also enlarges the quality of the output because it allows a different enhancement for different parts of the image. This procedure keeps away from over enhancement troubles in areas with normal dynamic ranges. Finally the proposed [11] experimental results show that the algorithm can without human intervention process an extensive range of images.

3. PROPOSED WORK

The proposed technique implemented here consists of three techniques:

Gaussian Filtering
Random Walker Segmentation
Canny Edge Detector

Gaussian Filtering

Since the segmentation done here is of stochastic images which contains additive noise, Since in random walker algorithm image is consider as graph and each pixel represents a node, so the number of unwanted pixel is also considered as node which increases the size of graph. Random walker segmentation is a region based where seed based image segmentation method is applied. Hence to overcome the limitation we improve the segmentation by first applying filtering technique on the image.

Random Walker Segmentation

It is a technique of segmentation on the basis of selecting foreground and background as seed pixels by moving randomly to other pixels moving from background till any foreground pixel is obtained and the region is extracted as segmented region from the image.

Canny Edge Detector

Canny edge detection method finds edges by looking for local maxima of the gradiant of f(x, y). Here the gradiant value is computed using the derivative of a Gaussian Filter. The approach used here will takes two thresholds to find strong and weak edges, and contain the weak edges in the output only if they are connected to strong edges. Therefore, this approach is additional likely to detect true weak edges.

1) Steps involved in canny method:

- The image is smoothed using Gaussian Filter with a specified standard deviation, σ, to reduce noise
- The local gradient point g(x, y) and edge direction are computed at each point.
- The edge point determined give rise to ridges in the gradient magnitude image. This ridge pixels are then thresholds, T1& T2, with T1<T2.

Ridge pixels with values greater than T2 are said to be 'strong' edge pixels. Ridge pixels with values between T1 & T2 are said to be 'weak' edge pixels.

The canny edge detector used here is to increase the smoothening factor of the segmentation part of the image. The Segment detected region using random walker segmentation is not very smoothened because of noisy region, hence by first applying filtering and then canny edge detector image can be segmented.

Finally transformation is done to enhance the images.

4. RESULT ANALYSIS

The figure shown below is the analysis of the technique implemented using non-stochastic resonance. The analysis is done on various images of low contrast and after applying methodology the performance is checked on the basis of parameters.

CLAHE	Time	MSE	PSNR	F	PQM	EME
Low image 1	1.46	1.47E+03	15.1854	1.3785	8.1644	1.7947
Low image 2	1.6784	570.3275	20.4688	1.8375	8.6834	1.8917
Low image 3	1.4912	1.34E+03	16.4401	1.6631	9.0027	1.6836
Low image 4	1.0856	9.64E+02	18.1439	1.1456	8.1368	1.0849

Table 1. Analysis of Existing Work

The figure shown below is the analysis of the technique implemented using random walker segmentation. The analysis is done on various images of low contrast and after applying methodology the performance is checked on the basis of parameters.

Image	Time	MSE	PSNR	F	PQM	EME
Low image 1	0.29	4.71E+02	21.2061	3.1574	9.8375	2.386
Low image 2	1.7252	1.68E+04	5.5231	2.386	10.0175	3.1858
Low image 3	0.368	4.04E+03	11.8652	3.3906	9.0859	4.2957
Low image 4	0.4304	9.61E+03	8.1593	5.1957	10	3.486

Table 2. Analysis of Proposed Work

Image	Time	MSE	PSNR	F	PQM	EME
Low image 1	0.4304	1.40E+03	16.2557	3.5294	10.0937	2.7164
Low image 2	0.8204	1.71E+04	5.4454	2.5712	10.1835	3.4173
Low image 3	0.4304	1.17E+04	7.0037	3.6193	10.0084	4.5182
Low image 4	0.4834	1.16E+03	18.3753	5.3821	10.1237	3.8163

5. CONCLUSION

The results generated shows that the image contrast through discrete wavelet and transformation provides better results as compared to the other wavelet transformation. The proposed method has been tested on various images and by comparing the histograms of various images and on the basis of various parameters it has been concluded that the proposed technique implemented here for the enhancement of contrast of images performs better as compared to the existing dynamic stochastic resonance technique for contrast enhancement.

6. REFERENCES

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