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Multiple Exposure Fusion for High Dynamic Range Image Acquisition

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***Abstract*: High Dynamic Range Image Acquisition (HDRI) is generally based on multi exposure principle for Capturing dynamic range of irradiance which basically works by merging some photographs shot with multiple exposures. Therefore here the Conventional methods which are based on the Performance of HDR construction have been explained That is by Combining multiple images taken with different exposures And Estimating irradiance value for each pixel but few problems have occurred during this which resulted as displacements of images by object movements, Yielding motion blur and Ghosting artifacts as well. So in this paper we have Proposed a method in which Multiple exposure fusion technique is used for Estimating displacements, occlusion and saturated regions though the Use of MAP(Maximum A Posteriori) estimation have also be done and even Constructing the motion blur free HDRIs which resulted in Application of new weighting scheme for multiple image fusion.**

***Keywords:* Image fusion, HDRI, Matlab, MAP**

I. INTRODUCTION

Human beings' vision system has high perceptional range. This dynamic range exhibited by human vision system is not yet achieved by the digital devices being used. Such devices can not cover high dynamic range of irradiance. In many real time applications it is required to obtain radiance in wider range. Such applications include robot vision, high-contrast photo development, artifact docking, surveillance, and in-vehicle cameras. Image based lighting is used in order to generate high quality images. Digital cameras have a limited dynamic range, which is lower than one encounter in the real world. In high dynamic range scenes, a picture will often turn out to be under or overexposed. A bracketed exposure sequence allows for acquiring the full dynamic range, and can be turned into a single high dynamic range image. Upon display, the intensities need to be remapped to match the typically low dynamic range of the display device; through a process called tone mapping Technologies came into existence for obtaining High dynamic range images. There is tremendous progress in the development and accessibility of high dynamic range (HDR) imaging technology. Modern image processing and graphics software becomes HDR enabled. Also HDR digital photography replaces low dynamic range (LDR) technologies. HDR photographs are of much better quality and easier to be processed in a digital darkroom. Unfortunately, HDR cameras are still very expensive and not available for average users. On the other hand, taking HDR photographs seems to be legitimate and crucial. In the near future LDR images may become almost obsolete due to the progress in LCD technology and it will not be easy to display LDR image correctly. LDR photographs will look pale and not interesting on HDR LCD displays. The multi-exposure HDR capture technique seems to be a good alternative to HDR cameras, which can be used to create an HDR image from photographs taken with a conventional LDR camera. The technique uses differently exposed photographs to recover the response function of a camera. From the response function, the algorithm creates an HDR image whose pixel values are proportional to the true radiance (or luminance) value of a scene. Because this technique requires multiple input photographs, there is a high likelihood of misalignments between pixels in the sequence of exposures due to moving of a hand-held camera (global motion) or dynamic object in a scene (local motion causing ghosting). It is crucial that misalignments between input photographs should be removed before fusing an HDR image we propose to skip the step of computing a high dynamic range image, and immediately fuse the multiple exposures into a high-quality, low dynamic range image, ready for display (like a tone-mapped picture). We call this process exposure fusion The idea behind our approach is that we compute a perceptual quality measure for each pixel in the multi-exposure sequence, which encodes desirable qualities, like saturation and contrast. Guided by our quality measures, we select the "good" pixels from the sequence and combine them into the final result. Exposure fusion is similar to other image fusion techniques for depth-of-field extension and photomontages have proposed the idea of fusing a multi-exposure sequence, but in the context of general image fusion. We introduce a method that can more easily incorporate desired image qualities, in particular those that are relevant for combining different exposures. Exposure fusion has several advantages. First of all, the acquisition pipeline is simplified; no in-between HDR image needs to be computed. Since our technique is not physically-based, we do not need to worry about calibration of the camera response curve, and keeping track of each photograph's exposure time. We can even add a flash image to the sequence to enrich the result with additional detail. Our approach merely relies on simple quality measures, like saturation and contrast, which prove to be very effective. Also, results can be computed at near-interactive rates, as our technique mostly relies pyramidal image decomposition. On the downside, one cannot extend the dynamic range of the original pictures, but instead we directly produce a well-exposed image for display purposes.

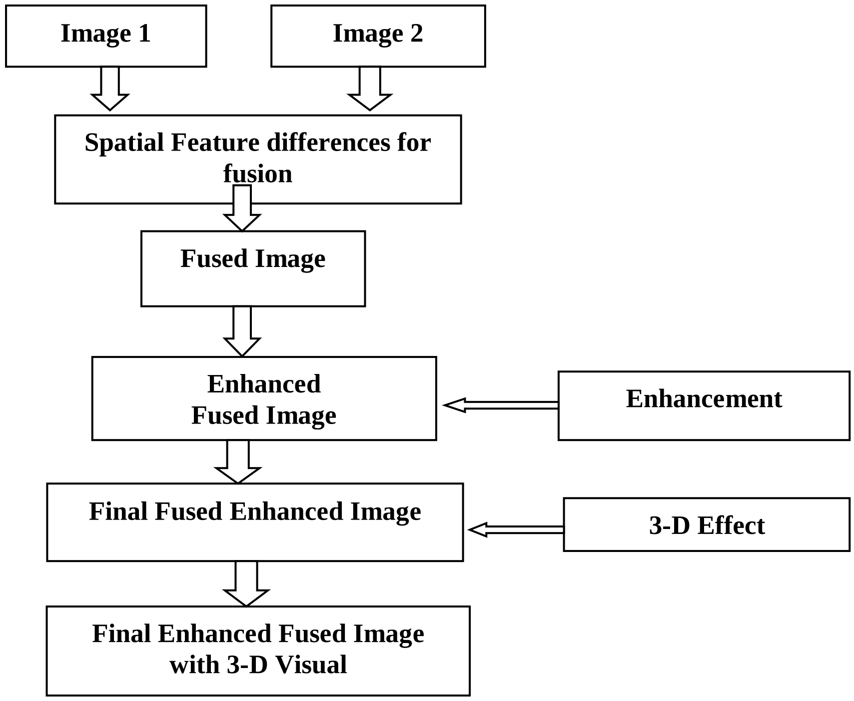
2. PROBLEM FORMULATION

Fusion is the process of combining relevant information from two or more images into a single image. The resulting image will be more informative than any of the input images. Several situations in image processing require high spatial and high spectral resolution in a single image. Most of the available equipment is not capable of providing such data convincingly. Image fusion techniques allow the integration of different information sources. The fused image can have complementary spatial and spectral resolution characteristics. However, the standard image fusion techniques can distort the spectral information of the multispectral data while merging. So, here some of the problems are that image visibility is not clear. And after the fusion the properties of the image get damaged.

3. PROPOSED WORK

In this paper an approach is proposed which provides the HDRI estimation based on the random field model. We can construct the HDRI by taking into consideration displacements, under- and over-exposures (saturation) and occlusions.
This proposed work has many variants of changing the properties of the images as a proposed the main approach has the quality of proving the fusion of image with different difference concepts also providing the enhancement of the fused image and finally the image can also be used to provide the 3d effect to it so can easily elaborate the hidden properties of the object in the image. The deracination vectors as well as the closure and the saturation are distinguished by the MAP estimation. So here in this method we do not need to estimate the detailed motion vectors but displacement to the pixel with the closest incandescent, while the current methods such as try to estimate the motion flawlessly. This diversion improves the final quality of the HDRI. The closure and the saturation are clearly classified and then delight it independently, which proceeds in the authentic replacement of ghosting antiquity.

4. FLOW CHART



5. METHODOLOGY

1. First step is to take or browse two different images.
2. Now determine the Spatial Feature differences for fusion.
3. After this we'll get the Fused Image
4. Next step is to apply the Enhancement so as to get the Enhanced fused Image.
5. Now, here to get the final fused Enhanced Image; 3-D effect is applied.
6. Finally we'll get the Enhanced Fused Image with 3-D visual.

6. RESULTS

After the implementation of the proposed methodology the following results are obtained by applying the fusion of HDRI images with advancement on spatial enhancement and the 3-D visual effect enhancement.

Simulation results show that the images obtained after the proposed work are better than the traditional work

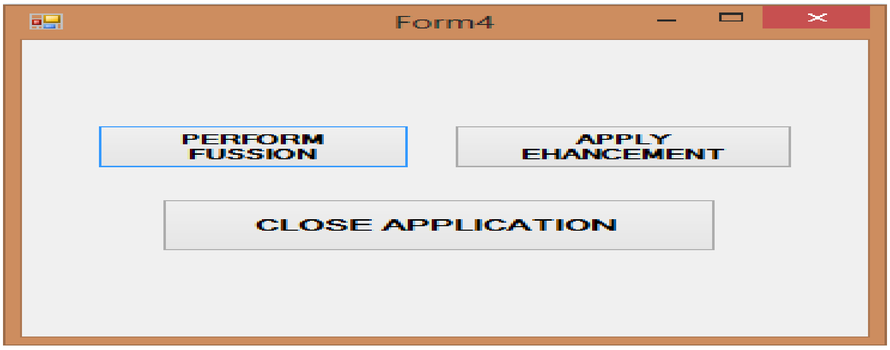


Fig.1 Front end of proposed HDR fusion

Fig.2 First Image to Fuse

Fig.3 Second Image to Fuse

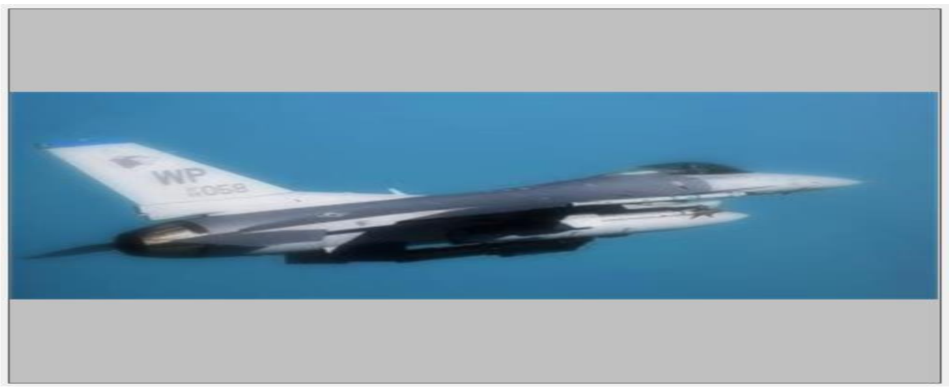


Fig.4 Final fused image

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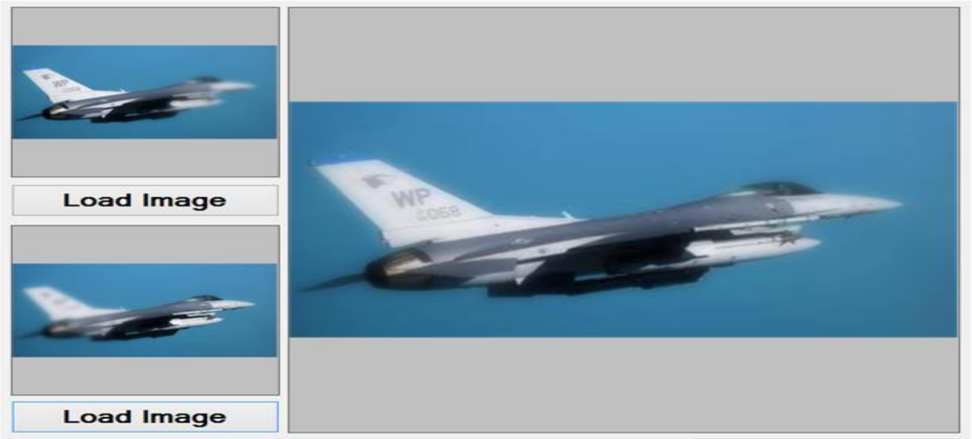

Fig.5 Proposed systems for HDR fusion

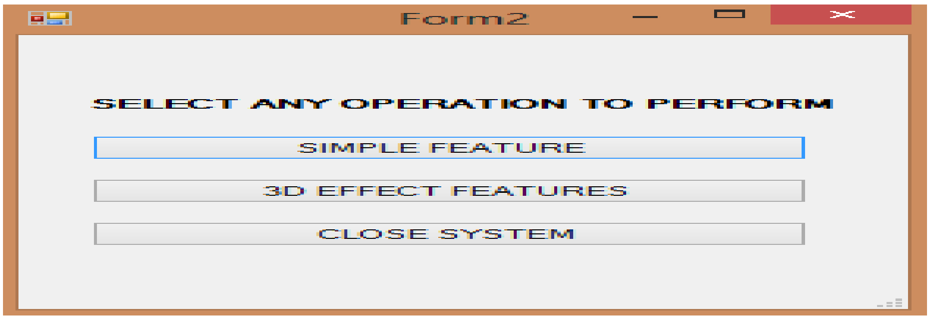

Fig.6 Proposed systems for to enhance the HDR image properties

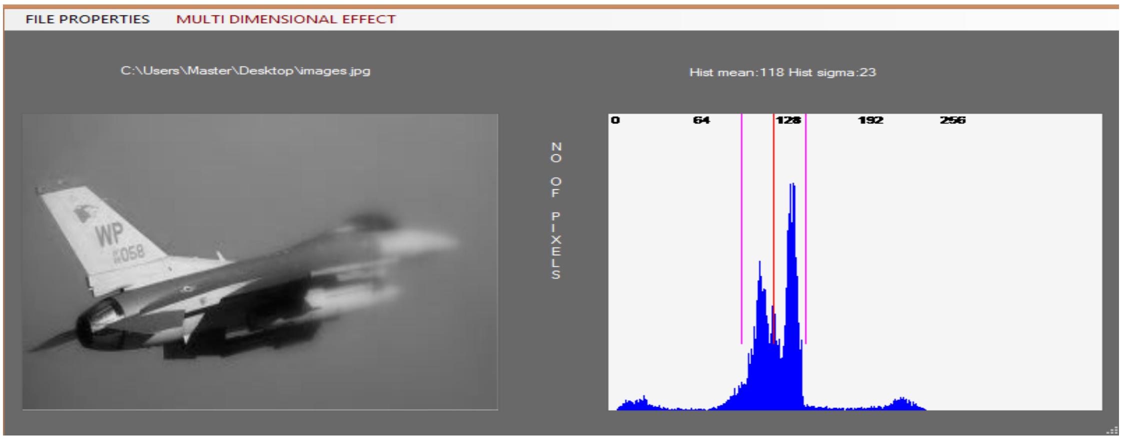

Fig.7 Histogram scale for image to apply 3d effect

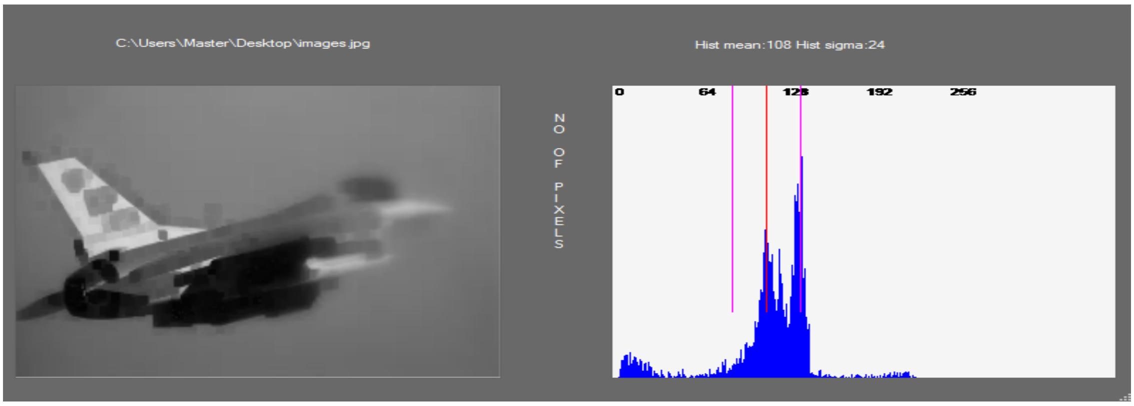

Fig.8 Histogram scale for image after 3d effect

7. CONCLUSION

To increase the efficiency and betterment of the image fusion and find the way out for a new approach has been developed. We have implemented a new approach where we are enhancing the image by using the 3-D visualization technique as per the perposed technology. As a future scope we can further work with the transformation based fusion to enhance the proposed methodology as a conclusion this proposed work provides enhanced results of the HDRI images with better visual effects.

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