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(54) Title of the invention : Development of Multi-Focus Image Fusion Algorithm for Improving the Depth of Field of imaging sensors in Visual Sensor Network Applications

(51) International classification	:G06T 5/50	(71)**Name of Applicant :**
(31) Priority Document No	:NA	1)**Ms. N. RADHA (Associate Professor)**
(32) Priority Date	:NA	Address of Applicant :DEPARTMENT OF ELECTRONICS
(33) Name of priority country	:NA	AND COMMUNICATION ENGINEERING, ADITYA
(86) International Application No	:PCT//	ENGINEERING COLLEGE, ADB Road, Aditya Nagar,
Filing Date	:01/01/1900	Surampalem, Andhra Pradesh 533437. E-mail :
(87) International Publication No	: NA	radha_naina@yahoo.com Andhra Pradesh India
(61) Patent of Addition to Application Number	:NA	2)**Dr. T. RANGABABU (Professor)**
Filing Date	:NA	(72)**Name of Inventor :**
(62) Divisional to Application Number	:NA	1)**Ms. N. RADHA (Associate Professor)**
Filing Date	:NA	2)**Dr. T. RANGABABU (Professor)**

(57) Abstract :

ABSTRACT Our Invention is development of multi-focus image fusion algorithm for improving the depth of field of imaging sensors in visual sensor network applications. In Visual Sensor Networks (VSN), imaging or vision sensors can be used to capture, process, and transmit a large set of images for monitoring objects and their behavior in surveillance, traffic, and industrial applications. However, the cameras that are used in vision sensors have a narrow depth of field (DOF). Because of this, when we capture an image, objects at a definite distance from the lens is focused (sharp) and remaining will be defocused (or blurred). This makes it tough for VSN to evaluate and analyse these divergent focused images. Multi-focus image fusion methods solve these issues by the fusion of extracted sharp details of divergent focused images to get a single fused image with more descriptive and reliable information. Identifying the focused areas, while extracting the sharp details of divergent focused images is the main challenge of multi-focus image fusion. many algorithms had existed for image fusion over a decade but their inability to distinguish between the focused and de-focused image regions lead to improper extraction of sharp details. Recently, transform and focus measurebased fusion algorithms have gained significant attention in multifocus image fusion. However, the existing focus measures based fusion methods lose some focused details due to neglecting the diagonal neighbour pixels during the extraction of the focused details, which reduce the quality of the fused image.To overcome these problems, a novel image fusion method based on stationary wavelet transform and focus measures is proposed to get a single image with all objects in focus. The proposed method aims to improve the fused image quality by effective selection of focused areas without unintended effects (edge smoothing, contrast reduction and artifacts). While the focus measures used in the proposed algorithm are able to extract the focused details effectively considering the diagonal pixels, the multi resolution property of Stationary wavelet transform helps in extracting the sharp details from the low and high frequency sub bands, with no loss of focused information. The proposed method not only removes artifacts in the fused image due to the shift-invariance of stationary wavelet transform but also preserves sharp details using extended spatial frequency and wavelet based focus measures. It can extract the focused details effectively with improved fusion results, making it easier for Visual Sensor Networks to evaluate and analyze the images. Thus, the proposed method is most preferred choice for real time VSN applications.

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