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# Automatic object recognition and tracking in complex environmental conditions

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The amazing progress in sensor technology has made it possible for capturing images of Giga bytes in frame size at a reasonable frame rate in wide area motion imagery (WAMI) processing scenario. Automatic detection, tracking and identification of objects in this imagery in real time are becoming a necessity for security and surveillance applications. Feature extraction and classification of moving objects in WAMI data is challenging as the size of the objects in the image may be too small and they appear in different viewing angles and in varying environmental conditions. We present a new framework for detection and tracking of such low resolution objects in wide area imagery. The motivation behind the development of this algorithm is to utilize the entire information that is available about the object of interest in the detection and tracking processes. The proposed method makes use of a dense version of localized histogram of gradients on the difference images. A Kalman filter based predictive mechanism is employed in the tracking methodology. The feature based tracking mechanism can track all the moving objects. The robustness of the proposed methodology is illustrated with the help of detection and tracking of several objects of interest in varying situations. It is observed that the new method can even track pedestrians in WAMI data. We also present the effect of our shadow illumination and super-resolution techniques to improve object detection and tracking in very long range videos.

## Biography

Vijayan K Asari is a Professor in Electrical and Computer Engineering and Ohio Research Scholars Endowed Chair in Wide Area Surveillance at the University of Dayton, Dayton, Ohio, USA. He is the Director of the Center of Excellence for Computer Vision and Wide Area Surveillance Research (Vision Lab) at UD. His research activities include development of novel algorithms for human identification by face recognition, human action and activity recognition, brain signal analysis for emotion recognition and brain machine interface, 3D scene creation from 2D video streams, 3D scene change detection, and automatic visibility improvement of images captured in various weather conditions. He received his BS in Electronics and Communication Engineering from the University of Kerala, India, and MTech and PhD degrees in Electrical Engineering from the Indian Institute of Technology, Madras. Prior to joining UD in February 2010, he worked as Professor in Electrical and Computer Engineering at Old Dominion University, Norfolk, Virginia for 10 years. He worked at National University of Singapore during 1996-98 and led a research team for the development of a vision-guided microrobotic endoscopy system. He also worked at Nanyang Technological University, Singapore during 1998-2000 and led the computer vision and image processing related research activities in the Center for High Performance Embedded Systems at NTU. He holds 3 patents and has published more than 500 research papers, including 85 peer-reviewed journal papers in the areas of image processing, pattern recognition, machine learning and high performance embedded systems. He is a Senior Member of IEEE and SPIE, and member of the IEEE Computational Intelligence Society. He is the Co-organizer of several SPIE and IEEE conferences and workshops.

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