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DETECTION AND EXTRACTION OF IMAGE FEATURES USING HOG AND SURF

Mr.S.Dilip kumar PhD. Scholar, Department of Computer Science, Government Arts and Science College, Kangeyam – dilipkumarsrirangaraj@gmail.com
Dr.K. Jayanthi Assistant Professor and Head, Department of Computer Science, Government Arts and Science College, Kangeyam – jaysureshlaya@gmail.com

Abstract: Harris Corner Detector that finds features in an image. It is simple to compute, and is fast enough to work on computers. The corners of an image are basically identified as the regions in which there are variations in large intensity of the gradient in all possible dimensions and directions. Corners extracted can be a part of the image features, which can be matched with features of other images, and can be used to extract accurate information. Harris Corner Detection is a method to extract the corners from the input image and to extract features from the input image. The resulting points with high corner values can be used for various computer vision tasks such as object detection and tracking. Harris corner detection is a robust method that can handle noise, illumination changes, and rotation. However, it may not always provide accurate and robust detection on its own.

By combining Harris corner detection with HOG and SURF features, the resulting corner points can be more accurately characterized and provide better performance in various computer vision tasks. The HOG feature representation can also be used to filter false detections, which is a common issue with Harris corner detection alone. Overall, the combination of Harris corner detection with feature extraction methods like HOG and SURF can improve the accuracy and robustness of corner detection and provide better performance in various computer vision tasks.
Key words: Harris Corner, gradient, HOG and SURF.

LITERATURE REVIEW:

Object detection in a cluttered scene using point feature matching is a well-studied problem in computer vision. Various techniques have been proposed over the years to address this challenge.One popular approach is using the Scale-Invariant Feature Transform (SIFT) algorithm. Lowe proposed the SIFT algorithm in 1999 for feature extraction and object recognition. SIFT is a scale and rotation invariant feature descriptor, which makes it suitable for object detection in cluttered scenes. However, SIFT is computationally expensive and not suitable for real-time applications.

To overcome the computational limitations of SIFT, several alternative methods have been proposed. One such method is the Speeded Up Robust Features (SURF) algorithm. SURF is a fast and efficient algorithm for feature extraction and matching. It uses a Difference of Gaussian (DoG) filter to approximate the scale-space extrema and then calculates the SURF descriptors. SURF has been used for various object detection tasks, including face recognition and vehicle detection.

Another popular method for object detection in cluttered scenes is the Histogram of Oriented Gradients (HOG) algorithm. HOG represents an image as a histogram of gradient orientation in local regions. It is robust to changes in illumination and is effective for object recognition tasks. HOG has been used for various object detection tasks, including pedestrian detection and vehicle detection.Several researchers have proposed combining Harris corner detection with feature extraction methods like HOG and SURF for object detection in cluttered scenes. For example, Zhu et al. proposed a method for detecting objects in cluttered scenes using Harris corner detection and HOG features. The method uses a sliding window approach to detect objects in cluttered scenes. Experimental results showed that the proposed method achieves higher accuracy and better performance than other state-of-the-art methods.In object detection in cluttered scenes using point feature matching is an active area of research in computer vision. Various techniques have been proposed over the years, including SIFT, SURF, HOG, and the combination of Harris corner detection with feature extraction methods like HOG and SURF. The choice of the appropriate method depends on the specific application requirements, including accuracy, computational complexity, and real-time performance.