# VISUAL RECOGNITION USING HYBRID CAMERA

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## ABSTRACT

Visual recognition is an exciting but difficult task. Recent dramatic advance in computer vision technology has made some promising progress. For example, the launch of hybrid camera provides both RGB and depth information for visual recognition.

Using the depth information, we proposed a novel feature for object recognition: Histogram of Oriented Normal Vectors (HONV). The HONV feature captures the local surface of an object to describe its 3D shape. Furthermore, a Rotation-Invariant HONV (RIHONV) feature is introduced to handle the problem of viewing angle variation. Our state-of-art performance on the RGB-D dataset shows that the proposed HONV and RIHONV features significantly outperform the HOG and HOGD features in both object detection and classification tasks.

Using the RGB information, we implemented people finder for eldercare application. To identify falls of older adults, finding the location of people is firstly needed. We implement a people finder using HOG-LBP feature. We establish a benchmark dataset for eldercare vision algorithms, named Mizzou-16S dataset. It covers 16 various scenarios, with all the ground truth automatically labeled by Vicon system. Our people finder can achieve good results on this dataset.

Also with the RGB information, we implemented efficient image classification algorithm for people counting in vehicles application. To identify the number of occupants in a vehicle on carpool lane, we do classification on the windshield image instead of human detection in it. We collect a new dataset for evaluation, Mizzou-windshield dataset. Our algorithm attains good performance in accuracy and speed.