Stereo vision-based pedestrian detection system: A review

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Abstract

The increment of road accident involving pedestrian have pushed everyone to start developing various safety system to minimize it. Although passive systems like seatbelt and airbags have been installed inside a vehicle, but they are just minimizing the risk of injury for the vehicle's occupant, but not towards the pedestrian. The usage of the advanced driver assistance system (ADAS), like a pedestrian detection system (PDS), with the purpose of preventing any accident from happening has shown some improvement in reducing fatalities. There are several approaches used in detecting pedestrian, and vision-based system is preferred due to its cost and the similarity with the human vision, compared to other type of active sensors. But problems with the unique image representation of both the pedestrian and the background need to be solved if using this approach to detect pedestrian. Both monocular and stereo vision have been used in detecting pedestrian, but the last method has shown a number of advantages in obtaining a 3D knowledge of the scene and thus, making it a more suitable technique in detecting pedestrian. Images taken from both left and right cameras were being processed to detect the existence of pedestrian. Then the pedestrian verification was conducted. Researchers have been combining several algorithms in object recognition in detecting and verify the pedestrian, from statistical based to neural network and other mathematical approaches as well. All these techniques were reviewed and discussed in accomplishing the most appropriate method for a stereo vision-based pedestrian detection system to be used inside a vehicle.