

Image Processing Approach for Time-Saving and Convenient Parking Slot Detection

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With the globalization, businesses around the world started to expand from the local boundaries to the international markets. As a result of that, transportation system management and parking management are gradually becoming key factors for successful businesses. Most of the Sri Lankan parking areas in operation are manually functioned and inefficient. Because of that reason on busy days, drivers may take extra time driving around the parking area to find a free parking space. Failure to find a free parking slot may cause traffic congestion, extra Carbon Dioxide emission, and arising the stress level of drivers. The free parking slot detector developed using the technology of image processing can be introduced as a great solution for all these issues. The shortest path algorithm contained in this detector assists drivers in finding the nearest vacant parking space. The camera of this detector is acting as a sensor. Since there are no sensors employed, the mechanical and electronic functionality of the system is reduced to a great extent. In previous researches, the Canny Edge detection method was used to identify the vehicles. In this research, the Yolo algorithm was used to detect the presence and the type of vehicles in the parking area since its' high accuracy compared to the Canny Edge detection method. After detecting the vehicles, the mean pixel value of each vehicle is taken. The coordinates of the parking slots are taken to an XML file when the parking area is empty and mark the polygon area of each parking slot. Ultimately, each parking slot is uniquely numbered and the status of the parking slot is decided according to the mean value of the vehicle. The updated status of each parking slot is displayed at the entrance of the parking area. The accuracy of the system was approximately 95% in different weather conditions and various angles of images. The developed system may lead to an effective transportation system.

Keywords: Free parking space detection, Shortest path algorithm, Convolutional neural network, Image processing