Speed Sign Detection and Recognition Based on Gray Image

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Abstract

The study, on the basis of gray image, uses the skill of computer vision processing to develop the technology of speed sign detection and recognition, and furthermore integrates a system of speed sign detection and recognition that has real-time processing ability to remind drivers of speed limitation when stopping vehicles in different road conditions. The technology includes four main processing modules:speed sign detection, speed sign segmentation , speed sign recognition and speed sign integration. In the aspect of speed sign detection, the Adaboost algorithm is adopted to quickly and stably detect the positions and ranges of the signs. In the aspect of speed sign segmentation, the image processing algorithms, such as Ostu algorithm, canny edge detection, ellipse fitting, image enhancement and morphology operation are utilized to efficiently cut out the image in the figure part of sign. In the aspect of speed sign recognition, for the formed rectangular image, including the figures cut out, its characters are validated by Histogram of Gradient (HOG) , and the characters of original image are validated by Support Vector Machine (SVM). Afterward, a linear combination is made by the results of the two validation ways to generate the final recognition result. In the aspect of speed sign integration, taking advantage of the characters of no repeated appearance and continuity in speed sign to reduce the errors caused by the background to be detected as a sign and furthermore to enhance the accuracy of recognition. In the aspect of system performance, Support Vector Machine (SVM) and character validation are mixed on recognition results to generate a high recognition performance up to 98.1%. The whole system efficiently integrates those processing steps, such as speed sign detection, speed sign segmentation, and speed sign recognition, and completes a rapid and stable speed sign detection and recognition system for gray image.

Keyword：Adaboost、Speed Sign Segmentation, HOG, SVM