An Approach To Licence Plate Recognition

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Abstract

Here we describe a project that deals with license plate location in raster images. The algorithm takes a raster image as input, and yields the position of a plate in the image. After the position is determined, the algorithm can determine the locations of the license plate characters, which could be easily combined with an OCR algorithm to convert the license plate number into an ASCII string.

1. Introduction

Recent interest in photo-radar systems has sparked interest in the old topic of license plate location and recognition. In spite of general commercial interest in the topic there has been relatively little published information. The essential problem is to locate a motor vehicle license plate in an otherwise untouched video frame or photograph. Clearly, such a scene will be cluttered by such items as shadows, bumper stickers, dents, and model identification plates. What will be proposed here is a detailed and novel method for location of vehicle plates.

The basic method for license plate location can be described by the following pseudo-code:

[1] input: original image

[2] preprocessing (RGB conversion/smoothing)

[3] edge detection

[4] location of characters

[5] genetic algorithm to find the license plate

[6] output: bounding box with the best score (from GA)

Each of these steps will be discussed in appropriate detail.

The authors would like to acknowledge the support provided by the Natural Sciences and Engineering Research Council of Canada.

2. Pre-processing and edge detection

The first step converts an RGB image to a gray-level image, using the method standard for NTSC images:

gray=(red*299+green*587+blue*114)/1000

Figure 1 shows an example of a picture that has been converted to gray scale. We will show the various steps of the algorithm based on this reference image.

In the second step a median filter (5x5) is applied to the gray-level image in order to remove the noise, while preserving the sharpness of the image. The median filter is a non-linear filter, which replaces each pixel by a value obtained by computing the median of values of pixels in an, in this case, 5x5 neighborhood of the original pixel. Figure 2a shows the result of applying the median filter to the original image.

After preprocessing the image, it is necessary to find the edges in the image. To this end the Shen-Castan edge detector [7] is employed, partly due to its excellent localization properties and because it can deal with significant amounts of noise. The algorithm amounts to a convolution with a smoothing kernel (the infinite symmetric exponential filter) followed by a search for the edge pixels (zero crossings of the Laplacian) and hysteresis thresholding.

The edge image obtained will help us to look for rectangular shapes in the image. For example, the objective function for the genetic algorithm will be based on how close the outline of a bounding box is to the edges in this image. Since there are cases when the edges around

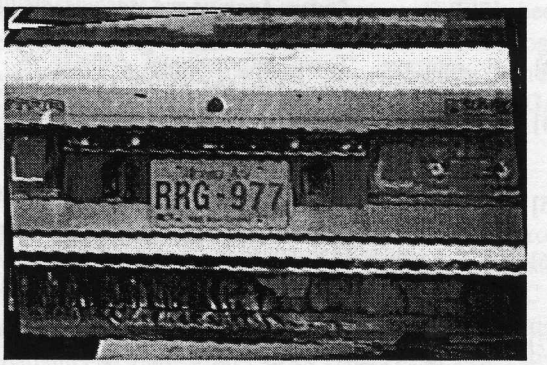

Figure 1. A sample image converted to grey levels