AUTOMATIC CAR PLATE RECOGNITION USING A PARTIAL SEGMENTATION ALGORITHM

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ABSTRACT

In this paper we present a new method for car plate recognition. In the past [1] [2], our group has worked extensively in this problem and one of our main conclusions was that segmentation was responsible for most part of the system errors. This upgrade is based on the simple idea of not performing a full segmentation in order to reduce errors. As we will explain along the paper, the new method is very simple and its results are quite good (better than those achieved with full segmentation).

KEY WORDS

Machine Vision, Mathematical Morphology, Optical Character Recognition.

1. INTRODUCTION

The purpose of our research is the automatic recognition of car license numbers. The main prerequisite is obtaining good car images. The paper in [1] describes how to deal with this problem with moving cars and variable environment conditions. In this paper we will focus on the processing problems that arise after the plate has been located and binarized. Plate location is based on mathematical morphology [3], the particular algorithm has already been published [4] and we only provide a brief outline here. For binarization we use the standard method from Otsu [5].

In the literature, there are many publications about systems of this kind [1] [2] [6] [7] [8]. All of them get their results through a process of location, segmentation and recognition. The key detail here is to remove part of the segmentation process doing only a "partial" segmentation and thus avoiding a great part of the segmentation errors. As we will see in section 3, this simple idea will yield very good results. The price to be paid will be a slower recognition process (although we have tried to optimize it as much as possible).

2. ALGORITHM DESCRIPTION

2.1. Plate Location

This method for plate location uses the following model: "characters are black objects of small thickness within a white background". A morphological transformation called "top-hat" (more exactly a "black top-hat" or "bottom-hat") will help us to find characters. We will use a circular structuring element (S.E.) with diameter bigger than character stroke width. This will make sure that the bottom-hat enhances the characters (the operation is $closing(I) - I$, so that it will work if the closing is able t erase the characters).

Figure 1. Car image (left) and "Bottom hat" (right).

To completely locate the plate, we will binarize the bottom-hat result so that we can work with binary morphology (using the classical Otsu method [5]). I we continue making a closing with a suitable linear S.E. (a horizontal line wider than character spacing) we will convert the characters into a white rectangle, fig. 2.

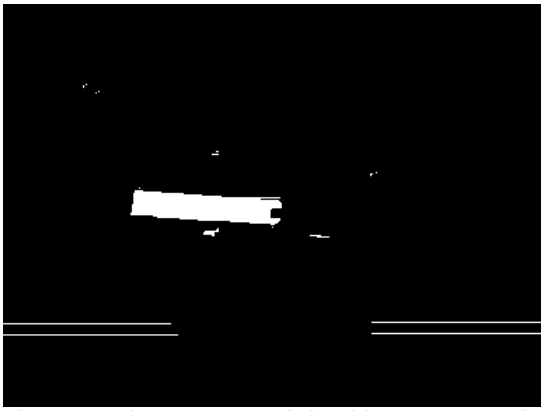

Figure 2. Characters are joined into a rectangle.