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Multi- scale License Plate Detection and Location for Traffic Surveillance

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Abstract: The outline of a new genetic algorithm (GA) is introduced to detect the location of license plate (LP) symbols. An adaptive threshold method is applied to overcome the dynamic changes of illumination conditions when it converts the image to binary. Connected Component Analysis Technique (CCAT) is used to detect candidate objects inside the unknown image. Two new crossover operators, which based on sorting, are introduced, which greatly upgrade the convergence speed of the system. Color (RGB) to Grayscale (GS) change is executed using the Filtering technique by eliminating the hue and saturation data while maintaining the luminance. Most of the CCAT problems, such as touching or broken bodies, edge-based techniques were also implemented to perceive the plate based on the high density of vertical edges inside it detecting license text and at the same time distinguishing it from similar patterns based on the geometrical connection between the symbols constituting the license numbers is the specific approach. These plates usually contain different colors written in different languages, and use different fonts.

Index Terms- Intelligent Transportation System, Component Based Object, License Plate Detection, Support Vector Machine, Traffic Surveillance

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INTRODUCTION

License plate detection presents a genetic algorithm for license plate detection that can detect multiple license plates with various sizes in unfamiliar and complex backgrounds. License plate detection is a main step in license plate recognition which has many applications in intelligent transportation systems. Vertical edges and edge density features are utilized to find candidate regions. Then, the candidates are filtered out situated on geometrical and textural properties. The efficiency of the method is improved using the integral edge image and two-stage candidate window observation. The experimental results confirm robustness and efficiency of proposed method. Intelligent transportation systems play more and more important role in modern society. Among these systems license plate identification is used in many applications including automatic toll payment, identification of stolen vehicles, border control, and traffic law enforcement. A license plate recognition system generally exists in three processing steps: license plate detection, character segmentation, and character recognition. There are many factors to be taken into account when expanding license plate detection method. License plate standards vary from country to country. Images can be captured in different illumination conditions and may contain other object such as buildings, people, trees, fences etc. Also the number of vehicles and the distance between the vehicle and the camera can vary. This makes license plate detection to be the most important and challenging step. In this approach a sliding-window and conditions with adaptive threshold values are used to detect multiple license plates with various sizes. License plate localization can be divided into several methods. Segmentation includes splitting characters into individuals, making latter character identification easier. Its main tasks are binarization and character segmentation. The key point of image binarization processing is to select the threshold reasonably. When the threshold is set too small, it is too easy to cause noise; when the threshold is set too big, it will lower the resolution and filter out a non- noise signal as noise. To ensure fast processing time, two stage candidate object detection and features based on edge density are used.

RELATED WORKS

This paper has said about the problem of robust and vehicle license plate detection and location in the presence of various illumination situations and has proposed a multi-scale license plate detection and location algorithm based on the Label-Moveable Maximal MSER clique. The process of multi-scaled license plate detection can be divided in to three segments [1]. The sufficient details about this topic and possible solutions giving importance on image processing techniques. We anticipate that

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researchers engaged in LPR or in related projects will report their results on this publicly available set or alternatively will contribute to the enrichment of this test database [2]. An effective approach to license plate detection and recognition is proposed, based on class-specific ERs and SaE-ELM. Firstly, top-hat transformation, various filters, different contours and validations are applied to achieve coarse license plate detection. Moreover, it is effective to deal with complex illumination and weather conditions during 24 hours one day [3]. SaE-ELM not only avoided limitations existed in E-ELM and DE-LM, where both algorithms suffered from manually selecting the trial vector generation strategies and control parameters, but also improved the generalization performance. Comparisons with E-ELM and DE-LM using eight different combinations of trial vector generation strategies and control parameters on several experiments in regression [4]. In this paper, we have presented the HNVS architecture in ITSs to review the state-of-the-art literature. The aim of vehicle surveillance is to extract the vehicles' attributes and understand vehicles' behaviors [5]. A novel component-based license plate detection approach has been proposed in this paper. The license plate is regarded as one compositional object, which is decomposed into several characters. Meanwhile, these characters are arranged in specific spatial and visual configurations. We extract MSERs as candidate characters and introduce a CRF model to describe the contextual relationship among the candidates [6]. LPR, as a means of vehicle identification, may be further exploited in various ways such as vehicle model identification, under-vehicle surveillance, speed estimation, and intelligent traffic management [7]. The LPR system whose evaluation is beyond the review capabilities of this paper is due to the fact that their operation is strictly confidential, and moreover, their performance rates are often overestimated for promotional purposes [8]. The new concepts and techniques introduced in this paper include the detailed classification and analysis of multi-style LP formats, the configurable parameters for multi-style LPs, the density-based region growing algorithm for LP location, the skew refinement algorithm, the multi-line LP separation algorithm, the optimized character segmentation algorithm, and the trainable character recognition method [9]. An end-to-end real-time scene text localization and recognition method is presented. The real-time performance is achieved by posing the character detection problem as an efficient sequential selection from the set of Extremal Regions (ERs) [10]. The RBM only yields a preprocessing or an initialization for supervised model in its own right. The RBMs can provide a self-contained framework for developing competitive classifiers. RBM (ClassRBM), a variant on the RBM adapted to the classification setting. The different strategies for training the ClassRBM and show that competitive classification performances can be reached when appropriately combining discriminative and generative training objectives [11]. The proposed VLPD algorithm consists of two main stages. Initially, HSI color space is adopted for detecting candidate regions. Geometrical properties of LP are then used for the classification. The proposed method is able to deal with candidate regions under independent orientation and scale of the plate [12].

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Fig. 1Sample Image

IMPLEMENTATION LICENSE PLATE DETECTION

Color (RGB) to grayscale (GS) transformation is performed using the Filtering technique by eliminating the hue and saturation information

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while retaining the luminance Most of the CCAT problems, such as touching or broken bodies Edge-based methods were also implemented to detect the plate based on the high density of vertical edges inside it Detecting license text and at the same time differentiate it from similar patterns based on the geometrical relationship between the symbols constituting the license numbers is the selected approach in this research. These plates usually contain dissimilar colors, are written in different languages, and use different fonts. In this Proposed System, the design of a new genetic algorithm (GA) is introduced to detect the locations of license plate (LP) symbols. A new technique is established in this paper that detects LP symbols without using any information associated with the plate's outer shape or internal colors. The proposed system is collection of two parts: image processing phase and GA phase. A new genetic-based prototype system for localizing 2-Dcompound objects inside plane images was introduced and tested in the localization of LP symbols. In Proposed System, we can execute the Car License plate through image and videos. The formulation of the GA phase to resolve the 2-D compound object detection problem will be found in specific, indicating the encoding method, initial population setup, fitness function formulation, selection method, mutation and crossover operator design and parameter setting. Encoding of a compound object such as the LP is accomplished based on the constituting objects inside it. Since the next step after plate observation is to recognize the license number, the main symbols identifying the plate number should be included as a minimum. In the case of recent Saudi LP, for example there are four Arabic digits and three English letters. The proposed fitness is selected as the inverse of the calculated objective distance between the prototype chromosome and the current chromosome. Before make clear how the objective distance is measured, we will show first how the geometric relationships between the objects inside a compound object are represented. The previous formulation can be used for the representation of a compound object consisting of a group of smaller objects and can be used to locate the compound object in an image given that its GRM values are fixed. It can also overcome orientation variability either by aligning the compound objects to a certain direction line or by taking projection parameters into account in the originated formulation. Binarization of the image according to a fixed global threshold is not suitable to overcome these problems.

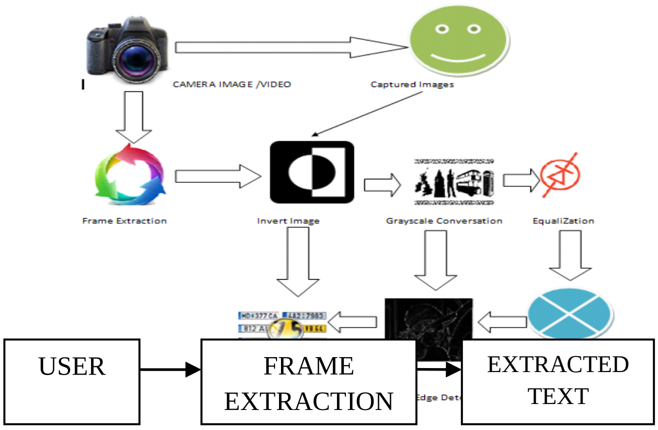

Fig. 2 System Architecture

Source Image

Fig. 3 Process Structure

FRAMEEXTRACTIONS

Input: Edge matrices E_1 and E_2, both of dimensions M x N, and movement tolerance threshold β

Output: Thresholded difference matrix D; any entry $D_{i,j}$ is 255 if there is a difference, 0 otherwise

```
Initialize D_{i,j} to 0 ∀i ∈ [0, M − 1], ∀j ∈ [0, N − 1];
foreach i ∈ [0, M − 1] do
    foreach j ∈ [0, N − 1] do
        if E1_{i,j} ≠ E2_{i,j} then
            D_{i,j} ← 255;
            foreach i′ ∈ [−β, β] do
                foreach j′ ∈ [−β, β] do
                    if (i + i′, j + j′) is within the bounds of E1
                    and E1_{i+i′,j+j′} = E2_{i+i′,j+j′} then
                        D_{i+i′,j+j′} ← 0;
                    end
                end
            end
        end
    end
end
return D;
```

GRAY PREDICATION

All grayscale algorithms utilize the same basic three-step process:

1. Get the red, green, and blue values of a pixel.
2. Convert these pixel values into gray values.
3. Replace the original red, green and blue values with the new gray value.

Basic Formula:

Gray= (Red+Green+Blue)/3

((0.3*R) + (0.59*G) + (0.11*B))

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CONCLUSION AND FUTURE ENHANCEMENT

Thus the color (RGB) to grayscale (GS)conversion is performed using the Filtering technique by eliminating the hue and saturation information while retaining the luminance Most of the CCAT problems, such as touching or broken bodies Edge-based ability were also implemented to detect the plate based on the high density of vertical edges inside it Detecting license text and at the same time differentiate it from similar patterns based on the geometrical relationship between the symbols constituting the license numbers is the selected approach in this research. These plates usually contain unlike colors, are written in different languages, and use different fonts. In this System, the design of a new genetic algorithm (GA) is introduced to detect the locations of license plate (LP) symbols. A new capability is introduced in this paper that detects LP symbols without using any information associated with the plate's outer shape or internal colors. In our LPR system, some restrictions were analyzed in physical appearance of the plates. Most of the images failed to identify representative plates without easily distinguishable characters; either due to plate damage or physical appearance (i.e., extremely dirty plates or ones with stickers and unofficial stamps affixed on their surface).

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