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**vehicle Identification by license plate using support vector
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General Introduction

Vehicle identification is a research area where image processing methods are used to identify vehicles by detecting and identifying the license plate numbers. Typical vehicle identification systems consist of three main stages. They are: locating the license plate, accurately identifying the numbers in the license plate and the identification of vehicles.

Although many intensive research studies have been conducted in other countries in the area of automatic vehicle identification, to our knowledge, there is virtually no research studies conducted in Algeria in this area. However, vehicle identification is an essential area in the development of intelligent traffic systems and surveillance. Given the current security situation in the country due to ethnic conflicts, this is one of the areas where there is an urgent need for the development of devices that could be used in variety of situations to ease the security concerns. In addition, the use of vehicles in Algeria has increased rapidly due to urbanization and modernization, especially in recent years, and thus, traffic congestion in cities has become a major issue due to inadequate road infrastructure. Therefore, control of vehicles and identification of traffic violators to maintain discipline, is becoming a big problem in many cities. Automatic vehicle identification systems can be used effectively for this purpose.

The recognition problem is generally sub-divided into two parts are:

- Number Plate Variations can be one of the given below: location: plates exist in different locations of an image, size: plates may have different sizes due to the camera distance and the zoom factor, color: plates may have various characters and background colors due to different plate types or capturing devices.
- Environmental variations: Illumination: input images may have different types of illumination, mainly due to environmental lighting and vehicle headlights, Background: the image background may contain patterns similar to plates, such as numbers stamped on a vehicle, bumper with vertical patterns, and textured floors, for example, in Algeria the norm is printing the license plate number in black colour on white background for front of vehicles and on a yellow background for back of vehicles. Number plate is a pattern with very high variations of contrast. If the number plates is very similar to the background it's difficult to identify the location, Brightness and contrast is changes to it. The morphological operation reused to extract the contrast feature within in the plate

The objective is to present architecture of ANPR (Automatic Number plate recognition system) by invariant moments to extract the parameters of discrimination and supporting vectors machine as classifiers.

This document includes four chapters, which allow us to present the various aspects of our work.

The first chapter will be devoted to plate registration, firstly present a general of the plate overview and historic, we will present them later in Europe, Africa and Asia the number plate and the description of the different series of license plate in the Algeria (Normal and special series).

We will present in the second chapter the general architecture and the various stages that make up the process of recognition of the license plate in general. We will present the most frequently cited techniques used at the every stage of Automatic Number plate recognition (ANPR) system (Image Acquisition Vehicle Image Pre-Processing, Extraction License Plate, License plate Pre-Processing, Character Segmentation and Character Recognition) and includes some works already done on this system by various researchers using different methodologies and algorithms.

In chapter three, we will discuss the classification method particularly well suited for treating high dimension data (support vector machine SVM).

In chapter four, we will first present the development environment and the different algorithms used. We present in this chapter a detailed description of the license plate recognition system, which includes six major phases: the vehicle image acquisition, preprocessing of the vehicle image, license plate extraction, preprocessing on the license plate character segmentation, and character recognition. Then we will present the experimental results obtained for each stage of the system made and the different discussion about these results.

We will finish the work with a conclusion and perspectives for future work in this research area.

Conclusion and future work

ALPR plays an important role in numerous applications and a number of techniques have been proposed. this system has become a main key of many traffic related applications, e. g. the road traffic monitoring, the traffic analysis, the parking lots access control etc. Accurately detecting the number plate from a vehicle image, extracting the numbers and characters from number plate, and quickly recognizing the number are considered to be the most important stage of ANPR system. They significantly affect the recognition accuracy and processing speed of the entire system.

In this work, we present a convenient and efficient methods for license plate recognition based hu moment and LBP for features extraction, and based SVM and template matching (KNN)for recognition. The proposed method is mainly designed for Algerian car license plate. The system is implemented in MATLAB and its performance is tested on a test database of 50 samples of extracted license plate images with different background, different distance and view point. We presents, results of a preliminary study carried out to extract the location and recognition of license plates from the still images of rear view of cars. The work carried out as part of this brief focuses on the registration plate recognition.

This system is based on two different tasks:

- The first: we have developed a number of image databases to be able to experience our system.
- The second: we have designed and set up a license plate recognition system, we has obtained the best performance is 80%.

Some perspectives that may help extend the work in this work are:

- Use another methods (example: Zernike invariant moment or other) for feature extraction.
- Use another methods (example: Hidden Markov Model (HMM), Neural Network, ...) for character recognition and improve recognition rat(RR) and processing speed to obtain a more robust system.
- Using the technique of video sequences, as an LPR acquisition method, still pictures were preferred in order to simplify acquisition and

processing operations, The image may be taken via digital camera for the rear or the front side of the vehicle Algerian.

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ملخص

التعرف التلقائي على لوحة الترخيم هو أسلوب المراقبة يستخدم التعرف الضوئي على الحروف في الصور لقراءة لوحات المركبات، وأنه يلعب دورا هاما في مختلف التطبيقات التي تتعلق بنظم النقل الآلي مثل رصد حركة المرور، والكشف عن السيارات المسروقة، الدفعات التلقائية للرسوم على الطرق أو الجسور ومواقف السيارات التحكم في الوصول الخ. ويجب أن تكون عملية المعالجة سريعة وناجحة في ظروف بيئية مختلفة، مثل في الداخل، في الهواء الطلق، ليلا أو نهارا. في عملنا، وتبين لنا العديد من التقنيات المستخدمة في نظام التعرف التلقائي على لوحة الترخيم استخدمنا خوارزمية نمط ثنائي المحلي (LBP) و المتغيرات الوقت الحالي لاستخراج الميزة و خوارزمية: آلة الدعم الموجه (SVM) و نموذج المقابلة (KNN) من أجل للتصنيف. في النتائج التجريبية، حققنا 80% كإقصى معدل الاعتراف باستخدام خوارزمية دعم آلة ناقلات و المتغيرات الوقت الحالي.

كلمات مفتاحية: التعرف التلقائي على لوحة الترخيم، آلة الدعم الموجه (SVM)، ونمط ثنائي المحلي (LBP)، الكشف عن الحافة

Abstract

The Automatic Number plate recognition it is a mass surveillance method that uses optical character recognition on images to read vehicle registration plates, it is playing an important role in variety of applications related to automated transport system such as road traffic monitoring, detection of stolen vehicles, automatic payments of tolls on highways or bridges, parking lots access control etc. It has to be quickly and successfully process license plates (LP) under different environmental conditions, such as indoors, outdoors, day or night time. In this work we are showing different techniques used for ANPR, used two methods : Hu variants moment and local binary pattern (LBP) for feature extraction , and two methods for classification support vector machine (SVM) and template matching (KNN). In Experimental results, we have obtained the best recognition rate of 80% using Hu variants moment and SVM.

Keywords: ANPR, support vector machine (SVM), Hu variants moment, LP, local binary pattern (LBP), edge detection.

Résumé

La reconnaissance automatique de plaques immatriculation est une méthode de surveillance de masse qui utilise la reconnaissance optique de caractères sur les images pour lire les plaques d'immatriculation des véhicules, il joue un rôle important dans diverses applications liées au système de transport automatisé telles que la surveillance de la circulation routière, la détection de véhicules volés, paiements automatiques de péages sur les routes ou les ponts, les parcs de stationnement contrôle d'accès, etc. Il doit être un processus des plaques immatriculation (LP) rapidement et avec succès dans différentes conditions environnementales, comme à l'intérieur, extérieur, jour ou de nuit. Dans ce travail, nous montrons différentes techniques utilisées pour ANPR, utilisé deux méthodes: moment de Hu et le modèle locale binaire (LBP) pour l'extraction de caractéristiques, et deux méthodes pour la classification : machine à vecteurs de support (SVM) et le modèle correspondant (KNN). Dans les résultats expérimentaux, nous a obtenu le meilleur taux de reconnaissance 80% en utilisant moment de Hu et SVM.

Mots-clés: ANPR, machine à vecteurs de support (SVM), moment de hu, LP, modèle locale binaire (LBP), détection de bord.