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Facultatea Calculatoare, Informatică și Microelectronică

Departamentul Ingineria Software și Automatică

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Admis la susținere

Șef department Ion Fiodorov conf. univ., dr. în informatică

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Rețele neuronale pentru analiza parcărilor auto (rețea neuronală convoluțională)

Teză de master

Student:	_____	**Eladii Vadim, gr. IS-211M**
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ADNOTARE

Retele neuronale pentru analiza parcarilor auto (retea neuronala convolutionala)

a studentului gr. IS-211M, "Ingineria Software"programul,

Eladii Vadim

Structura tezei: Lucrarea contine adnotari in limba engleza si romina, cuprins, introducere, 3-capitole si bibliografie

Cuvintele-cheie: parking space, camera, parking space, machine learning, R-CNN ,classification, car, logistic regression, prediction, Convolution Neural Network (CNN), reset, transfer learning, feature extraction.

Domeniul de studiu: Analiza si crearea unui system de gestionare a parcarilor auto bazat de retea neuronala convolutionala

Scope: Crearea unui system care solutionaza problema locurilor de parcare

Objectives: Proiectarea uni astfel de sistem de parcare, care reduce problemele de parcare. Lucrarea prezintă un system de învățare automata bazat pe, Convolution Neural Network (CNN) care este utilizat pentru a determina daca locurile de parcare sunt odupate sau libere. Pentru a optimiza sarcina de clasificare, în lucrare este implementată metoda de invățare prin Transfer Learning. Problema parcării nu se limitează doar la problema legata se distinatori de automobile, ci și escaladează la probleme mult mai mari și extinse, afectând mai mulți oameni din mediul înconjurător. Prin urmare, este foarte important să existe un sistem de parcare utilizind modelul propus. In lucrare vom implementa si posibilitatea soferilor de a vedea locurile de parcare prin intermediul unei applicatii de la distanta, reducând astfel mult timpul de așteptare pentru vehicul.

Theoretical value of the thesis: Analiza tipurilor de parcare si evolutia lor. Analiza tipurilor de modele de antrenare pentru detectarea masinelor.

ADNNOTATION

Creating a neural network for the analysis of car parking lot (convolutional neural networks)

of the student gr. IS-211M, "Ingineria Software" program,

Eladii Vadim

Thesis structure: The thesis contains annotations in English and Romanian language, contents, introduction, 3 chapters, conclusions, bibliography.

Keywords: parking space, camera, parking space, machine learning, R-CNN , classification, car, logistic regression, prediction, Convolution Neural Network (CNN), reset, transfer learning, feature extraction.

Study domain: Parking spot detection.

Scope: Finding a parking space nowadays becomes an issue that is not to be neglected, it consumes time and energy.

Objectives: Design such parking system, which, in many ways reduces the hassles of parking. The paper presents a system where a Machine Learning model, Convolution Neural Network (CNN) is used to classify parking slots in a parking space into vacant and filled slots. In order to optimize the task of classification, the method of Transfer Learning is implemented in the paper. The problem of parking stands not only limited to causing inconvenience to the drivers, but also escalates to much larger and extensive problems, affecting a lot more people the environment. Hence it is very important to have a system is used parking system in place. The model proposed in the paper sends across parking information to a driver well in advance, there by greatly reducing the waiting time for the vehicle.

Theoretical value of the thesis: Analyzing history and type of parking lot systems to detect parking spot. Analyzing different type of training model to detect cars.

TABLE OF CONTENTS

INTRODUCTION

In recent years, the problem of creating smart parking has become highly essential. As the number of cars has quickly increased over the last years, so does the need for parking spaces and search facilities. Assuming that the medium a driver spends 39 minutes searching for such a place every day, about 165 hours a year could be spend on something more valuable.

Nowadays, there are many smart parking projects, but ready for use examples can be counted on the fingers of one hand, and information about the cost-effective aspect of their implementation is generally minimal. It should be noted that when designing such tools, the most significant financial part of the development is created by the software, not hardware.

The achievement of this work is to create a solution that will be able to detect parking spot occupancy status from a camera video feed. Solution is not reliant on existing roadway markings and uses object detection to find stationary cars in the parking lot. The location of these stationary cars is being used as the reference for further classification of the status of the parking space.Entire architecture of the system is able to support multiple cameras running in mutually disjoint fields of view and to have a mobile application that provide the information about the available parking space. Output is be displayed in web-based application in the form of statistics about parking lot and its parking spots as well as its configuration. In addition, to have a mobile application witch will show in real time the number of available parking space.

This paper presents and approach for a real-time parking space classification based on Convolutional Neural Networks (CNN). CNN is similar to the human neural network build with synapses (weights) and neurons. From this point of view, complex tasks can be provided through the network. This uses CNN with pre-existing architectures and traning models to detect in real-time the availability of a parking spot.

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