Utilizing Computer Vision for Service Location Determination

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Contents

Chapter 1

Background, Context, Scope

Public authorities, as a core requirement, must choose where to place services. This requires a comprehensive understanding of the availability of other services, such as parking in the area. Traditional methods of gathering this information can be time-consuming and inefficient, often involving consulting maps and other complex data. Therefore, a solution is needed that can efficiently analyze this information. This solution could leverage the growing field of geospatial data analysis, specifically the integration of machine learning with satellite imagery. This approach can provide a more accurate and real-time understanding of local services, facilitating more effective planning and management of public services.

Literature in the field of Computer Vision for geospatial applications highlights significant advancements in object recognition and image analysis. Research by X and Y demonstrates the efficacy of convolutional neural networks (CNNs) in detecting physical objects from aerial images, which aligns closely with the objectives of this project. Similarly, studies on data fusion techniques, as discussed by Z, provide a foundation for integrating aerial imagery with other data sources, such as municipal records of underground parking and public transportation facilities. (TODO: Re-add refrences)

Situated within the broader computer science domain, this project contributes to the fields of geospatial analysis, data integration, and application development. (TODO: IMPROVE THIS) It addresses practical needs and pushes the envelope in applying machine learning techniques in real-world scenarios.

Subsequent phases will expand the application's capabilities to include data integration, whereby information on other logistical elements such as underground parking availability and public transport links will be introduced as metrics. This approach aims to provide a comprehensive tool for urban logistics, as much data related to the domain as possible should be colated.

1.1 Approaches to Solving the Problem

1.1.1 Machine vision smart parking using internet of things (IoTs) in a smart university

[7]

1.1.2 Research on Parking Space Status Recognition Method Based on Computer Vision

[5]

1.1.3 Deep Learning based Automated Parking Lot Space Detection using Aerial Imagery

[2]

1.1.4 A Web Application Exhibiting Parking Guidance using Smart Sensor Networks

[8]

1.1.5 A systematic review of machine-vision-based smart parking systems

[1]

1.1.6 An adaptive vision-based outdoor car parking lot monitoring system

[6]

1.1.7 Smart Vehicle Parking System Using Computer Vision and Internet of Things (IoT)

[9]

1.1.8 Autonomous Parking-Lots Detection with Multi-Sensor Data Fusion Using Machine Deep Learning Techniques.

[4]

1.1.9 Automatic vision-based parking slot detection and occupancy classification

[3]

Chapter 2

Problem Description

This research project proposes the development of a Single Page Application that integrates Computer Vision with publicly available map datasets to assess the logistical suitability of specific locations for public services and events. Utilizing aerial photography the application aims to enhance the efficiency of planning processes for public authorities by providing detailed insights into available amenities.

This project's high-concept is to streamline the preparation of event management and urban planning. By providing abstracted evaluations of infrastructure through Computer Vision and the Integration of Publicly Avalible Data, the application seeks to replace or supplmement traditional, labor-intensive methods, reducing the amount of time required to come to decisions about service placement. Initial functionalities will focus on the quantification of street-level parking spaces within a designated radius, employing aerial imagery to detect and count local parking.

The experimental component of the project will involve the development of a prototype SPA that uses a pre-trained CNN to process aerial images and identify parking spaces within a specified radius of a given location. The initial phase will focus on collecting and processing high-resolution aerial photographs of multiple urban areas, followed by the application of image segmentation techniques to discern parkable surfaces from other elements.

By conducting this experiment, the project should demonstrate it's potential to streamline the planning process for public services and events.

Chapter 3

Research Question

Chapter 4

Hypothesis

Chapter 5

Design and Build

Chapter 6

Evaluation

Chapter 7

Refrences

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Chapter 8

Activities