Software Requirements Specification

for

Free Parking Lot Detection, Release 1.0

Version 1.0, not approved

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1. Introduction

1.1 Purpose and tasks

This SRS describes the software functional and nonfunctional requirements for release 1.0 of the Free Parking Lot Detection (FPLD). This document is intended to be used by the members of the project team that will implement and verify the correct functioning of the system. Unless otherwise noted, all requirements specified here are high priority and committed for release 1.0. One of the most common problems in metropolitan areas is finding a free parking space. Often we just circle the parking lots only to realize that there is not a single space available! So drivers get very frustrated and find it extremely difficult to find a free space. Moreover, in recent years there has been a growing interest in automatic parking systems.
The goal of the project is to develop a web service to detect free parking spaces. To solve it the following tasks are formulated:

- Train detector models using different approaches (depending on the dataset) and calculate metrics
- Conduct a comparative analysis of trained models, in terms of metrics and applicability to the applied problem
- Develop a web service on hosting

1.2 References

1. *http://cnrpark.it/*
2. *https://lafi.github.io/LPN/*
3. *https://github.com/ultralytics/yolov5*
4. *https://arxiv.org/pdf/1506.02640.pdf*

2. Overall Description

2.1 Product Perspective

A service with a web interface that allows you to upload photos (in the future, videos) to analyze available parking spaces using deep learning models.

2.2 Product functions

1. Parking lot detection
2. Counting free and occupied parking spaces
3. Ability to upload photos to analyze the availability of parking spaces
4. Ability to connect to real cameras freely available

2.3 User Documentation

Web service is intended for any user who has access to the Internet and a browser.

2.4 Assumptions and Dependencies

The possibility of signal loss between the web service and the signal source.

3. External Interface Requirements

3.1 User Interfaces

A web page with a window for uploading photos or videos, two buttons "Upload" and "Process". After processing, a window with graphical and numerical detection results.

4. Other Nonfunctional Requirements

4.1 Common Requirements

The web service must be available at any time for the user under normal conditions.

4.2 Usage constraints

- The minimum picture/video stream quality is 512x512 pixels.
- Stable Internet speed, sufficient for sending video signal/streaming.

4.3 Performance Requirements

Inference of models, close to real-time (<200ms per frame)

4.4 Quality Requirements

The accuracy of the model predictions should be greater than 80%. Also mean average precision (mAP) should be at least 0.7.

Appendix A: Models of detectors