SOFTWARE REQUIREMENTS SPECIFICATION

for

Image Segmentation Using Mask R-CNN

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CHAPTER 1

INTRODUCTION

1.1 Purpose

The purpose of this document is to provide a debriefed view of the requirements and specifications of the project called Image Segmentation using Mask R-CNN. It will explain the purpose and features of the software, the interfaces of the software, what the software will do, and the constraints under which it must operate. This document is intended for users of the software and also potential developers.

1.2 Document Conventions

This document was created based on the IEEE System Requirement Specification Documents template.

1.3 Intended Audience and Reading Suggestions

Anyone with some programming experience and familiarity with Python and C can understand this document. The document is intended for developers, software architects, testers, project managers, and documentation writers.

This Software Requirement Specification also includes:

- Overall description of the product
- External interface requirements
- System Features
- Other non-functional requirements

1.4 Product Scope and Motivation

From any Artificial intelligence and Machine learning based devices analysing the image is a very crucial task, it's been a difficult task for the devices or programs to analyse the image using the existing algorithms, to overcome this problem, this project is introduced. In the proposed system, image analysis is

done using the Mask R-CNN. This image segmentation can also be implemented in traffic signals, to make them automated like detecting whether there are any vehicles coming in the way. On detection, the system decides whether the road is free or not and sets the signals accordingly.

CHAPTER 2

OVERALL DESCRIPTION

2.1 Product Perspective

Image segmentation involves dividing a visual input into segments to simplify the image analysis. Segments represents objects or parts of objects and comprise sets of pixels. Image segmentation creates a pixel wise mask for each object in the image this technique gives us far more granular understanding of the image. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely it is the process of assigning a label to every pixel in an image such that pixels with same label share certain characteristics.

2.2 Product Functions

- Autonomous object detection
- Locating objects and boundaries.

2.3 User Classes and Characteristics

- Typical Users, such as Authorized Government officials who want to use this proposed system for the smart traffic signals.
- Advanced/Professional Users, such as engineers or researchers, who want to use it for further research.
- Programmers who are interested in working on the project by further developing it or fixing an existing bug

2.4 Operating Environment

- Windows 2000
- Windows XP
- Windows Vista
- Windows 7
- Windows 8
- Windows 10

- Mac OS X
- Linux

2.5 Assumptions and Dependencies

The Proposed System is developed completely in Python and therefore requires Python to be installed on the user's system. The system requires a minimum Python version 7 or higher. This applies to Windows and Linux users as well as Mac OS X. As there is a lot of training of data in DNN it requires minimum of 4GB RAM.

CHAPTER 3

EXTERNAL INTERFACE REQUIREMENTS

3.1 User Interface

The proposed system does not have any user interface.

3.2 Hardware Interface

The minimum hardware requirements of Image Segmentation using Mask R-CNN is 4 RAM. Also, because the proposed system training phase involves a large dataset. A system with these specifications can handle a Network of approximately span of 10mins of videos. For more accuracy and bigger networks, additional software implementation is required.

3.3 Software Interfaces

The Proposed System requires Python to be installed on the system, more specifically Java version 7 or 8 for its latest release. The system requires a minimum Python version 7 or higher. This applies to Windows and Linux users as well as Mac OS X. As there is a lot of training of data in CNN it requires a minimum of 4GB RAM.

CHAPTER 4

SYSTEM FEATURES

This section demonstrates the proposed system's most prominent features and explains how they can be used and the results they will give back to the user.

4.1 Upload IMAGE:

Initially, the user uploads the image for the website which is to be segmented and analysed.

4.2 Analyse the Image

This module, Mask R-CNN is used to analyse the image.

4.3 Detection of Object

After analysing, the next step is to detect the objects in the image. This is done using the Mask R-CNN which is the most important model from the deep neural network. There are three levels of image analysis: Classification, Object detection segmentation. Classification: categorizing the entire image into class such as animals, humans, objects. Object detection: detecting objects in an image and drawing a rectangle around them. Mask R-CNN is a state-of-the-art deep neural network architecture used for image segmentation. Using Mask R-CNN, we can automatically compute pixel-wise masks for objects in the image, allowing us to segment the foreground from the background. Mask R-CNN, can automatically predict both the bounding box and the pixel-wise segmentation mask of each object in an input image.

CHAPTER – 5

OTHER NON-FUNCTIONAL REQUIREMENTS

5.1 Performance Requirements

The minimum hardware requirements of Image Segmentation using Mask R-CNN is 4 RAM. Also, because the proposed system training phase involves a large dataset. For more accuracy and bigger networks, additional software implementation is required. Performance depends on the clarity of the image that is input and as a result.

5.2 Security Requirement

The Proposed System does not have any security requirements and thus any type of user can use it without any additional privileges.

5.3 Software Quality Attributes

The Proposed system provides the users with both simple and advanced features. Due to its well designed and easy to use interface it can be used by both Government experts and typical users.