## Customer Requirements Speciﬁcation

**SAG ML TextRecog CRS ـــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــ**

**Table of Contents**

[Document Status](#_heading=h.gjdgxs) 1

[Document History](#_heading=h.30j0zll) 2

[Reference Document](#_heading=h.1fob9te) 2

[Project Description](#_heading=h.3znysh7) 3

Features 3

Key Elements 3

System Context4

CRS Requirements4

# Document Status:

|  |  |  |
| --- | --- | --- |
| **Name** | PO\_SAG\_CRS\_ML\_TextRecog | |
| Version | V1.3 | |
| Status | Draft | |
| Author | AA | |
| Date | [18-11-2022] | |
| Team approval | AES | Approved |
| Mentor approval |  |  |
| Final approval |  |  |

# 

# Document History:

|  |  |  |  |
| --- | --- | --- | --- |
| **Version** | **Author** | **Date** | **Change** |
| 1.0 | AA | [8-11-2022] | * Initial Creation * Add CRS Requirements |
| 1.1 | AES | [13-11-2022] | * Edit The Document Title. * Edit the Reference Document version. * Edit the Project Definition, Features , Key Elements and Requirements. |
| 1.2 | AES | [14-11-2022] | * Edit System Context * Edit some Key Elements. |
| 1.3 | AA | [18-11-2022] | * Edit System Context * Edit all requirements |

# Reference Document:

|  |  |  |  |
| --- | --- | --- | --- |
| **Ref.number** | **Doc.Name** | **Version** | **Status** |
| 1 | PO\_SAG\_CR\_ML | V1.2 | Released |

# Project Description:

## Definition:

The Text Recognition aims to help the blind read by extracting and recognizing text from different kinds of images and then converting it to a sound that they can hear.

## Features:

* Text Recognition.

## Key Elements:

* The Text Recognition model shall recognize text including handwritten on other objects (book, paper, sign, etc.).

## **Text Recognition**

## System Context:

Diagram

Description automatically generated



## CRS Requirements:

|  |  |  |  |
| --- | --- | --- | --- |
| **Req\_ID** | Req\_SAG\_CRS\_ML\_TextRecog\_***001***-V1.3 | **Covers** | PO\_SAG\_CR\_ML\_004-V1.1 |
| **Description** | The TextRecog\_Class class shall take the Input\_Video\_Files cut it into frames and convert them to gray-scale image. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req\_ID** | Req\_SAG\_CRS\_ML\_TextRecog\_***002***-V1.3 | **Covers** | PO\_SAG\_CR\_ML\_004-V1.1 |
| **Description** | The TextRecog\_Class shall call a resizing algorithm shall resize each image and expand its dimension to make it compatible with the input shape of architecture. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req\_ID** | Req\_SAG\_CRS\_ML\_TextRecog\_***003***-V1.3 | **Covers** | PO\_SAG\_CR\_ML\_004-V1.1 |
| **Description** | The TextRecog\_Class shall call a normalization algorithm shall Normalize the image pixel values by dividing it with 255. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req\_ID** | Req\_SAG\_CRS\_ML\_TextRecog\_***004***-V1.3 | **Covers** | PO\_SAG\_CR\_ML\_004-V1.1 |
| **Description** | The TextRecog\_Class shall call an encoding algorithm to encode each character of a word into some numerical value | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req\_ID** | Req\_SAG\_CRS\_ML\_TextRecog\_***005***-V1.2 | **Covers** | PO\_SAG\_CR\_ML\_004-V1.1 |
| **Description** | The TextRecog\_Class shall use the CNN architecture to process each image to extract the INN\_CharFeatureMap. | | |

|  |  |
| --- | --- |
| **Info\_id** | info\_PO\_SAG\_CRS\_ML\_TextRecog \_***001***-V1.0 |
| **Description** | The INN\_CharFeatureMap map is an inner signal from the CNN layer and it represents the feature maps for the letters | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req\_ID** | Req\_SAG\_CRS\_ML\_TextRecog\_***006***-V1.2 | **Covers** | PO\_SAG\_CR\_ML\_004-V1.1 |
| **Description** | The TextRecog\_Class shall use bidirectional-LSTM to take the INN\_CharFeatureMap and output INN\_SoftMaxProbablities. | | |

|  |  |
| --- | --- |
| **Info\_id** | info\_PO\_SAG\_CRS\_ML\_TextRecog \_***002***-V1.0 |
| **Description** | The INN\_SoftMaxProbablities is an inner signal that the bidirectional-LSTM outputs and it represents the SoftMax probabilities over the vocabulary. | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req\_ID** | Req\_SAG\_CRS\_ML\_TextRecog\_***007***-V1.1 | **Covers** | PO\_SAG\_CR\_ML\_004-V1.1 |
| **Description** | The TextRecog\_Class shall use the CTC decoder to get the INN\_SoftMaxProbablities from different time steps to get the raw text. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req\_ID** | Req\_SAG\_CRS\_ML\_TextRecog\_***008***-V1.1 | **Covers** | PO\_SAG\_CR\_ML\_004-V1.1 |
| **Description** | The TextRecog\_Class shall send the Text\_TextRecog to the Text\_To\_Audio\_Formatter and get the Output\_Audio\_Files\_TextRecog | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Req\_ID** | Req\_SAG\_CRS\_ML\_TextRecog\_***009***-V1.1 | **Covers** | PO\_SAG\_CR\_ML\_004-V1.1 |
| **Description** | The TextRecog\_Class shall return the Output\_Audio\_Files\_TextRecog to the ECU. | | |