MACAU UNIVERSITY OF SCIENCE AND TECHNOLOGY

School of Computer Science and Engineering

Faculty of Innovation Engineering

<<Software Project for Course Software Engineering>>

Homework ID : Task3-Structured Requirements Analysis

Report Title : A Development of Multifunctional Real-time Translation Software with AI-OCR and Natural language translation model

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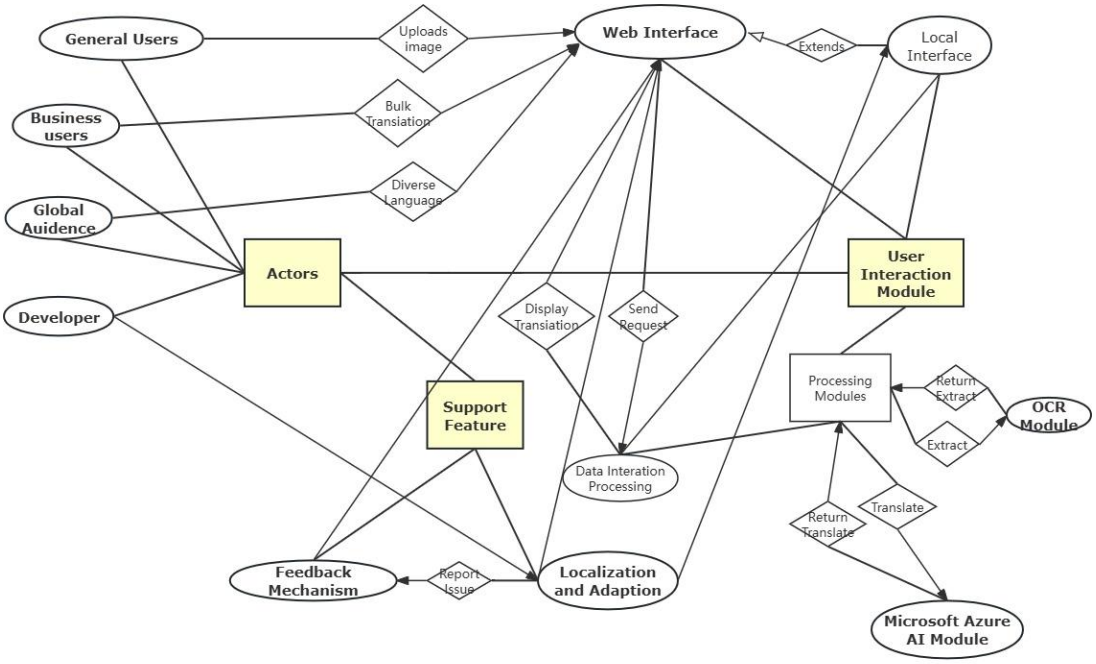
Abstract

This software engineering project aims to use existing open source (or self-trained) deep learning artificial intelligence models to achieve the function of obtaining text from different scenes (images) and translating it into other languages in real time. This project relies on multiple existing open source projects and Microsoft's natural language model. Designed to provide support for anyone who is troubled by language barriers and needs localization work.

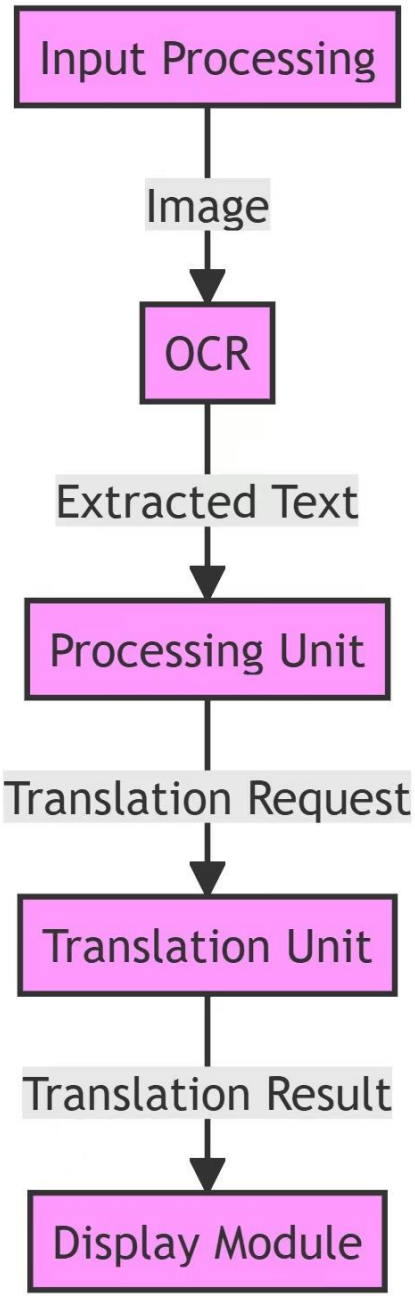
Chapter 1 Structured Requirements Analysis Diagram

1.1 Entity-Relationship (E-R) diagram

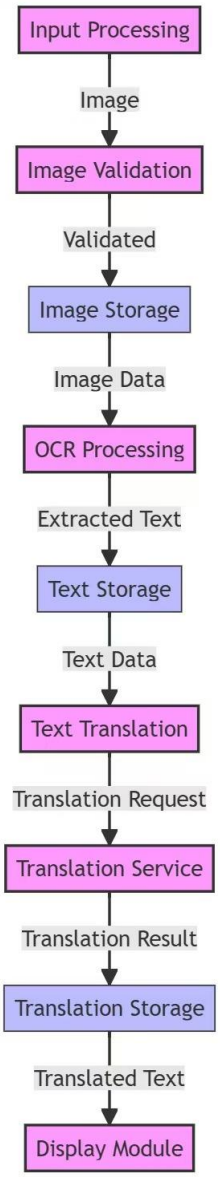


1.2 Data-Flow Diagram (DFD)

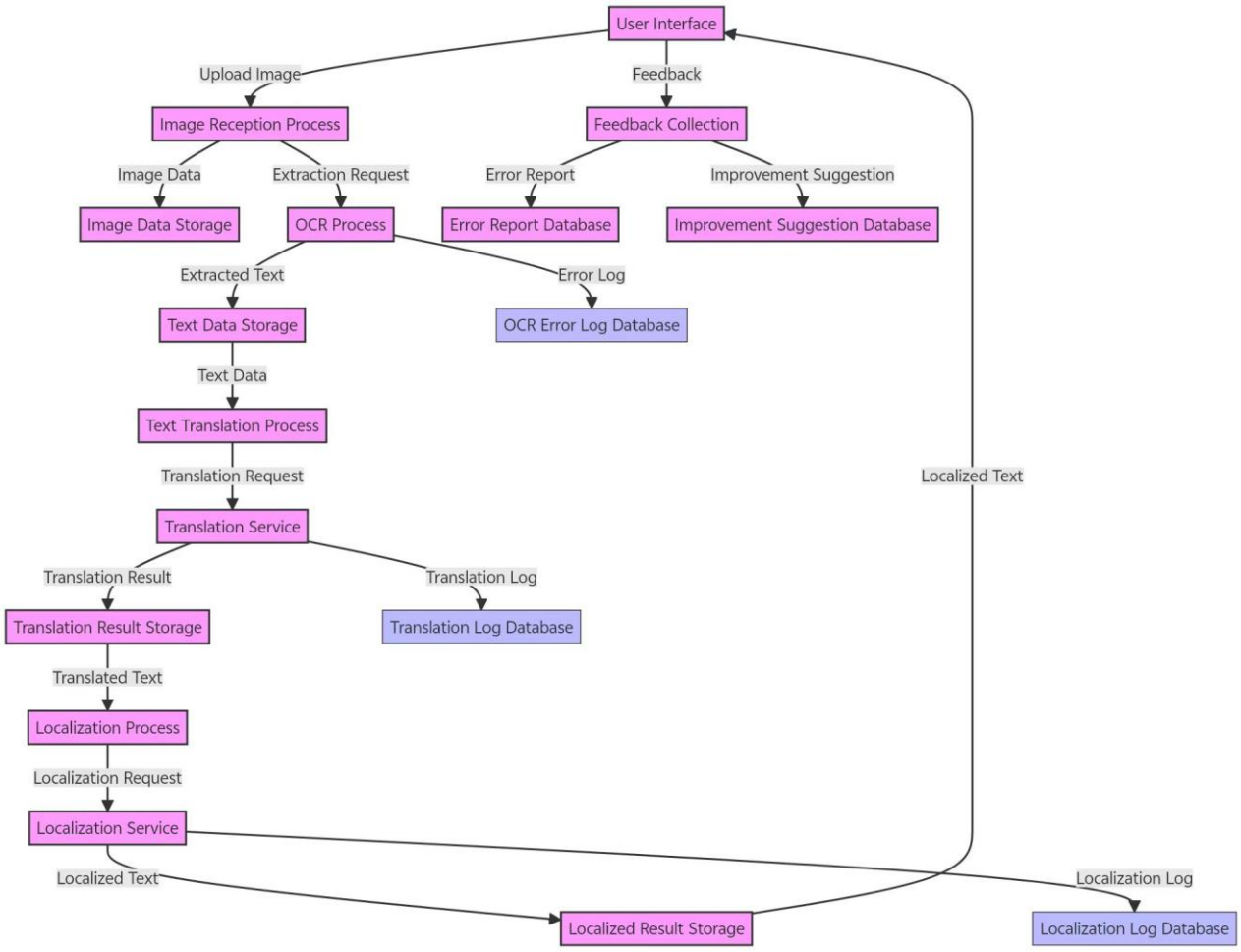
Lever 0:



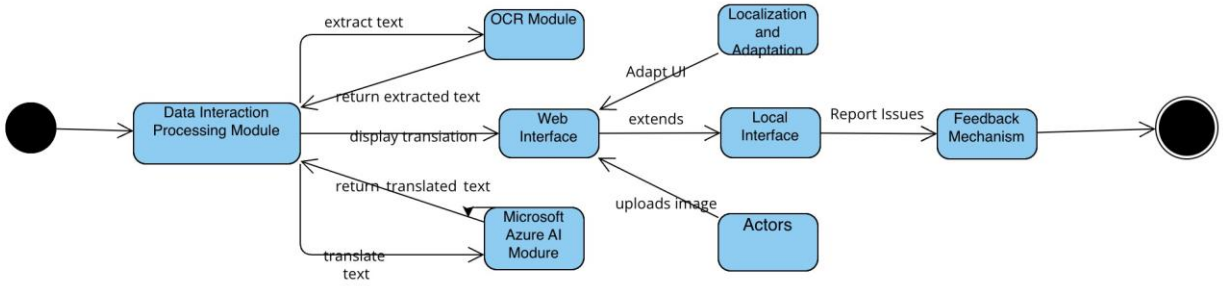
Lever 1:


Input Processing
Image
Image Validation
Validated
Image Storage
Image Data
OCR Processing
Extracted Text
Text Storage
Text Data
Text Translation
Translation Request
Translation Service
Translation Result
Translation Storage
Translated Text
Display Module

Lever 3:


User Interface
Upload Image
Feedback
Image Reception Process
Feedback Collection
Image Data
Extraction Request
Error Report
Improvement Suggestion
Image Data Storage
OCR Process
Error Report Database
Improvement Suggestion Database
Extracted Text
Error Log
Text Data Storage
OCR Error Log Database
Text Data
Text Translation Process
Translation Request
Localized Text
Translation Service
Translation Result
Translation Log
Translation Result Storage
Translation Log Database
Translated Text
Localization Process
Localization Request
Localization Service
Localized Text
Localization Log
Localized Result Storage
Localization Log Database

1.3 State Transfer Diagram (SDT)



Chapter 2 Structured Requirements Analysis

Introduction

This document outlines the structured requirements analysis for the AI-driven translation solution project. The focus is on understanding the user characteristics, assumptions, and dependencies critical to the system's development and deployment.

User Characteristics

The system is designed to cater to a diverse user base, each with specific needs:

- **General Users**:
  - **Purpose**: Quick and accurate translations of text within images for personal or professional use.
  - **Interface Needs**: Simple, self-service interface for easy image uploads and translations.
- **Business Users**:
  - **Purpose**: Bulk translation services or specialized translations for business applications.
  - **Requirements**: Integration capabilities with existing systems and robust data management features.
- **Developers and Tech Enthusiasts**:
  - **Purpose**: Interest in the technical aspects for potential development or integration.
  - **Resources Needed**: Detailed documentation and API access.
- **Global Audience**:
  - **Purpose**: Usage by users from diverse linguistic backgrounds.
  - **Requirements**: Broad language support and culturally sensitive translations.

- **Platform Compatibility**:
  - **Devices**: Desktop computers, laptops, tablets, and smartphones.
  - **Operating Systems**: Windows, macOS, Linux, Android, and iOS.
  - **Browsers**: Chrome, Firefox, Safari, and Edge.

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Assumptions

These are foundational assumptions for the system:

1. **Availability of Datasets**:
    - High-quality, diverse datasets will be accessible for training and testing OCR and translation models.
2. **Technological Compatibility**:
    - Software compatibility with existing hardware and software infrastructure, specifically Azure AI services.
3. **User Adoption**:
    - Users will have necessary devices and internet connectivity to utilize the software efficiently.
4. **Regulatory Compliance**:
    - The solution will adhere to data privacy and security regulations, with no unforeseen legal challenges.
5. **Stable API Support**:
    - Continued support and updates from PaddleOCR and Azure AI APIs are anticipated.

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Dependencies

Key dependencies for the project include:

1. **PaddleOCR and Azure AI**:
    - The project relies on the capabilities and reliability of these services.
2. **Local Translation Models**:
    - Availability of robust local translation models is necessary for system integration.
3. **User Feedback Mechanism**:
    - A functional feedback system is crucial to gather user insights for iterative improvements.
4. **Testing Environments**:
    - Access to diverse testing environments is required to ensure robust performance across different platforms.

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Conclusion

This structured requirement analysis outlines the essential user characteristics, assumptions, and dependencies necessary for the successful development and deployment of the AI-driven translation solution. These elements are critical to addressing the needs of diverse users and ensuring the system's overall effectiveness and reliability.

Chapter 3 STAFF:

Wang Haocheng :

Chapter 2:Structured Requirements Analysis

Li Yuanqi:

1.3 State Transfer Diagram (SDT)

Wang zi:

1.2 Data-Flow Diagram (DFD)

Ma Weiyan：

1.1 Entity-Relationship (E-R) diagram