Software Specification Document
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1. Overview

1.1 Purpose of the Document

This document outlines the functional and technical requirements for an AI-powered system that extracts text, emojis, and timestamps from WhatsApp chat screenshots. It serves as a reference for developers, testers, and stakeholders involved in the project.

1.2 Formatting Guidelines

To ensure consistency and clarity, this document follows these guidelines:

- **Headings & Structure:** Organized in a hierarchical format for easy navigation.
- **Text Styles:**
  - *Italics* highlight important notes.
  - **Bold** indicates section titles and key terms.
- **Requirement Identifiers:** Functional requirements are labeled as FR-XXX.
- **Data Representation:**
  - Time follows a 12-hour format.
  - Text is extracted in English (A-Z, a-z).
  - Emojis are identified by their Unicode representation.

1.3 Project Objectives

The system is a deep learning-based application designed for high-accuracy recognition of text and emojis in WhatsApp screenshots. Key functionalities include:

- Training models using labeled datasets.
- Achieving a high accuracy rate.
- Providing a structured JSON-based API response.
- Supporting local and cloud deployment.
- Relying solely on open-source technologies.

1.4 References

- PyTorch documentation
- OpenCV documentation
- Technical research papers on OCR and deep learning

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2. System Description

2.1 Product Context

The system comprises convolutional neural networks (CNNs) that process WhatsApp screenshots to extract structured data.

2.2 User Categories

- **Developers:** Utilize extracted data for integration into other applications.
- **Data Analysts:** Leverage structured chat data for analysis.
- **General Users:** Extract conversation details for personal documentation.

2.3 Technical Environment

- Compatible with cloud and local execution.
- Requires Python 3.x, PyTorch, and OpenCV.
- Accepts PNG and JPEG image formats.

2.4 Constraints & Requirements

- Aims for at least 99% accuracy.
- Optimized for WhatsApp’s default Android theme.
- Requires a GPU for optimal performance.
- No reliance on external APIs.

2.5 Assumptions & Dependencies

- Input images must be clear and legible.
- Depends on open-source NLP and OCR tools.

3. Core Functionalities

3.1 Text Recognition

3.1.1 Overview

The system extracts text from chat screenshots.

3.1.2 Workflow

- Users upload an image.
- Extracted text is returned in JSON format.

3.1.3 Functional Specifications

- Utilizes OCR to recognize text from various font styles.

3.2 Emoji Identification

3.2.1 Overview

Detects and extracts all emoji content from the screenshot.

3.2.2 Workflow

- Users upload an image.
- The system returns Unicode representations of detected emojis in JSON format.

3.2.3 Functional Specifications

- Uses an emoji classification model with high accuracy.
- Supports standard WhatsApp emoji sets.

3.3 Timestamp Recognition

3.3.1 Overview

Extracts message timestamps from the screenshot.

3.3.2 Workflow

- Users upload an image.
- Extracted timestamps are formatted in JSON output.

3.3.3 Functional Specifications

- Uses NLP techniques to recognize and standardize timestamps.

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4. Data Specifications

4.1 Data Model

The system structures extracted data using a predefined schema.

4.2 Data Dictionary

- **Text:** UTF-8 formatted string.
- **Emoji:** List of Unicode characters.
- **Timestamp:** ISO-compliant datetime format.

4.3 Report Generation

The extracted data is presented in structured JSON format, including:

- **Text Report:** Displays extracted text.
- **Emoji Report:** Shows detected emoji Unicode values.
- **Timestamp Report:** Provides timestamps in a standardized 12-hour format.

4.4 Data Handling Policies

- Uploaded images are processed and then discarded.
- Ensures data integrity by avoiding redundant storage.

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5. External Interfaces

5.1 User Interaction

- Provides both web and command-line interfaces.

5.2 Software Compatibility

- Exports data in JSON format.

5.3 Hardware Requirements

- Requires GPU for real-time processing.

5.4 Communication Protocols

- Supports REST API-based interactions.

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6. Quality Metrics

6.1 Usability

- Designed for ease of use with a simple upload mechanism.

6.2 Performance

- Processes images in under 5 seconds.

6.3 Security

- No storage of uploaded images to ensure privacy.

6.4 Reliability

- Ensures robust extraction across varied input conditions.

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7. Localization Considerations

- Supports only English text extraction.
- Extracts emojis as Unicode values for cross-platform consistency.
- Maintains WhatsApp's default 12-hour timestamp format.

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8. Key Terms

- **CNN:** Convolutional Neural Network
- **OCR:** Optical Character Recognition
- **JSON:** JavaScript Object Notation
- **API:** Application Programming Interface

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9. Analytical Models

Additional analysis models will be included in future updates.