
Software Requirements Specification

for

VoyageVista

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1 Introduction

1.1 DOCUMENT PURPOSE

The purpose of this document is to provide a comprehensive specification of the software requirements for the H1-B Visa Approval Prediction System. The document outlines the functionalities, system behavior, constraints, and performance criteria of the software. It serves as a reference guide for developers, quality assurance teams, and project stakeholders involved in the development and maintenance of the system.

1.2 PRODUCT SCOPE

The H1-B Visa Approval Prediction System is designed to predict the probability of H1-B visa approval based on historical visa petition data. The system will utilize a machine learning model trained on data attributes like employer name, job title, location, and prevailing wage. The goal is to assist visa applicants, employers, and consulting agencies by providing insights into their chances of visa approval based on historical trends and patterns.

Key features include:

- A web interface for user input and displaying prediction results.*
- A backend server that handles data processing and model integration.*
- A machine learning model for prediction based on input parameters.*
- A database for storing historical data and logging prediction queries.*

1.3 REFERENCES AND ACKNOWLEDGMENTS

- H1-B Visa Petition Dataset (2011-2016): <https://www.kaggle.com/datasets/nsharan/h-1b-visa>*
- IEEE Standard 830-1998: IEEE Recommended Practice for Software Requirements Specifications.*
- Flask Documentation: <https://flask.palletsprojects.com/en/3.0.x/>*
- Scikit-learn Documentation: <https://scikit-learn.org/0.21/documentation.html>*

2 Overall Description

2.1 Product Overview

The H1-B Visa Approval Prediction System is designed as a web-based application that allows users to input visa-related data and receive a prediction regarding their chances of visa approval. The system leverages machine learning techniques to analyze historical visa petition data and provide predictions.

The system will have the following components:

1. **Frontend:** Provides a user interface for inputting visa application details and viewing prediction results.
2. **Backend:** Manages requests between the frontend, machine learning model, and database.
3. **Machine Learning Model:** Performs data preprocessing, prediction, and evaluation.
4. **Database:** Stores historical visa data and logs user input data and prediction results.

2.2 Product Functionality

The key functionalities of the H1-B Visa Approval Prediction System include:

- **Data Input:** Users can input their visa-related information (e.g., employer name, job title, location, wage).
- **Data Validation:** The system validates the entered data for completeness and correctness.
- **Prediction:** The machine learning model generates a probability score indicating the chances of visa approval.
- **Result Display:** The system displays the prediction result in a user-friendly format.
- **Historical Analysis:** Allows users to view historical data trends and patterns in visa approvals.

2.3 Design and Implementation Constraints

- **Real-time Response:** The system must provide predictions in real-time or near-real-time to ensure a smooth user experience.
- **Data Privacy:** User data must be protected, and the system should comply with data privacy regulations.
- **Compatibility:** The system should be compatible with all modern web browsers and support mobile devices.

2.4 Assumptions and Dependencies

- The system assumes the availability of a reliable dataset for training and testing the machine learning model.
- The application requires an active internet connection for user interaction and backend communication.
- The machine learning model should be retrained periodically to reflect changes in the visa application trends.

3 Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

- **Login Page:** The user will access the system through a login page that requires a username and password.
- **Main Page:** The main page contains fields for users to enter visa-related data, such as:
 - Employer Name
 - Job Title
 - Location
 - Prevailing Wage
 - Year Filed
- **Result Page:** After submitting data, users will see a page displaying the predicted probability of visa approval and any additional insights.

3.1.2 Hardware Interfaces

The system will run on a standard web server with the following minimum hardware requirements:

- 2.0 GHz dual-core processor or higher.
- 4 GB RAM.
- 10 GB of free disk space.

3.1.3 Software Interfaces

- **Frontend:** Developed using HTML, CSS, and JavaScript.
- **Backend:** Implemented using Flask and Python.
- **Machine Learning Model:** Developed using Scikit-learn.
- **Database:** Uses a SQL-based database such as PostgreSQL.

3.2 Functional Requirements

- **FR1:** The system shall allow users to input their visa-related data, including Employer Name, Job Title, Location, Prevailing Wage, and Year Filed.
- **FR2:** The system shall validate the input data for missing or incorrect values.
- **FR3:** The system shall preprocess the input data for model prediction.
- **FR4:** The machine learning model shall generate a probability score indicating the likelihood of visa approval.
- **FR5:** The system shall display the prediction results to the user in a graphical or tabular format.
- **FR6:** The system shall log each prediction request and response in the database for future reference.

3.3 Use Case Model

The use case model describes the interactions between the user and the system:

1. **Submit Visa Data:** The user enters visa-related information into the form fields.
2. **View Prediction Results:** After submitting the form, the user views the probability of visa approval based on the input data.
3. **Analyze Historical Data:** The user can view historical trends and patterns in visa approvals, if needed.

4 Other Non-functional Requirements

4.1 Performance Requirements

- The system shall provide prediction results within 2 seconds of data submission.
- The system shall handle up to 10,000 prediction requests per hour.

4.2 Safety and Security Requirements

- All user data must be encrypted during transmission using SSL/TLS.
- The system should log all access attempts and notify administrators of suspicious activities.

4.3 Software Quality Attributes

- **Usability:** The system shall have a user-friendly interface that requires minimal training to use.
- **Scalability:** The system should be able to handle increased load without performance degradation.
- **Maintainability:** The system should be designed to allow easy modifications and updates.

5 Other Requirements

- The system should include a mechanism for administrators to update the machine learning model with new training data.
- The database should include backup and recovery mechanisms to prevent data loss.

Appendix – Data Dictionary

Define the meaning and format of all data fields, such as:

- *Case Status:* Status of the H1-B petition (Approved, Denied, etc.)
- *Employer Name:* Name of the petitioning employer.
- *Job Title:* Job title for the position.
- *Location:* City and state where the employee will be working.
- *Prevailing Wage:* Salary offered for the position.
- *Year Filed:* Year the petition was filed.