
Software Requirements Specification

for

ModelForge

Version 1.0 approved

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1. Introduction

1.1 Purpose

The purpose of this document is to provide a detailed description of the requirements for a Machine Learning Library, which primarily focuses on two main functionalities: Linear Regression and Logistic Regression. This SRS outlines the scope, features, and interface requirements of the software.

1.2 Intended Audience and Reading Suggestions

This document is intended for software developers, data scientists, machine learning engineers, and project stakeholders who will be involved in the development, testing, and use of ModelForge. It is recommended to read this document in its entirety to understand the software's requirements and capabilities.

1.3 Product Scope

ModelForge is a comprehensive software package that enables users to perform linear regression and logistic regression tasks. It provides tools and functions to build, train, and evaluate machine learning models for regression and classification purposes. The library is designed to be flexible, efficient, and easy to integrate into existing data science and machine learning workflows.

2. Overall Description

2.1 Product Perspective

ModelForge is a self-contained library capable of functioning independently or being integrated into other Java applications and frameworks. It operates autonomously, without reliance on external machine learning frameworks, emphasizing ease of use and extensibility.

2.2 Product Features

ModelForge encompasses the following key features:

- 1. Linear Regression*
- 2. Logistic Regression*
- 3. Model Training*
- 4. Prediction*
- 5. Model Evaluation*

2.3 Operating Environment

The operating environment is as listed below.

- *Operating Systems: It is platform-agnostic and can run on any operating system that supports Java, including Windows, macOS, and Linux.*
- *Java Runtime Environment (JRE): ModelForge necessitates Java 8 or a later version for execution.*

2.4 User Interfaces

ModelForge does not possess a graphical user interface (GUI). Instead, it is intended to be accessed through a Java programming interface, which encompasses method calls for model training, prediction, and evaluation.

2.5 Hardware Interfaces

ModelForge's hardware requirements are not distinctive and are contingent upon the hosting environment.

2.6 Software Interfaces

ModelForge operates autonomously without external software interfaces, libraries, or frameworks. It functions as a self-contained Java library.

3. System Features

ModelForge encompasses the following features:

1. **Linear Regression:**
 - 1.1. *The library offers functionalities for both training and deploying linear regression models for predicting continuous numeric values.*
2. **Logistic Regression:**
 - 2.1. *ModelForge extends support for training and employing logistic regression models for binary classification tasks.*
3. **Data Preprocessing:**
 - 3.1. *Users can initiate model training by providing input data along with the target variable.*
4. **Model Evaluation:**
 - 4.1. *Users can assess the performance of their models using various metrics, including mean squared error for linear regression and accuracy, precision, recall, and F1-score for logistic regression.*
5. **Prediction:**
 - 5.1. *Once models are trained, they can be utilized for predictions on new data.*

4. Other Nonfunctional Requirements

4.1 Performance Requirements

- **Efficiency:** *ModelForge must be proficient in training and predicting with minimal computational resources.*
- **Scalability:** *The library must effectively scale with varying dataset sizes, accommodating both small and large datasets.*

4.2 Safety Requirements

- **Data Validation:** *ModelForge must include mechanisms to validate input data, ensuring it adheres to the expected format and structure.*
- **Error Handling:** *The library should effectively manage errors, providing users with clear and informative error messages.*

4.3 Security Requirements

ModelForge, as a machine learning library, does not inherently entail specific security requirements.

4.4 Software Quality Attributes

- **Reliability:** *ModelForge should consistently deliver accurate and reliable results during training and prediction.*
- **Usability:** *The library must be user-friendly and well-documented to ensure ease of use.*
- **Maintainability:** *Code should be organized and documented to facilitate ease of maintenance and future updates.*