Patient Readmission Predictor User Manual

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1 Introduction

1.1 About This Manual

This user manual provides comprehensive guidance for using the Patient Readmission Risk Predictor, an advanced artificial intelligence application designed to help healthcare professionals identify patients at risk of hospital readmission. This document covers the instructions to run the app and few key aspects about the application.

1.2 System Overview

The Patient Readmission Risk Predictor is a state-of-the-art predictive analytics tool that leverages machine learning algorithms to assess patient readmission risk based on clinical and demographic data. By identifying high-risk patients early, healthcare providers can implement targeted interventions to improve patient outcomes and reduce unnecessary readmissions.

1.3 Key Features

- **Accurate Prediction:** Trained by experimentation on many different models with many different hyperparameters with the use of MLFlow
- **User-Friendly Interface:** Intuitive Streamlit frontend designed for healthcare professionals
- **Robust Backend:** Fast API implementation ensuring quick and reliable predictions
- **Version Support:** Every model deployed and every data on which the model is trained are versioned

1.4 Target Users

This application is designed for:

- **Healthcare Providers:** Physicians, nurses, and care coordinators
- **Hospital Administrators:** For resource allocation and quality improvement
- **Clinical Researchers:** For studying readmission patterns and intervention effectiveness
- **IT Staff:** For system deployment and maintenance

1.5 Benefits

Implementing the Patient Readmission Risk Predictor offers numerous advantages:

- Reduced hospital readmission rates
- Improved patient outcomes through targeted interventions

- Optimized resource allocation
- Enhanced compliance with quality measures
- Data-driven decision making
- Cost savings for healthcare institutions

2 Getting Started

2.1 Running the Application

Make sure you have docker installed in your system

```
# 1. Clone the repository
git clone https://github.com/iamthemarkjack/Patient_Readmission_Prediction
cd Patient_Readmission_Prediction

# 2. Navigate to the serving directory
cd serving

# 3. Build the application
docker build .

# 4. Deploy with Docker Compose
docker compose up
```

This will deploy both the Frontend-Streamlit and Backend-FASTAPI of the application

2.2 User Interface Overview

2.2.1 Dashboard Layout

Upon successful start of application, you will be directed to the main dashboard:

The dashboard is divided into several key areas:

1. **Navigation Sidebar:** Access different sections of the application for single or batch prediction
2. **Model status:** Listing the model that is being used for the prediction
3. **Key Features:** Listing the key features of the application
4. **Application Metrics:** Listing the application metrics

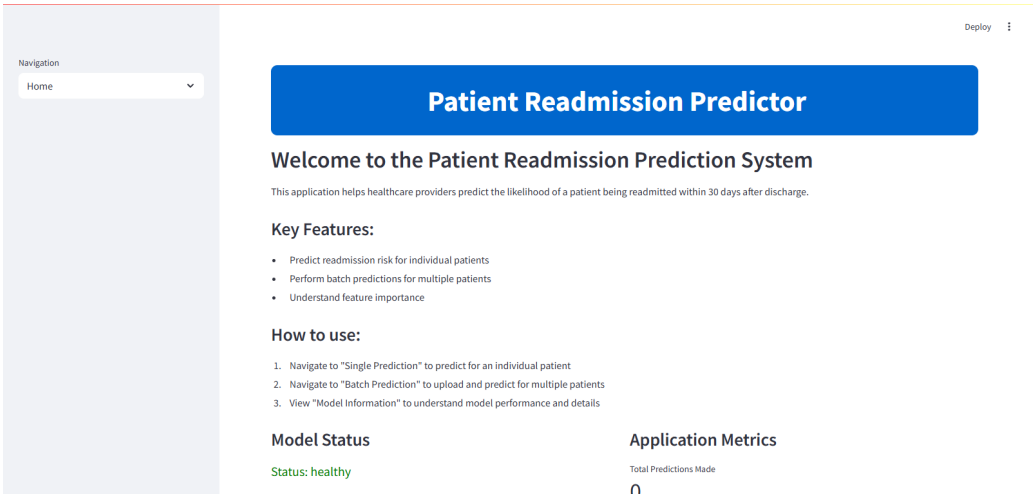

Figure 1: Main Dashboard Overview

2.2.2 Navigation Menu

The main navigation menu provides access to all application features:

- **Dashboard:** Overview and summary statistics
- **Single Prediction:** Predict for 1 single patient
- **Batch Prediction:** Generate results for multiple pateient

2.3 Quick Start Guide

You can perform readmission risk predictions for either a single patient or multiple patients at once. Follow the appropriate instructions below.

1. Predicting for a Single Patient

1. Open the **Patient Readmission Predictor** application.
2. Enter the patient details using the available sliders and dropdowns:
    - **Age** (between 18 and 100)
    - **Number of Procedures** (between 0 and 10)
    - **Gender** (Male or Female)
    - **Primary Diagnosis** (e.g., Diabetes)
    - **Days in Hospital** (between 1 and 30)
    - **Comorbidity Score** (between 0 and 5)
    - **Discharged to** (e.g., Home)
3. Click the **Predict Readmission Risk** button.

4. The model will display the predicted readmission risk for the patient.

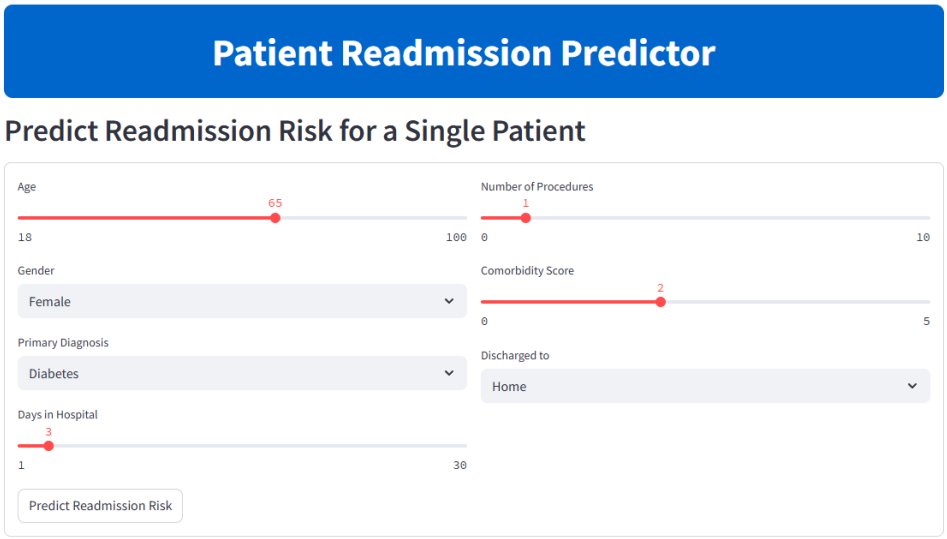

Figure 2: Single Prediction Interface

2. Predicting for Multiple Patients (Batch Prediction)

1. Navigate to the **Batch Prediction** section of the application.
2. Click **Browse files** or drag and drop a CSV file containing patient data.
3. Ensure the CSV is in the correct format and under the 200MB size limit.
4. The system will process the file and display readmission risk predictions for each patient.

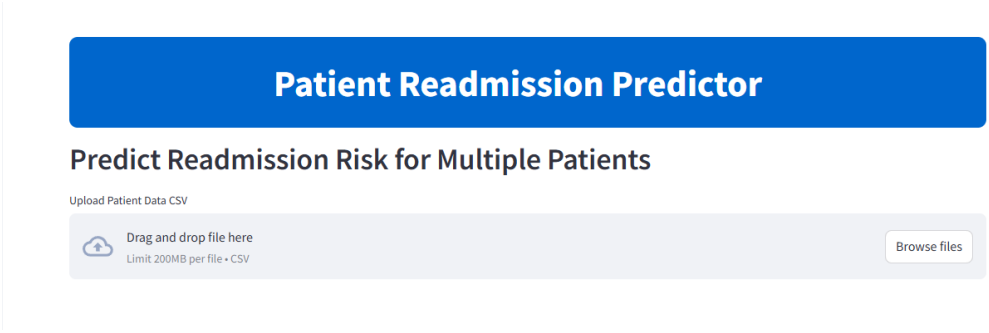

Figure 3: Batch Prediction Interface