

Intelligent First-Aid & Medical Assistance System Using Machine Learning for Severity Prediction and Hospital Routing

1. Project Overview

This project implements a machine learning–based healthcare decision support system that:

- Predicts patient condition severity (Mild / Moderate / Severe)
- Recommends appropriate medical action (first-aid, clinic visit, emergency care)
- Locates nearby hospitals or clinics using latitude and longitude

The system is designed for deployment within a hospital chain that already maintains electronic medical records (EMR).

2. Folder Structure

Please arrange the files in the OneDrive folder exactly as shown below:

Machine_Learning_Project/

medical_dataset.csv

Final_project_code.ipynb

Machine Learning Project PPT.pdf

README.txt

Important Note:

- The dataset (medical_dataset.csv) and the notebook (Final_project_code.ipynb) must be in the same folder.
- Do not rename the files

3. System Requirements

To execute the project, ensure the following are available:

- Python version: 3.9 or above
- Jupyter Notebook / JupyterLab / VS Code (with Jupyter extension)
- Internet access (only for installing libraries)

4. Required Python Libraries

The following libraries are used in this project:

- pandas
- numpy
- scikit-learn
- matplotlib
- seaborn
- geopy
- osmnx
- geopandas

5. Installing Required Libraries

Open the notebook (Final_projects_ML.ipynb) and run the first code cell:

```
!pip install pandas numpy scikit-learn matplotlib seaborn geopy
```

After installation:

- Restart the kernel
- Run all cells again from top to bottom

6. How to Execute the Code (Step-by-Step)

1. Open Final_project_code.ipynb
2. Run all cells in sequence from top to bottom
 - This will:
 - Load the dataset
 - Perform EDA
 - Preprocess data
 - Train baseline and advanced models
 - Perform model evaluation and tuning
3. No manual file path changes are required
4. The notebook uses relative paths, ensuring portability.

7. Hospital & Clinic Location Data (Germany)

- Hospital and clinic locations are fetched from OpenStreetMap using the osmnx library
- For efficient execution, hospitals are loaded at city or region level (e.g., Berlin, Germany)
- Distance is calculated using geodesic distance based on latitude and longitude

This approach demonstrates real-world hospital routing used in healthcare systems.

7. Live Demo

After running all cells, execute:

```
interactive_demo()
```

Enter patient details, vital signs, and a Germany-based latitude & longitude.
The system will output:

- Severity classification
- Medical advice

- Nearest clinic or emergency hospital (for Moderate / Severe cases)

8. Notes

- The medical dataset is synthetic and used for academic purposes
- Hospital location data is real, sourced from OpenStreetMap
- The system is a decision-support tool, not a diagnostic or prescription system
- Results in the notebook correspond to those shown in the PPT

9. Files Included

- Final_project_code.ipynb – Complete code implementation
- medical_dataset.csv – Dataset used for training and evaluation
- Machine Learning Project PPT.pdf – Presentation
- README.txt – Execution instructions