**Medical decision support tool (maggic risk, maggic risk+ etc.)**

General description

This project is a computational health risk assessment tool designed to calculate patient health risks using the MAGGIC Risk Model initially, and in the future, additional models such as the improved MAGGIC Risk Plus Model. The system is implemented in a user-friendly, web-based environment where users can upload patient data files and receive analytical results.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Functionality

**1. Upload Patient Data**

Users can upload patient data files containing clinical information in various formats, such as CSV, TXT, JSON, Excel, or PDF.

The system reads the uploaded file and validates it by checking the file extension to ensure it is one of the supported formats and the content structure to verify that required fields, such as age, gender, and clinical parameters, are included.

If the file is invalid, the interface displays an error message to notify the user.

**2. Model selection**

Users select the model to be used for risk assessment.

The models include between the basic MAGGIC Risk model or choose another model such as MAGGIC Risk Plus model (currently under development and includes additional parameters and refined scoring mechanisms. We are waiting for detailed results from Oxford). Future updates will allow for the addition of more models as needed.

**3. Data Processing**

The **data processing** step is a crucial component of the MAGGIC Risk Calculator. It involves transforming raw patient data into actionable insights by analyzing the data and calculating relevant risk scores.

The system extracts and structures the information from the uploaded file. For example:

* In Excel files, data is extracted row by row from specific sheets.
* In JSON files, structured objects are used to retrieve patient attributes.

Τhen the MAGGIC score is derived from a comprehensive set of patient-specific parameters, including:

* **Demographics:** Age and gender.
* **Clinical Parameters:** LVEF (Left Ventricular Ejection Fraction), BMI (Body Mass Index), NYHA Class (New York Heart Association Classification), SBP (Systolic Blood Pressure), and creatinine levels.
* **Comorbidities:** Smoking status, diabetes, COPD (Chronic Obstructive Pulmonary Disease).
* **Medications:** Use of beta-blockers or ACE inhibitors.

Each parameter is assigned a specific point value based on validated scoring tables, and the total score is calculated.

Based on the calculated MAGGIC score, the system categorizes patients into:

* **Low Risk:** Score < 20
* **Moderate Risk:** Score 20–30
* **High Risk:** Score > 30

**4. Mortality risk calculation**

The next phase is to estimate the likelihood of patient mortality based on the calculated MAGGIC score. The system calculates the probability of mortality within the first year and three years based on the MAGGIC score. Essentially, these predictions help clinicians prioritize patient care and allocate resources effectively.

**5. Production of Analytical Reports**

The purpose of this step is to generate detailed reports that provide a comprehensive summary of the patient’s clinical profile, risk assessment, and personalized recommendations.

The reports include the following:

* 1. Medical Data Interpretation

Each patient’s clinical parameters, such as LVEF and BMI, are analyzed and interpreted with additional insights to provide a deeper understanding of their health status.

* 1. Risk Predictions

The reports present the calculated MAGGIC score, the associated risk category (low, moderate, or high), and the predicted probabilities of mortality over 1 and 3 years. iii) Personalized Messages and Recommendations

Messages are tailored based on the patient’s MAGGIC score, which determines their risk level.

Recommendations are further customized to the patient’s specific characteristics, including: -Guidance on managing comorbidities such as diabetes or COPD.

-Suggested lifestyle changes for conditions like high BMI or systolic blood pressure (SBP).

-Medication recommendations, such as starting or adjusting beta-blockers or ACE inhibitors, to optimize treatment outcomes.

All detailed descriptions, messages, and recommendations are exported to a .txt file. For the reason to form the dataset to train the Agent, enabling it to generate relevant insights and support decision-making in the future.

**6. Results presentation**

* Results are presented to the user in a structured HTML format for easy understanding and clear illustration.

Εικόνα που περιέχει κείμενο, στιγμιότυπο οθόνης, γραμματοσειρά, αριθμός

Περιγραφή που δημιουργήθηκε αυτόματα

Figure 1: MAGGIC Risk Calculator - Data Input Interface

Εικόνα που περιέχει κείμενο, στιγμιότυπο οθόνης, έγγραφο, γραμματοσειρά

Περιγραφή που δημιουργήθηκε αυτόματα

Figure 2: MAGGIC Risk Calculator - Detailed Patient Results

Εικόνα που περιέχει κείμενο, στιγμιότυπο οθόνης, γραμματοσειρά, αριθμός

Περιγραφή που δημιουργήθηκε αυτόματαΕικόνα που περιέχει κείμενο, στιγμιότυπο οθόνης, γραμματοσειρά, αριθμός

Περιγραφή που δημιουργήθηκε αυτόματα

Figure 3. Message for the patient

Εικόνα που περιέχει κείμενο, στιγμιότυπο οθόνης, γραμματοσειρά, χαρτί

Περιγραφή που δημιουργήθηκε αυτόματα

Figure 4. Message for the patient

Εικόνα που περιέχει κείμενο, στιγμιότυπο οθόνης, γραμματοσειρά

Περιγραφή που δημιουργήθηκε αυτόματα

Εικόνα που περιέχει κείμενο, στιγμιότυπο οθόνης, γραμματοσειρά

Περιγραφή που δημιουργήθηκε αυτόματα

Εικόνα που περιέχει κείμενο, στιγμιότυπο οθόνης, γραμματοσειρά

Περιγραφή που δημιουργήθηκε αυτόματα

*Figure 5. Example of the output for one patient exported in .txt format.*

Here (in fig.5) we have an example of a specific patient, which includes all their characteristics, messages, and recommendations tailored to the patient as well as to their doctor. This process will be repeated for all the patients included in the dataset, with each patient's information being stored and exported in a .txt file.

.