perplexity

Usage of Libraries in the Code

1. numpy (`np`)

- Used for numerical operations, especially to create ranges of values for fuzzy logic variables (e.g., `np.arange`). This is essential for defining the universe of discourse for fuzzy variables like age, cholesterol, etc.

2. pandas (`pd`)

- Handles data loading and manipulation. It's used to read CSV/Excel files for datasets (e.g., `pd.read_csv`, `pd.read_excel`), clean column names, and display data in the UI.

3. scikit-fuzzy (`skfuzzy` and `skfuzzy.control` as `fuzz` and `ctrl`)

- Implements fuzzy logic systems for medical risk prediction.
  - `ctrl.Antecedent` and `ctrl.Consequent` define fuzzy variables.
  - `automf` generates membership functions automatically.
  - `ctrl.Rule` constructs fuzzy inference rules.
  - `ctrl.ControlSystem` and `ctrl.ControlSystemSimulation` build and run the fuzzy inference engine.

4. streamlit (`st`)

- Provides the web interface for the application.
  - Used for UI elements such as titles, buttons, sliders, number inputs, file uploads, displaying dataframes, and showing messages or errors.

5. streamlit_option_menu (`option_menu`)

- Enhances Streamlit's sidebar with a customizable menu for navigation between different sections like Home, Heart Disease, Diabetes, etc.

Summary Table

Library	Usage in Code
numpy (`np`)	Numeric range creation for fuzzy logic variables
pandas (`pd`)	Data loading, cleaning, and display
scikit-fuzzy (`skfuzzy`, `ctrl`)	Fuzzy logic system definition, rule creation, and simulation
streamlit (`st`)	Web UI elements, interaction, and feedback
streamlit_option_menu	Sidebar navigation menu

These libraries together enable the code to load and process medical datasets, apply fuzzy logic for health risk prediction, and present an interactive web interface for users to input data and view results.

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