

Functional Requirements

1. Read Excel Files

The application shall allow the user to select and load two Excel files through a file dialog interface.

2. Validate Excel File Formats

The application shall verify that each selected file has a `.xls` or `.xlsx` extension before reading its content.

3. Combine Data

The application shall merge data from the two loaded Excel files by matching records where `Mother_First_Name`, `Mother_Last_Name`, and `Child_Date_of_Birth` are identical after normalization.

4. Display Combined Data

The application shall present the combined data in a list view, displaying `Mother_IDs`, `Child_Names`, and `Date_of_Birth` for each matched record.

5. Check Minimum Files Requirement

The application shall disable the data combination functionality until both Excel files are successfully loaded.

6. Normalize Name Fields

Before merging data, the application shall process `Mother_First_Name` and `Mother_Last_Name` by removing all spaces, converting all letters to lowercase, and removing all non-alphanumeric characters.

7. Error Handling

The application shall display specific error messages in message boxes if an Excel file cannot be read, if the file format is invalid, or if data cannot be combined due to mismatches.

8. Child Profile Display

When the user double-clicks on a child's name in the list view, the application shall open a new window displaying a detailed profile of the child, including all associated data from the combined records.

9. Save Combined Data

After completing the merge process, the application shall provide an option for the user to save the combined data to a new Excel file named `combined_matched_data.xlsx`.

10. Display Unmatched Entries

The application shall show a list of unmatched records, identified by `Mother_ID`, in a designated area of the user interface to assist the user in identifying missing data.

Non-Functional Requirements

1. **Usability**

The application shall include "Read Excel Files" and "Combine Excel Files" buttons on the main interface. When either button is pressed, the corresponding operation shall complete within 3 seconds for Excel files containing up to 1,000 rows each.

2. **Performance**

The application shall complete the data reading and merging process within 5 seconds when processing two Excel files, each containing up to 1,000 rows of data.

3. **Error Tolerance**

The application shall remain operational without crashing when encountering missing files, invalid file formats, or data mismatches, and shall inform the user of the specific issue via error messages.

4. **Portability**

The application shall be compatible with Windows 10 (and later versions) and macOS Catalina 10.15 (and later versions) without requiring additional software installations beyond standard system updates.

5. **Maintainability**

The application's source code shall be organized using the command design pattern, with each button action implemented as an extensible command class, allowing new features to be added without modifying existing code structures.