Mitigation App User Manual

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1 Introduction

The **Mitigation App** is an R Shiny application designed to help users optimize environmental mitigation projects using the Simplex method. Through an intuitive dashboard interface, the app allows you to select projects, compute optimal allocations, explore Simplex tableaus step-by-step, and export the results as PDF or image files.

This manual provides a complete guide on installation, usage, exporting reports, and understanding the features included in the app.

2 Installation

2.1 Prerequisites

Before running the application, make sure the following are installed on your system:

- R (version 4.3 or higher)

- RStudio (optional but recommended)

- Required R packages:

  - shiny
  - shinydashboard
  - DT
  - here
  - rmarkdown
  - webshot

- PhantomJS (needed for PDF and image export using `webshot`)

2.2 Installation Steps

1. Install all necessary R packages:

   ```r
   install.packages(c(
       "shiny",
       "shinydashboard",
       "DT",
       "here",
       "rmarkdown",
       "webshot"
   ))
   webshot::install_phantomjs()
   ```

2. Download or clone the project folder.

3. Open `app.R`, `server.R`, or `ui.R` in RStudio.

4. Run the application using:

   ```r
   shiny::runApp()
   ```

3 Getting Started

3.1 Launching the App

After starting the application, it will automatically open in your default web browser. The dashboard contains three main tabs:

- **Home**

- **New Project**

- **User**

3.2 Home Tab

The Home tab provides:

- A quick introduction to the app

- A summary of its purpose and workflow

- A list of recent activities or solved project sets

- Basic instructions on how to use the system

- Contact information for support

4 Creating a New Project

4.1 Selecting Projects

To begin solving a problem:

1. Open the **New Project** tab.

2. Use the checkbox list to select one or more mitigation projects.

3. Use the search box to filter specific items quickly.

4. The **Select All** button selects all available projects.

5. The **Reset** button clears all selections.

4.2 Solving the Problem

1. Once you have selected your projects, click the **Solve** button.

2. If no project is selected, the app displays an error message.

3. After computation, the system presents:

   - The optimized total cost
   - Cost breakdown per selected project

- The initial Simplex tableau
- Detailed iteration history
- The final tableau
- The final optimal solution

4.3 Results Tabs

The results are organized into four tabs:

1. **Initial Tableau** — Displays the initial configuration of the Simplex method.

2. **Iterations** — Shows each step of the Simplex process, along with the evolving tableaus and basic solutions.

3. **Final Tableau** — Shows the completed tableau after the algorithm reaches optimality.

4. **Final Solution** — Summarizes the final number of units for each project and the associated optimized costs.

5 Exporting Reports

5.1 PDF Export

1. Click the **Save as PDF** button.

2. The app generates a PDF using `rmarkdown` and PhantomJS.

3. The PDF includes the optimized cost, project details, and solution table.

5.2 Image Export

1. Click the **Save as Image** button.

2. The system produces a PNG file of the solution report.

3. The PNG contains the same information as the PDF export.

6 User Tab

The **User** tab provides a simplified, in-app version of the user manual. It includes the core information a user needs while navigating the dashboard, such as:

- A brief overview of the app

- Step-by-step instructions on basic usage

- Helpful tips for navigation and interaction

- A short FAQ section

Because the panel is designed to be compact and easy to read inside the Shiny interface, it only covers the essential features.

For complete explanations, expanded workflows, and technical details, this PDF document serves as the full version of the user manual.

7 Error Handling

The application includes several built-in checks:

- If the **Solve** button is pressed with no selected projects, the system displays an error message.

- If the selected problem is infeasible, the app notifies the user instead of generating a solution.

8 Appendix: Example Workflow

A quick example scenario:

1. Select the projects *Project A* and *Project B*.

2. Click **Solve**.

3. View the optimized cost (e.g., $5000).

4. Explore the Initial Tableau and Iterations tabs to follow the Simplex process.

5. Export the results as PDF or image for documentation or reporting.

9 Contact Information

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