CITY POLLUTION REDUCTION PLAN

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Project Overview

This R Shiny application serves as a linear programming optimization tool designed to select the most cost-effective combination of mitigation projects to meet specific city pollution reduction targets. Instead of using pre-built solver libraries, this project implements a custom Simplex Algorithm from scratch to solve the minimization problem.

Prerequisites

To run this application, you need the following software installed on your computer:

1. **R**: Download R
2. **RStudio**: Download RStudio

Installation

This project requires two specific R packages: **shiny** and **bslib**.

1. Open R or RStudio.
2. Copy and paste the following command into the console and press **Enter** to install the dependencies: **install.packages(c("shiny", "bslib"))**

How to Run the App

Using RStudio

1. Save the provided code in a file named **app.R**.
2. Open **app.R** in RStudio.
3. Click the green **Run App** play button located at the top right of the script editor.

User Guide

Configuration (Sidebar)

- **Select Projects:** On the left sidebar, you will see a list of 30 available mitigation projects (e.g., "Large Solar Park", "EV Charging Infrastructure").
- **Check/Uncheck:** Use the checkboxes to include or exclude specific projects from the optimization pool.

- **Calculate:** Once you have selected the projects you wish to consider, click the **"CALCULATE"** button.

Viewing Results

The main panel contains three tabs:

- **Optimal Solution:** Displays the breakdown of exactly how many units of each project should be funded and the total cost to minimize spending while meeting all pollution targets.
- **Final Tableau:** Shows the final matrix resulting from the Simplex algorithm calculation.
- **Simplex Algorithm Iterations:** A detailed log showing every step, pivot, and iteration the custom algorithm took to reach the solution.

Troubleshooting

- **"The problem is INFEASIBLE":** If you see this message, it means the projects you selected in the sidebar are not sufficient to meet the strict pollution reduction targets (e.g., you deselected high-impact projects like "Rail Electrification"). Try selecting **"Check All"** and running it again.
- **Package Errors:** If you get an error saying "there is no package called 'bslib'", please repeat the **Installation** step above.