Documentation

(Group 28)

**Group Information**

Project Name - LDU Factorization

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Overview of Project

In this project we developed a web application which demonstrates factorization of a matrix into LDU(Lower, Diagonal, Upper) matrix. User can access the application through-

* Give Input for dimension
* Give input for matrix A
* Will compute the Upper triangular matrix along with all elimination matrix.
* Determine the Lower triangular matrix by calculating inverse of elimination multiplication matrices.
* Construct Diagonal Matrix.
* Will Verify the LDU factorization.

HTML Elements

* **Dimension of Matrix**-

The button (<button onclick="takeorder('showmatrix')">) allow user to give input for desired matrix dimension.

* **Upper Triangular Matrix (U)**:

Users can compute UUU by clicking <button onclick="Umatrix('showUmatrix')">.

In the div of id=”showUmatrix” all the elimination matrices will display.

* **Matrix (L)**:

Users can calculate LLL with <button onclick="lmatrix('showlmatrix')">.

The result is displayed in div with id="showlmatrix".

* **Updated Upper Matrix**:

In the div with id="UUmatrix", by clicking on <button onclick="UUmatrix('uumat')"> user will get the Updated Upper triangular matrix.

* Diagonal Matrix:

In the div with id="dmaat", by clicking on <button onclick="Dmatrix('dmat')"> allow user display diagonal matrix.

* Finally, user will compare A’= LDU’ and at last A=A’ will verify the result.

CSS Styling

**General Page Styling**

* Sets default font to Arial and applies a light blue background color.
* Removes page margin and adds padding for spacing.
* Sets default text color and centers text.

**Header Styling (h1)**

* Centers the header text, sets text color to black.
* Adds bottom margin for spacing and increases font size.

**Matrix Display Section**

* Adds top margin, padding, and a white background.
* Sets a gray border, rounded corners, and shadow for depth.
* Sets a minimum height and centers text.

**Button Styling**

* Sets green background with white text and rounded corners.
* Adds padding, margin, and cursor change to indicate interactivity.
* Adjusts font size and applies a smooth color transition on hover.

**Matrix Table Layout**

* Expands table width to 100% and removes cell spacing.
* Adds a border to tables, headers, and cells.
* Centering text in cells and applies padding.
* Distinguishes header and cell backgrounds with color.

**Form Input Styling**

* Adds padding, spacing, and rounded corners.
* Sets a light grey border, font size, and green border on focus.

**Matrix Labels**

* Increases font size and boldness.
* Adds top margin for separation.

**Responsive Design for Smaller Screens**

* Reduces body padding for smaller screens (under 768px).
* Sets button width to 100% and adjusts font sizes for readability.

JAVA Script Logic

* **Define global Variables**

**n** is storing the order of dimension of square matrix while a is storing the entered values

* **Functions Used**

*takeOrder(id)*,

Is allowing users to create a matrix by giving its order and elements, then it will display matrix.

*matrixFormat(matrix),*

Is forming a 2D (matrix) into a string representation for display on the webpage.

The application successfully demonstrates LDU factorization by decomposing a matrix A and reconstructing it through multiplication of L, D, and U′.