

Matrix Shuffler 2: Improving a Web App for Matrix Reordering

Group 2: Lukas Auer, David Heidinger, Nina Tschikof and Christina Vogel

24 Jun 2026

Information Visualisation SS 2026

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Overview

1. History and Related Work
2. Motivation and Project Idea
3. Matrix Shuffler 1
4. Matrix Shuffler 2

History and Related Work



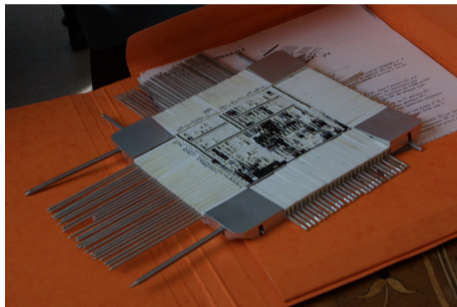
History and Related Work

- Late 19th century: first tabular visualizations.
- Row and column reordering techniques reveal hidden patterns.
- Scalogram Board (Louis Guttman, 1950s).
- Le Permutateur (Robert Pagès, 1960s).

Perin, C., Dragicevic, P., & Fekete, J.-D. (2014). *Revisiting Bertin Matrices: New Interactions for Crafting Tabular Visualizations*.
<https://www.aviz.fr/wiki/uploads/Bertifier/bertifier-authorversion.pdf>

Related Work - Bertin

- Semiology of Graphics (Jacques Bertin, 1967).
- Developed general and domain-independent analysis method.
- Recognized importance of interactivity.
- Reorderable matrices considered the most general analysis method.



Bertin's device (Domino) for reordering matrices. Source: Jean-Baptiste Labrune, Flickr (CC BY-SA 2.0)

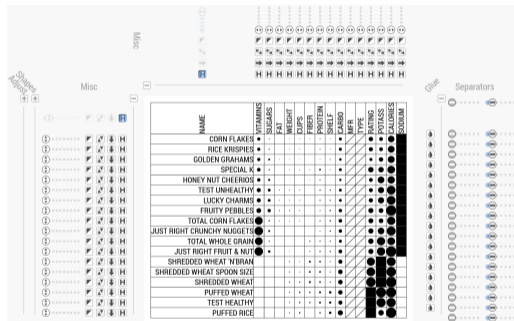
Perin, C., Dragicevic, P., & Fekete, J.-D. (2014). *Revisiting Bertin Matrices: New Interactions for Crafting Tabular Visualizations*.

<https://www.aviz.fr/wiki/uploads/Bertifier/bertifier-authorversion.pdf>

Image source: <https://www.flickr.com/photos/jeanbaptisteparis/3407305484/in/album-72157616180779845/>

Related Work - Bertifier

- Webapp for creating tabular visualisations from spreadsheets.
- Directly draws from Bertin's matrix analysis method.
- https://aviz.fr/bertifier_app/



Screenshot created by the authors.

The screenshot displays the Bertier software interface. At the top, the text "Bertier Live Demo" is prominently displayed. Below it, a table lists various cereal products with their corresponding nutritional data represented by colored circles. The table columns include: NAME, FIBER, MINIS, SUGARS, FAT, WEIGHT, PS, FIBER, PROTEIN, SHELF, CARBO, MFR, TYPE, RATING, POTASS, CALORIES, and SODIUM. The products listed are: RICE KRISPIES, GOLDEN GRAHAMS, SPECIAL K, HONEY NUT CHEERIOS, TEST UNHEALTHY, LUCKY CHARMS, TOTAL CORN FLAKES, JUST RIGHT CRUNCHY NUGGETS, JUST RIGHT FRUIT & NUT, SHREDDED WHEAT 'N'BRAN, SHREDDED WHEAT SPOON SIZE, SHREDDED WHEAT, PUFFED WHEAT, TEST HEALTHY, and PUFFED RICE.

Surrounding the table are several toolbars:

- Misc:** Located at the top and left, containing various icons for editing and navigation.
- Shapes Adjust:** Located on the left side, featuring a vertical column of circular icons.
- Glue:** Located on the right side, featuring a vertical column of circular icons.
- Separators:** Located on the right side, featuring a vertical column of circular icons.

<https://youtu.be/dqfSa4k4xCg>

Matrix Shuffler 1

- Web app for interactive matrix reordering.
- Visual clustering and anomaly spotting.
- Cross platform support.
- Github: <https://github.com/AndrejKnaus/matrix-shuffler>
- Authors: Esmā Karic, Andrej Knaus, and Laura Thaçi
- Our project idea: extend current implementation.

Matrix Shuffler 1



File View Actions Help

Dataset

9 rows x 16 columns

Recently Loaded:

	A	B	C	D	E
High School	0	0	0	0	0
Agricultural Cooperative	0	1	1	1	0
Railway Station	0	0	0	0	0
One Room School	1	1	0	0	1
Veterinary	0	1	1	1	0
No Doctor	1	1	0	0	1
No Water Supply	0	0	0	0	0
Police Station	0	0	1	0	0
Land Reallocation	0	1	1	1	0

High School

Agricultural Cooperative

Railway Station

One Room School

Veterinary

No Doctor

No Water Supply

Police Station

Land Reallocation

Settings

NORMALIZATION

None

Row-wise

Column-wise

Global

LABEL ROTATION

Rotate Column Labels: 45°

Auto (Optimal) 0° 45° 90°

CELL SIZE

Cell Dimension: 40

10 20 40

VISUALIZATION COLORS

Min Color:

Max Color:

COLOR SCHEME PRESETS

MATRIX SORTING

QUICK ACTIONS

ALGORITHMIC SOLUTIONS

STATISTICAL SORTING

Method:

Directions:

Screenshot of Matrix Shuffler 1.

Overview

- Import dataset as CSV/TSV.
- Load recent datasets.
- Table view.
- Transpose dataset.
- Normalise values.
- Shuffle rows/columns.
- Manually reorder rows/columns.
- Algorithmic solutions for reordering.
- Statistical and similarity sorting.
- Export modified dataset.
- Export as PNG/SVG.

Algorithmic Solutions

- 2D Sort: Sort rows/columns by average or sum.
- Greedy Seriation: Iteratively reorders rows/columns based on distance.

Tech Stack

- Frontend: Vue + TypeScript
- Styling: CSS
- Native Desktop: Tauri 2
- Build Tools: Vite
- Package Manager: PNPM
- Libraries: PixiJS

Matrix Shuffler 2



Implemented Changes

- Getting rid of PixiJS.
- Added example data sets.
- Added Canvas2D rendering option.
- Added renderer dropdown for comparison.
- Added scrolling/zooming.
- Implemented Bertin encodings.

Implemented Changes

- Added various visual encodings.
- Grab and drag on title of row or column instead of only on data itself.
- Minimap for better navigation.
- Replace folder and settings icons with chevrons.

Build Options

- Web Application:
 - Install dependencies: `pnpm install`
 - Development server: `pnpm dev`
 - Production build: `pnpm build` (outputs to `dist/`)
- Native Desktop Application (Tauri):
 - Prerequisites: Rust, Cargo, and OS-specific build tools
 - Desktop development: `pnpm tauri dev`
 - Fast production build: `pnpm tauri:build` (creates executable, skips installers)

Dataset

154 rows × 13 columns

Recently Loaded:

Renderer:

Matrix Shuffler 2 Live Demo

Live Demo

Showcase Video

https://youtu.be/MhCGFP5_oIM

	alcohol	malic acid	ash	alkalinity of ash	magnesium
Wine 1	0.8245	0.2179	0.6858	0.3048	0.9193
Wine 1	0.5233	0.2337	0.5000	0.0365	0.4838
Wine 1	0.5116	0.3640	0.8397	0.4878	0.5
Wine 1	0.5350	0.4157	0.9679	0.6341	0.7741
Wine 1	0.8157	0.2292	0.6987	0.2804	0.6774
Wine 1	0.8713	0.2539	0.6987	0.2439	0.4193
Wine 1	0.7748	0.3168	0.8012	0.4268	0.8225
Wine 1	1	0.2022	0.5192	0.2073	0.4354
Wine 1	0.7163	0.1370	0.5833	0.3292	0.4516
Wine 1	0.7865	0.3191	0.6025	0.4512	0.5645
Wine 1	0.7923	0.1662	0.6153	0.3780	0.4032
Wine 1	0.6842	0.2224	0.6730	0.3292	0.3064
Wine 1	0.9766	0.2224	0.6602	0.0487	0.3387
Wine 1	0.8684	0.2539	0.6538	0.0853	0.5161
Wine 1	0.6491	0.2404	0.8589	0.4024	0.6774
Wine 1	0.8450	0.2651	0.8717	0.5731	0.8064

Settings

Normalisation

- None
- Row-wise
- Column-wise
- Global

Label Rotation

Rotate Column Labels: 45°

0° 45° 90°

Cell Size

Cell Dimension: 40

10 20 40

Visualisation Colours

Min Colour: Max Colour:

Matrix Sorting

Quick Actions

Algorithmic Solutions

Questions?

