



Visualizing complexity: Infographic materials as complementary tools for data-rich articles. Part 2

Graphical representation is a critical dimension of modern scientific communication. It clarifies complex data and ensures reasonable access to knowledge. Effective figures (graphs, charts, and diagrams) allow readers to quickly grasp relationships, trends, and patterns that are difficult to convey through text alone [1]. However, these illustrations are often designed without considering the diverse needs of the readership, including individuals with visual impairments or color vision deficiencies. This limits the reach and impact of published research. As noted in ref. [1], approximately 5% of US adults experience some form of visual impairment. This statistic underscores the necessity of inclusive design practices that adhere to accessibility standards, such as the Web Content Accessibility Guidelines. The effectiveness of graphical materials also depends on thoughtful design choices (color contrast, structural differentiation, and layout) that enhance the overall clarity [2,3].

Meanwhile, the growth of data-intensive research requires visualization tools that are precise, portable, interactive, and scalable at the same time. Traditional spreadsheet applications often fail to support rich and exploratory data interaction that can limit long-term accessibility [4]. In psychology and related fields, figures often represent abstract relationships, requiring creative visual representations that actively support comprehension rather than merely decoratively illustrating concepts [5]. Despite the availability of advanced software and plotting tools, many researchers lack formal training in visual design [6].

In light of these challenges, the editorial board of Chimica Technica Acta is expanding its collection of web-based visualization applications. In the first part of this discussion [7], we introduced three tools dedicated to textual, geospatial, and enhanced statistical graphics. Here, we present four additional utilities that empower authors to create accessible, publication-ready figures that tell a compelling story. Each tool is designed with academic rigor and user-centered design principles, enabling researchers to transform raw data into visual stories that are intuitive and enhance analytical depth and communicative reach.

The fourth application is the Heatmap Generator [8], which provides a versatile solution for visualizing matrix-like data structures, **Figure 1**. It enables users to create multi-dimensional heatmaps, contour plots, and three-

dimensional surface representations from tabular data. It accommodates various data formats and offers extensive customization options. A notable feature is its ability to generate normalized (0–1 scale) and absolute value representations, which facilitate comparative analysis across datasets. The tool also produces contour maps with adjustable smoothing parameters that reveal underlying patterns and gradients obscured by discrete heatmap representations. These visualizations are valuable in fields such as materials science, spectroscopy, and multivariate statistics because they allow for the simultaneous examination of relationships between two or more variables.

The fifth application, the Min/Max Analyzer [9], provides comprehensive statistical summaries and comparative distribution analyses (**Figure 2**). This application performs detailed statistical computations, including measures of central tendency, dispersion, and distribution shape, on single or multiple datasets. The Min/Max Analyzer generates a suite of comparative visualizations: histograms, box plots, violin plots, and cumulative distribution functions. One distinctive feature is the four-parameter analysis, which visualizes minimum, median, mean, and maximum values simultaneously through radar charts, parallel coordinates, and bubble diagrams. This application allows researchers to quickly evaluate distribution characteristics, identify outliers, and compare sample populations. The tool also provides logarithmic transformations and quantile-quantile plots for assessing normality, making it suitable for exploratory data analysis across diverse scientific domains.

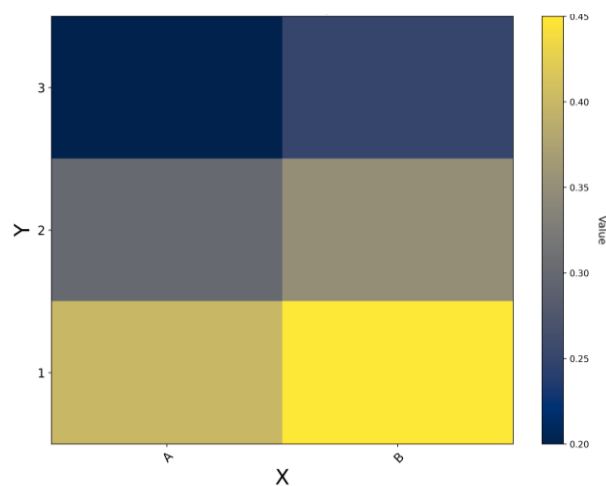


Figure 1 An example of heatmap generated.

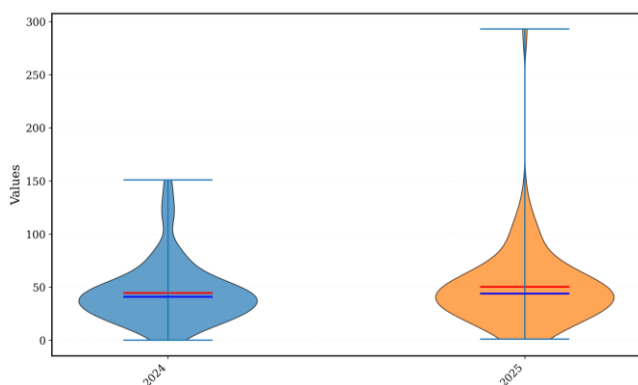


Figure 2 Stats regarding number of references in papers published in the Chimica Techno Acta journal in 2024 and 2025.

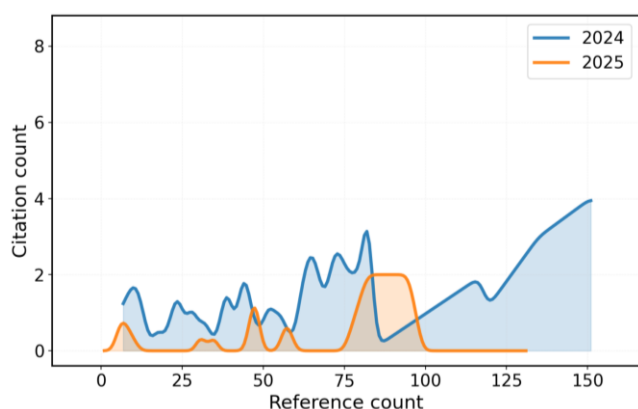


Figure 3 Citation vs. reference counts for the papers published in the Chimica Techno Acta journal in 2024 and 2025.



Figure 4 Number of papers published in the Chimica Techno Acta journal in 2024 and 2025.

The sixth application is the Histogram and Distribution Visualizer [10], which specializes in the graphical representation of univariate and bivariate distributions (**Figure 3**). It supports multiple datasets and allows users to customize visual attributes. Several advanced features are offered: including normalization options (global or dataset-specific), vertical offsetting for stacked visualizations, and smoothing algorithms for generating continuous density estimates from discrete data. These features are useful for comparing experimental results, theoretical predictions, and computational simulations.

The final application is the Speed Graph Generator [11], which takes a novel approach to displaying single metrics or comparative values using circular gauge (speed graph) diagrams (**Figure 4**). Users can create single gauges or multiple comparative gauges and have full control over style, color schemes, scale markings, and numerical formatting. These gauges can display absolute values or normalized proportions, making them suitable for performance indicators. While traditional plots remain im-

portant for detailed data analysis, these gauge representations offer immediate visual impact for relative comparisons.

Together, these four additional tools expand the graphical facilities available to scientific authors: heatmaps reveal patterns in matrix data; statistical analyzers provide comprehensive insights into distributions; distribution visualizers enhance comparative analysis; and circular gauges offer concise representation of metrics. These tools complement established plotting methods by addressing specific visualization challenges that conventional plots may not solve optimally.

The growing number of specialized visualization tools reflects a broader shift in scientific communication. As research becomes more complex, the methods for communicating insights must evolve as well. These advanced graphical techniques allow authors to create figures that present or interpret findings more deeply. We encourage researchers to consider these tools and select the most appropriate visualization method for each analytical task.

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Sincerely,
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