A close-up of a paper

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* The nested model is about four levels of design a visualization: Domain situation, Data/task abstraction, Visual encoding/interaction idiom, and Algorithm. These levels are nested, and the output from an upstream level is input to the downstream level.
* The image shows the set of threat to validity of each level. Here is the explanation:

**1. Domain Situation**

The threat is that the problem is mischaracterized: the target users do not in fact have these problems.

An immediate form of validation is to interview and observe the target audience to verify the characterization, as opposed to relying on assumptions or conjectures.

One downstream form of validation is to report the rate at which the tool has been adopted by the target audience. Adoption rates do not tell the whole story, but it reports what the target users do of their own accord, as opposed to the approaches below where target users are implicitly or explicitly asked to use a tool.

**2. Task and Data Abstraction**

The threat is that the identified task abstraction blocks and designed data abstraction blocks do not solve the characterized problems of the target audience.

The key aspect of validation against this threat is that the system must be tested by target users doing their own work, rather than doing an abstract task specified by the designers of the vis system.

A common downstream form of validation is to have a member of the target user community try the tool, in hopes of collecting anecdotal evidence that the tool is in fact useful.

A more rigorous validation approach for this level is to conduct a field study to observe and document how the target audience uses the deployed system, again as part of their real-world workflow.

**3. Visual Encoding and Interaction Idiom**

The threat is that the chosen idioms are not effective at communicating the desired abstraction to the person using the system.

One immediate validation approach is to carefully justify the design of the idiom with respect to known perceptual and cognitive principles.

Another downstream validation approach is the presentation of and qualitative discussion of results in the form of still images or video, or the quantitative measurement of result images created by the implemented system.

A downstream approach to validate against this threat is to carry out a lab study: a controlled experiment in a laboratory setting, teasing out the impact of specific idiom design choices by measuring human performance on abstract tasks that were chosen by the study designers.

**4. Algorithm**

The threat is that the algorithm is suboptimal in terms of time or memory performance, either to a theoretical minimum or in comparison with previously proposed algorithms. Obviously, poor time performance is a problem if the user expects the system to respond in milliseconds but instead the operation takes hours or days. (slow algorithms)

An immediate form of validation is to analyze the computational complexity of the algorithm, using the standard approaches from the computer science literature.

The downstream form of validation is to measure the wall-clock time and memory performance of the implemented algorithm. The considerations are scalability in terms of how dataset size affects algorithm speed, and the matching up with standard benchmarks.

A paper with text and images

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**1. Genre of storytelling: magazine style**

In this case, the webpage utilizes a combination of charts and text to present the story of the crime case. The charts likely visualize data related to the case, such as a Sankey diagram for “Đường dây nhận hối lộ từ các doanh nghiệp đến 21 bị can ở 5 Bộ, VPCP và 2 địa phương”, a line chart for “Dòng tiền hối lộ vụ chuyến bay giải cứu từ 2020 đến 1/2022”, etc. The accompanying text provides explanations, descriptions, and narrative elements that connect the different pieces of information and guide the reader through the story.

The magazine style genre typically involves presenting information in a sequential and visually appealing manner, resembling the layout and design conventions found in magazines. By incorporating both charts and text, the visualization aims to engage readers, provide context, and convey the narrative of the crime case effectively.

**2. Goals of using charts and interactive charts in the article**

* Need to explore data that is big/complex

Too much data

Too many ways to show it

* Charts can distill complex data into an easy-to-understand visual format.
* Interaction amplifies cognition

Understand things better if we can touch them, and we can observe cause and effect.

- Enhance engagement: Interactive charts encourage reader interaction, increasing engagement with the content.

- Facilitate better understanding: Visuals can help readers quickly grasp trends, patterns, and outliers in data.

- Support storytelling: Charts can serve as visual evidence that supports the narrative of the article.

- Encourage memory retention: Visual data representations can be more memorable than text-based descriptions.

**Without charts, readers might face difficulties in:**

* Understanding complex data or statistical information.
* Staying engaged, especially if the article is data-heavy.
* Visualizing the information the article is trying to convey, which might lead to misinterpretation or a lack of interest.

**3. Analyze the chart**

**• What is input data? (5 marks)**

The input data for this chart would include:

* The identities of the 21 suspects (bị can) implicated in the case.
* The five ministries involved in the alleged corruption network.
* The relationships between the individuals and the entities.
* The amounts of money involved in the bribery, possibly detailed per individual or entity.
* The roles of the suspects such as who offered the bribe (đưa hối lộ), who received the bribe (nhận hối lộ), any middlemen (môi giới hối lộ), and any instances of fraud (lừa đảo chiếm đoạt tài sản).

**• Which marks and channels are used to visualize the data? (10 marks)**

Marks: These are the elements that represent the data points. In the chart, marks include:

* Circles: representing individuals or entities involved in the bribery network.
* Lines or connectors: indicating relationships or transactions between the individuals and entities.

The channels used include:

* Position: the spatial placement of the marks to show the connections and the hierarchy within the network.
* Size: the size of the circles likely represents the amount of money involved in the bribery.
* Color: used to differentiate the roles of the participants (e.g., who gave bribes, who received them, intermediaries, etc.).
* Opacity: may be used to indicate the level of involvement or certainty in the data about a particular individual or entity

**• What is the goal of the chart in terms of task abstraction in visualization? (10 marks)**

* Data Correlation: The visualization correlates individuals with monetary amounts, indicating who received or gave bribes, and possibly their role in the network (e.g., giver, receiver, broker).
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* Educational Tool: It likely serves as an educational tool to inform the public or stakeholders about the extent of corruption within these institutions.
* Analytical Overview: The visualization provides an analytical overview of the bribery network, which can be used for further analysis or reporting.
* Investigation Aid: For investigative purposes, such a chart could help in identifying key players and understanding the flow of illicit funds.

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A close-up of a chart

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1. **Identify Courses by Semester**: Start by creating a list or a table for each semester. Each course should be identified by its unique code, title, and credit hours.
2. **Visual Markers for Changes**:
   * **Addition of New Courses**: You could represent new courses by using a distinct color or a '+' symbol next to them.
   * **Removal of Existing Courses**: Indicate removed courses with a different color or a '−' symbol.
   * **Moved Courses**: For courses that have changed semesters, use arrows or lines to connect their old position to their new one.
   * **New Connections Between Courses**: Illustrate new connections with a dotted or dashed line between related courses.
   * **Removed Connections**: For connections that have been removed, you could show the previous link with a strike-through line.
3. **Layout**: Ensure that the layout is consistent across all semesters to make comparison easier. Align courses that continue from one version to the next horizontally across the semesters for a clear visual path.
4. **Legend**: Include a legend or key that explains what each symbol or color means in the context of the curriculum changes.
5. **Interactivity** (optional): If this is a digital visualization, you could add interactive elements such as hover-over effects to provide more information about the changes.
6. **Annotations**: Use annotations to provide additional context where necessary, such as why a course was added or removed, if this information is relevant and available.
7. **Consistency in Design**: Use the same font, size, and style for all comparable elements to maintain visual coherence and make the graphic easy to understand.
8. **Review and Iterate**: After your initial design, review the visualization to ensure it accurately reflects the curriculum changes and is clear to the viewer. Get feedback from others and refine as needed.

- Color Coding: Different colors to represent courses that are new, removed, or unchanged. For example, green for new courses, red for removed courses, and blue for unchanged courses.

- Lines and Arrows: Use solid lines to connect related courses that are prerequisites or corequisites. Dashed lines could indicate connections that have been removed.

- Layout: Position courses in a grid according to the semester they are offered. This allows for easy comparison of which semester a course is moved to or from.

- Annotations: Use annotations or side notes to indicate significant changes, like if a course has been significantly updated in terms of content.

- Interactive Elements: If the visualization is digital, interactive elements can allow users to hover over or click on courses to see detailed changes, like the syllabus or credit hours.

- Version Toggle: Include a toggle switch or slider to move between the old and new curriculum versions for a direct comparison.

- Summary Section: Provide a summary box that lists the number of courses added, removed, and changed.

- Filter Options: Give users the ability to filter the visualization by category (e.g., new, removed, unchanged, moved).