

## ISM 6361 – Exam/Reflection II – Beautiful Visualization Chapters 11-20

Course Points - 50 pts

Due: see Canvas course website

DIRECTIONS: Answer TWO of the following three questions.

1. Pick a chapter from the text *Beautiful Visualization* (Chapters 11-20) and focus your discussion on the TOOL(S)/TECHNIQUES used to create that visualization. What was the impact on you (the reader of the visualization) in your learning and understanding? What were some of its major strengths in making that visualization decision, and what were some of the challenges of this/these tools/techniques? Remember nothing is for free... (25 pts)

Data visualization is a critical aspect of data analysis, providing a clear means of interpreting complex datasets and communicating insights effectively. The chapter “The Desing of X by Y” from the book – chapter thirteen, offers a compelling example of innovative data visualization methods.



[5 cost-effective tools for data visualization | TechRepublic](#)

In the chapter, the author outlines tools and techniques used to handle and visualize complex data:

- Dbcounter Script: A custom script developed in Nodebox, dbcounter helped the team gain a preliminary understanding of the database's structure by categorizing data and counting occurrences. This tool was useful for identifying missing or inconsistent data entries, a common challenge in data visualization projects.
- Tableau software: Utilized for its robust data handling and interactive visualization capabilities, Tableau allowed the team to explore data dynamically. This included slicing data by various dimensions such as country, year, and category, enabling quick identification of data trends and gaps.
- Microsoft Excel: Known for its spreadsheet management, Excel was used for its capacity to produce stacked charts, helping to analyze trends over time or compare attributes across subsets of data.
- Flash ActionScript and Flare Library: These were employed to prototype visual options dynamically. Flash and Flare facilitated the exploration of more complex interactive visualizations, such as stacked area charts, providing a preliminary view of how different data segments interacted over time.
- Golden Angle Placement Algorithm: Perhaps the most innovative technique used was the application of the golden angle (approximately 137.5 degrees) to optimize the spatial distribution of data points. This approach was inspired by the natural packing of sunflower seeds, allowing for a visually engaging and efficient arrangement of data points in circular forms.

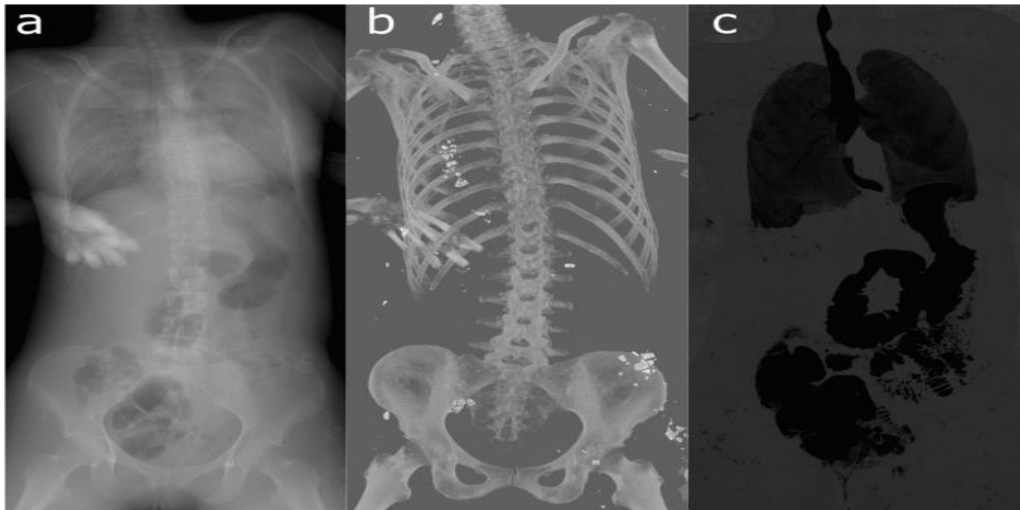
The combination of these tools and techniques led to a deep and nuanced understanding of the Prix Ars Electronica submissions. The use of Tableau and dbcounter, for instance, provided an initial grasp of the data's scope and anomalies, which is crucial for setting the stage for deeper analysis. The visualization approaches, particularly the use of the golden angle for data point distribution, not only maximize the use of space but also make the data aesthetically pleasing and engaging, encouraging viewers to explore the visualizations more deeply.

The major strength of visualization decisions lies in their ability to transform abstract numbers into informative and compelling stories. The use of the golden angle for placing data points created a visualization that was both beautiful and scientifically meaningful, highlighting patterns in the data that might not be apparent in more traditional linear or tabular presentations. This method also allowed for the representation of each data point as a unique entity, which is crucial in understanding the individuality of each submission while observing broader trends. Moreover, integrating dynamic tools like Tableau and interactive scripting with Flash and Flare allowed the visualization to be both informative and interactive. This interactivity is vital in modern data visualization, as it enables users to explore the data in a personalized manner, enhancing understanding and engagement.

Despite these strengths, the tools and techniques used also presented challenges. For example, the golden angle placement, while visually stunning, required a high degree of precision and understanding of mathematical principles, which could be a barrier for those without a strong background in mathematics and programming. Similarly, the use of multiple tools like Tableau, Excel, and custom scripts demanded a high level of proficiency in different software, posing a steep learning curve. Furthermore, the reliance on visual aesthetics can also obscure the need for accuracy and depth in data analysis. It raises questions about the balance between aesthetic appeal and the accurate representation of data. How much simplification is too much? Is there a risk that the visual appeal of the data might overshadow its actual informative value?

In conclusion, "The Design of X by Y" provides an excellent case study of how diverse data visualization tools and techniques can be harnessed to convey complex data in engaging and insightful ways. While the chosen methods brought certain challenges, the overall impact on understanding and engagement justifies their use. As the field of data visualization continues to evolve, it will be crucial to continue exploring these balances and trade-offs, ensuring that visualizations remain both beautiful and rigorously informative.

2. Pick a DIFFERENT chapter (from question 1) from the text *Beautiful Visualization* (Chapters 11-20) and focus your discussion on the STORYTELLING used in creating and displaying that visualization. What was the impact on you (the reader of the visualization) in your learning and understanding? (25 pts)



[A review of visualization techniques of post-mortem computed tomography data for forensic death investigations | International Journal of Legal Medicine \(springer.com\)](#)

The chapter on “Postmortem Visualization” from the book “Beautiful Visualization – Chapter Eighteen” offers a compelling narrative that both educates and provokes thought regarding the advancements in medical visualization technologies, particularly within the context of forensic pathology. This narrative, by illustrating the shift from traditional autopsies to virtual autopsies (VA), not only outlines the technological progression but also significantly enhances the reader’s understanding of the potential impacts and benefits of these innovations in real-world applications. The storytelling approach used in this chapter effectively communicates complex information through a well-structured explanation of the new methodologies and their advantages over traditional methods. For instance, the description of how virtual autopsies are conducted using multidetector computed tomography (MDCT) and magnetic resonance imaging (MRI) provides a clear visual understanding of a non-invasive technique that preserves the dignity of the deceased while offering a comprehensive analysis of the cause of death. This narrative technique helps the reader visualize the process and appreciate its value in forensic science.

The impact of this storytelling approach on my learning curve was profound. It transformed a topic that could have been presented in a dry, technical manner into an engaging narrative that highlights the human and technological aspects of forensic pathology. This made the information more relatable and easier to understand, enhancing my appreciation for the sophistication and utility of modern medical imaging technologies. Moreover, the storytelling raises important considerations regarding the broader implications of adopting virtual autopsies. For example, it prompts questions about the acceptance of VA data in legal contexts and the ethical considerations surrounding traditional autopsies. It also explores the potential resistance from certain cultural or religious groups, adding layers of complexity to the narrative that invite further inquiry and discussion. Further questions that arise from this discussion include: How can legal systems worldwide be harmonized to accept virtual autopsy data as standard evidence? What are the potential privacy concerns associated with storing highly detailed digital representations of the

deceased, and how might these be mitigated? Addressing these questions within the narrative could provide a more comprehensive understanding of the challenges and considerations involved in implementing these technologies. Perhaps, the use of visual aids and case studies throughout the chapter could enhance the storytelling by providing concrete examples of virtual autopsies in action. This would not only serve to ground the theoretical aspects discussed but also show real-world applications and their outcomes, thereby strengthening the narrative's impact on learning and understanding.

In conclusion, the storytelling used in the chapter on "Postmortem Visualization" significantly enhances the reader's engagement and understanding by effectively blending technical details with human interest elements. It serves as an excellent example of how complex information can be conveyed in an accessible and compelling manner, encouraging deeper reflection, and learning. This approach not only educates but also inspires further exploration into the potential and future of virtual autopsies in both forensic and clinical contexts.

3. Pick a DIFFERENT chapter (from question 1 or 2) from the text *Beautiful Visualization* (Chapters 11-20) and focus your discussion on how well this visualization(s) in this chapter LIE or are TRUTHFUL with respect to what you have learned in *How Charts Lie*, in your discussion, you might address how you might make the visualization more truthful/insightful. (25 pts)

In analyzing the use of visualizations in Chapter Nineteen of “Beautiful Visualization”, it is essential to discern how animation impacts the truthfulness and effectiveness of data representation. The chapter, primarily focused on the use of animation in visualization, provides a broad perspective on both the potential enhancements and the pitfalls of incorporating movement into visual data displays. Drawing from Cairo’s insights in “How Charts Lie”, we can evaluate whether animations in visualizations serve to clarify or confuse the intended message. The chapter begins by positing that while static images are powerful, the dynamic nature of animation could theoretically provide a richer understanding by depicting changes over time or transitions between states. This notion is in line with Cairo’s emphasis on the clarity and accuracy of data representation. For instance, the use of animation in Jonathan Harris and Sep Kamvar’s “We Feel Fine” is highlighted as a successful example where the movement of bubbles – each representing different emotions extracted from blog posts – helps illustrate the distribution and dynamics of emotions over time. This kind of animation can enhance the viewer’s understanding and engagement by providing a visual narrative that static images cannot. However, the truthfulness of an animation depends significantly on its execution. As noted in the chapter, not all animations achieve their intended clarity or effectiveness. In some cases, animations can mislead by introducing too much sensory information at once, making it difficult for viewers to follow or accurately interpret the data. This problem is exacerbated when animations include unnecessary or overly complex movements that do not add informational value but rather serve as aesthetic enhancements. Cairo warns against such practices, suggesting that truthfulness in visualization comes from simplicity and directness that align with the data’s actual message.

One of the key discussions in the chapter revolves around the principles of animation adapted from traditional cartooning. Techniques like “squash and stretch” or “anticipation” can make animations more lively and relatable but can distort the factual accuracy of the data being represented if not applied carefully. In the context of data visualization, maintaining the integrity of the data should always supersede artistic embellishment. This is where the chapter’s insights intersect critically with Cairo’s principles: ensuring that any enhancement, including animation, serves to clarify rather than confuse or distort the truth. Further considerations for making visualizations more truthful involve adhering to principles such as minimizing unnecessary motion, maintaining consistent mappings, and ensuring that each frame of an animation can stand alone in its representation of the data. These considerations are crucial for animations intended for exploratory data analysis, where the user interacts with the data to uncover underlying patterns and insights. The chapter’s critique of algorithms animations in educational settings – where such animations did not necessarily improve understanding – underscores the need for animations to be thoughtfully integrated, emphasizing interactivity and user control as potential ways to enhance learning and comprehension.

The chapter concludes with a thoughtful discussion of the different applications of animation for presentation versus exploration. This dichotomy is vital: animations used in presentations can be highly directed and curated to support specific narratives or conclusions, while exploratory animations must provide tools for users to interact with and explore data independently. Here, the design principles for animations must reflect the intended use – whether to educate, inform, or enable discovery. In summary,

the truthfulness of animations in data visualization hinges on their ability to enhance understanding without oversimplifying or distorting the data.

**BONUS QUESTION:** how designers can better equip users to control and interact with animated visualizations? What guidelines can be established to evaluate the effectiveness of an animation in various contexts of data presentation and exploration?