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Data Visualization

**Principals of Data Visualization Summary:**

Creating data in a visual way is critical because it tells a story. There are two main goals that need to be met in order to tell this story, they are explanatory and exploratory. Visualizations should explain the data to resolve issues or answer a question and they should explore the many dimensions the data set offers. The explanatory goal has a definite ending or conclusion, while exploratory data sets can pose new questions and explore without necessarily having a specific point end.

Memory is a crucial component in humans processing visual information. Long term memory is formed from past experiences and changing a visualization to the opposite of societal norms is not recommended. While working memory uses the method, chunking, to hold three chunks of information at a time while looking at a visual. Within working memory there are preattentive attributes that instantly are perceived within milliseconds of looking at them. Some of these preattentive attribute categories are; form, color, and spatial position. After the preattentive attributes then analytical patterns are seek out in the visual. These analytical patterns are organized using the Gestalt Principals (proximity, similarity, enclosure, symmetry, closure, continuity, connection, figure and ground) that lets the mind neglect the noise in the visual and identify the important patterns in the visual.

**Perceptions in Visualization Summary:**

This article starts by discussing the preattentive processing similar to the last article, the instant identification of multi-element displays within milliseconds. These elements that have been identified as preattentive is target detection, boundary detection, region tracking, counting and estimation, and many more. To further understand the process and reasoning behind preattentive process there are several studies that have been four models developed.

The first model is the feature integration theory, which believes that when one is first exposed to a visual the features in the visual are encoded in parallel to their respective feature maps. The second model is the texton theory. This theory divides up visual features (textons) into categories (elongated lobs, terminators, and crossing of line segments), in which noticing the difference in these categories are the only items noticed preattentively. The third model is the similarity theory, in which the preattentive search among features depends on the similarity between targets and non-targets and the similarly within non-targets themselves. The last model is the guided search theory, in which each element (color, shape, depth, etc.) have their own feature map and the visual display is a combination of both bottom-down and top-down activation.

Transitioning from preattentive processing of a visual display to post attentive processing deemed to not spark a large difference according to Wolf. He concluded that sustained attentions to the features in the visual did not enhance the visual search and cannot be committed to long term memory. A reason that these visuals many not be held long term is because of change blindness, where humans are “blind” to changes that occur in a visual when they are interrupted during looking at it. This phenomenon leaves many innovative ways for thinking about visuals. Lastly, there are many factors that have consistently strongly influenced perception of visuals and those are color, texture, motion, and nonphotorealism. Color allows the viewer of the visual to have a perceptual balance, be able to distinguish elements and flexibility. Texture is a collection of fundamental perceptual dimensions, rather than a single visual feature. Motion has three distinct aspects of it, flicker, direction of motion and velocity of motion all in which can be applied in an effective manner in a visual. Nonphotoralism is the process of developing computer generated graphics that are undistinguishable from real photos, which can be more effective or more appropriate than a real photo.