Research on Practical Logic Structure of Information Visualization

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Abstract. The basic task of information visualization is to make complex information clear, and the most important link in this process is to organize information and select appropriate paths for information reproduction. This appropriate path is the logical structure of information. This paper first discusses the practical logic type of information organization, and analyzes the information according to the logic, and finally selects the logical structure suitable for information display. This visual information reproduction provides an accurate and stable structural basis.

1. Introduction

With the advent of the age of information big data, the amount of information has multiplied every day, making the valuable information that we really need be covered. Therefore, information visualization has become the most effective way for us to organize information, reproduce information, and understand information. Richard Saul Wurman sees information visualization as a way of constructing information structures. He believes that the fundamental task of information architects is to design information representations. That is, information architects should be able to extract complex environments and information. The kernel is presented to the user in a clear and beautiful manner. Nathan Shedroff believes that information visualization is ubiquitous. It is about the ideas and data that organizations try to communicate. They are concerned about the information and purpose of communication, and then find out the ways that are truly suitable to represent them so that they can be clear and accessible. A technique that is close and easy to understand.

2. Practical logic type of information visualization

The practical logic of information visualization is mainly the logical derivation of abstract concepts, searching for the real relationship between concepts and forms of subject and object. Through the three information dimensions of data, time, and space, the logical connection of information is constructed and information is organized. A clear structural hierarchy is presented to the audience.

2.1. Data Text Information

Data text information refers to information in the form of data and text, including text and numbers. Data information, also known as statistical information, is the main body of information visualization and the most representative form of information visualization. Data text information can be used as the
main element of information dissemination, and it can also be used as an auxiliary element of information dissemination.

2.2. Time information
Time information refers to the collection of information generated by taking time as the main axis, which has a clear sense of time flow. Because time gives people a sense of forwardness, time information often runs in a linear fashion and has irreversible characteristics. [1] It is worthwhile to expect that the events of the current incident have become past events, and that the next time will happen. Visualization of information based on time information can accurately record the process of development and flow of information. The cluster of information and the composition of information units are all around the time axis. When designing, we must consider how to display the maximum in a limited plane space, shows a logical relationship between maximizing the amount of information and the information order of the information cluster in the time dimension.

2.3. Spatial Information
Spatial information is a collection of describing spatial data. The main structure of information is composed of real existing objects (such as terrain, geomorphology, architectural space layout, etc.), with high accuracy and a clear sense of space. Highlighting the spatial relationship of information is a common expression of information visualization, and can display the order and logical relationship of information in the form of space.

3. Practice Logic Grading
The seemingly unrelated things in the world, in fact, all have internal order and logical connections. The order of information exists between the logic of information, information clusters, information units, and individual information symbols. Information order determines the primary and secondary relationships, logical relationships, structural relationships, and communication sequences of information. Finding, excavating, and sorting out the internal structural order of information is the primary task of information visualization. [2] The establishment of information order is conducive to the formation of a good dissemination mechanism, which constitutes a harmonious relationship between the overall information and the part. The logical hierarchy is the reasoning and argumentation of the abstract logical relations such as time, space, quantity, and location of the original information, determining the dimensional relationship and hierarchical relationship of the information, and establishing a clear logical structure relationship of information. The original information is scattered, and the information logical hierarchy is based on the concept of the center of the goal of the original information collected and analyzed, and the level of information and logical division, is a simple process from the induction process.

Logical grading is to fully demonstrate the inherent regularity of data, and the results obtained by analyzing and calculating data through histograms, current lists, and mathematical formulas are based on the logical thinking methods and methods, and are reasonably described and divided into relatively independent data collection. [3]

3.1. Series determination
The number of grading sets the overall data collection as an object, and directly controls the accuracy of grading of data statistics. For the determination of the number of information grades, the information level should be determined by focusing on the main body information. The setting of information levels is closely related to the external manifestation of the data, especially when the data contained in the data as a whole has a significant difference, the data is clustered. Clustering can be used as another basis for the division of the number of information visualizations. The method of determining the number of classifications based on clustering is especially used for the comparative analysis between information visualization data. In addition, as the design object, the graded data will appear in a unique visual form, forming a relationship that is unified by information logic and level. In addition, in the visual
transformation of information, it is necessary to consider the audience's ability to perceive and recognize the same visual symbol. Generally, the art's concrete symbols are suitable for grading at about three levels, while abstract geometric figures are allowed to have more gradations.

3.2. Classification limits
How to reasonably determine the grading limits of data is the main task and core after the technology is determined. The classification boundary can be understood as certain specific values that can directly affect the distribution and hierarchical display of data. The classification boundary is a watershed between information units. In information visualization, the following three principles must be taken into account in determining the classification limits of information data: First, the clustering hierarchy. Clustering can be used to minimize intra-level data gaps, reduce the difference between cluster data and the number of representatives at that level, and expand the differences between data clusters as much as possible, which are conducive to the overall order and logical presentation of information data; Secondly, the principle of correspondence classification. The classified information must contain corresponding information data within all levels, and each information data must exist within its corresponding level; again, classification principle for easy identification. On the basis of the determination of the number of stages, maintaining the close logical connection between the data set and the clusters can enhance the overall information identification.

4. The structure of practical logic
Provides designers and all vision workers with a way to sort the way most information is organized. Information can also be structured according to different attributes of information, collecting the information and data, forming a logical framework, making it effective information. Constructing a reasonable visual structure of information is the key to achieving information visualization. Richard Saul Wurman first put forward the "five hats" in his book "Information Anxiety". In most cases, different elements can be combined in five ways: alphabetically, in chronological order, in azimuth order, in a specific ratio, in a specific category (such as images, videos, and text). According to the "LATCH" theory, we summarize the basic structural types of the four architecture information:

4.1. Grid Structure - Column Structure
The term "Grids" is usually understood as a grid. This definition was given by the Swiss designer Hans Rudolf Boszard: "A mesh with a uniform horizontal and vertical line." A grid structure is a structure that characterizes the related attributes such as influence relationships, logics, and groupings among information entities. It has very orderly system features that emphasize proportions and order. The grid structure is based on the grid structure of the histogram model. It generally has two or more dimensions of information. It can express complex data through the combing of the grid and effectively combine the data with the schematic. On the one hand, the grid is represented by the logical relationship of the text; on the other hand, it is represented by the layout hierarchy and the structural spatial relationship.

Figure 1. Composite and deformation of mesh structure
4.2. Coordinate structure - pie structure
The coordinate structure is the structure of comparative attributes that characterize the degree of information, numerical values, and so on. This structure consists of information entities and the characterization of information attributes. The coordinate structure is based on the structure of the pie chart model. This structure takes the coordinate point as the base point, mainly takes one-dimensional information, and has centripetal or centrifugal characteristics. As shown in Figure 2, this coordinate structure contains the information entities and information attributes of each country participating in the Mars program and its degree of exploration. It is processed into a five-dimensional structure: the satellites that participated in the research failure, the satellites that are close, the satellites that are close to orbit, and the orbit Satellites, satellites that are still operating, have a clear and intuitive structure, making it easier to read information.

Figure 2. Mars Project Information Design

4.3. Spatial Position Structure
The spatial location structure is a structure that characterizes the spatial orientation, distance, and other related attributes of information. This structure presents information entities or information as a whole containing spatial or geographical attributes. [4] Its structure consists of graphical elements that represent the geographic location of the space and graphical elements that characterize the information entities. Among them, the structure includes two forms, one is the physical space structure, that is, the graphical element representing the geographical position of the space can be a map that is represented by an equal proportion with the actual space; the second is the abstract position relationship structure, and the structure is not completely corresponding to the physical position. The structural relationship is an abstract positional relationship that characterizes space and classifies and expresses numerical information in different geographical locations.
4.4. Time Stream Structure

The time flow structure is a structure that characterizes the information as a whole or information entities, attributes, and the like that change over time. It contains the time axis, and the changes in the information are characterized by changes in the graph on the time axis. As shown in Figure 4, the map uses the structure of geographical contours to display all the schools of music, representative figures, and representative works formed by popular music. It integrates time and inheritance as clues. The chart is beautiful and aesthetically pleasing.

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