

Data Visualization techniques concept and issues

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Abstract: *In today's world Data is a main asset in life. The information is acquired from different sources. There are million or trillions of data where it is difficult to animalising on that. In recent few years there is new technology which comes into the market; this technology is nothing but data visualization technique. This technology is used in different areas like marketing, medical, networking. Due to invention of computer human is get closer to the modern digital era through the Data visualization technique. Data visualization is very important concept user analysed the data according to that it helps to user for taking decision on specific problem. There are many tools freely available in market so that Data is easily analysed. There are so many factors consider while annualized the data size of the data, complexity, scope of the data. Section I tell about what is data visualization, where it is to be used, basic steps for data visualization technique. This all points are covered in that. In Section II Data visualization Basic steps with its explanation. In Section III which techniques are used while performing data visualizing and which one is better for understanding. The purpose of this Research paper what are methods which are used for data visualization. While using DVT (Data Visualization Technique) what are issues may be occurred this is written in Section IV. Section IV is dealing with issues while using any data visualization technique in different areas. Especially issues occurred while working with big data.*

Keywords: *Data Visualization, techniques, Acquisition, Filtering, Mapping, Rendering, multidimensional, heterogeneous data*

I. INTRODUCTION

The information is essential part of human life. Data stored it any format like email, chat, word document, excel format. Because of the different format of the data there is a big challenge how to represent that data.

Visualization in that there is lots of data which is comes from different sources and that data represent in bar graph, tree diagram and more than other format. In that data is textual or numerical format which is converted into meaningful image format, because human brain is very effective catch up large amount of data easily.

II. DATA VISUALIZATION BASIC STEPS

For visualization of the data which is converted into specific model so there are some important steps are listed below [1]:

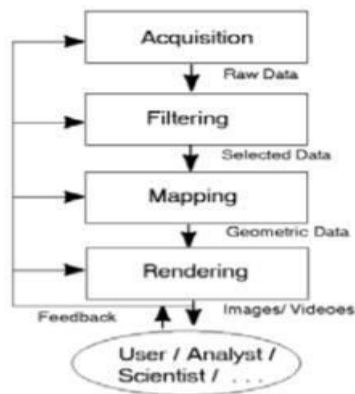


Fig. 1 Data Visualization Basic Steps

The explanation of the Figure 1 is given below:

A. Acquisition

In that we are declare aim or objective of that data. Depending on the requirement data acquired. According to the requirement we are gathering that data from different sources. Gather that data through sensor or simulation. After gathering that data stored that data somewhere place so we can used that data for further process. This is nothing but raw data.

B. Filtering

After gathering that data then filters that data. The important data which is useful select first that data and stored it somewhere so we can use it for further process. The commonly used filter technique is clustering.

C. Mapping

Mapping process in that data is converted into lines, triangle or polygon, and have an attribute of colour, texture and size.

D. Rendering

Rendering in that data is stored in videos or image format. Rendering is complex step. According to the images and videos user gives feedback on that.

III. DATA VISUALIZATION TECHNIQUES

Techniques are used for representation of the data in any format. There are some Techniques are listed below:

- Line graph:

In line graph points are determined by variable. If points are changed then variable is also change. It is used for representation of the temperature at specific time period. [6]

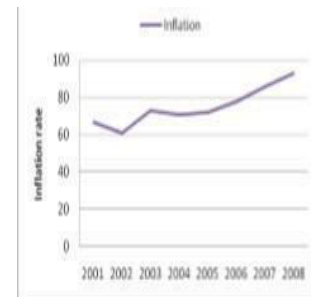


Fig. 2 Line Graph

- Scatter plot

It is also called as scatter graph. The points represent relationship between two variables. One variable represent horizontal distance and Second variable represent vertical distance. Scatter plot represent how strong the relationship between scatter plots. [3]

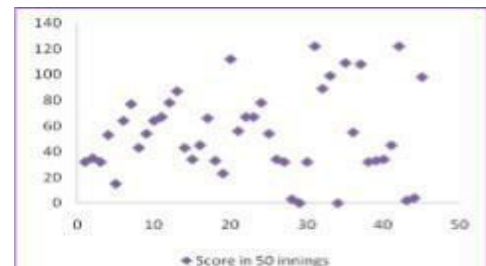


Fig. 3 Scatter plot

- Tree Map

Tree map is also known as tree mapping. The data which is represent in the hierarchical format. In that nodes and sub nodes compare with each other and recognize the pattern. Each data or object is represented by the rectangle. Attribute depends on intensity of the colour. [3]



Fig. 4 Tree Map

- Parallel Co-ordinates

It is used for plot individual different co-ordinate across many dimensions. Each element are plotted into the vertical line format and then connected with each other. It is used for multiple sets of huge data.

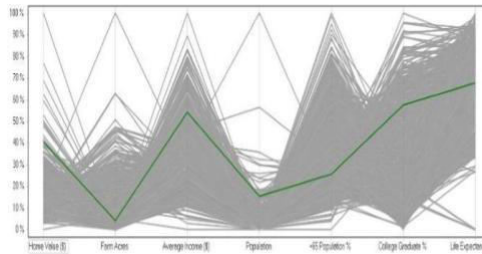


Fig. 5 Parallel Co-ordinates

- Scatter Plot Matrices

Scatter plot matrices represented by small dot. So that it is fitted into the single page. It is used for multiple regression analysis.

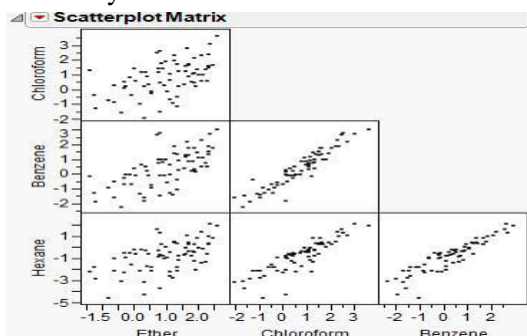


Fig. 6 Scatter Plot Matrices

- Spatial visualization

Spatial visualization actually dealing with local base data such as map, 3D maps, graphs, timelines. It is also dealing with relationship between different events.

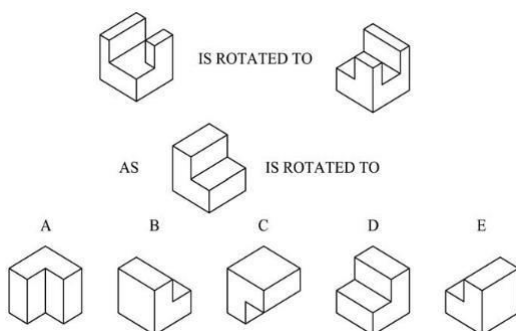


Fig. 7 Spatial Visualization

- 2D isosurfaces

In 2D surface, there is certain boundary in that and we have to consider each point as a value. Interpolation is required in that for where the boundary is crossed. We are using contour lines for representing 2D isosurface.

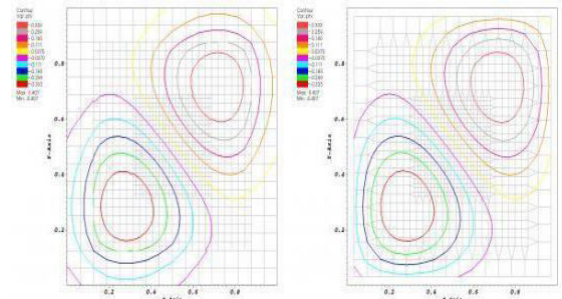


Fig. 8 2D isosurfaces

- 3D isosurfaces

3D surface is a same as 2D isosurface manner. In 2D isosurface it is shown by contour manner but in 3D isosurface it is shown in triangular manner.

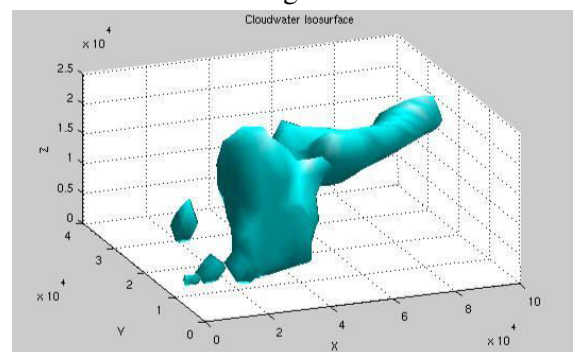


Fig. 9 3D isosurfaces

- Rubber sheet

In Rubber sheet there is 3D surface mapping the values into 2D surface. Points are connected in triangular format.

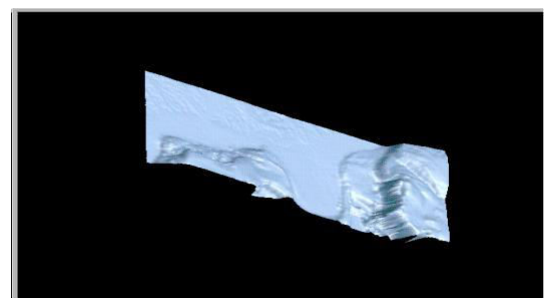


Fig. 10 Rubber Sheet

- Volume visualization

A 3D scalar data grid by casting through projection plan into scalar field. There are three volume visualization methods isosurfacing, maximum-intensity projection and direct volume rendering.

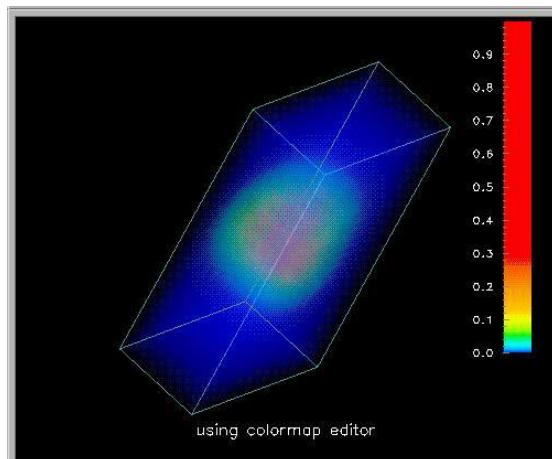


Fig. 11 Volume Visualization

- Scalar glyphs

Glyphs data visualization in that collection of different objects which is converted into glyphs. Glyphs have attribute size, shape and colour. Glyphs have single value.

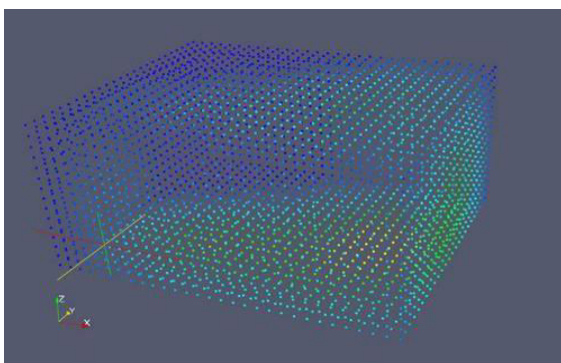


Fig. 12 Scalar glyphs

IV. DATA VISUALIZATION TECHNIQUES ISSUES

In today's world visualization is most important technology. In that analyser collecting the data from different sources and give the proper output so that it helps to us make any decision. In market there are many business tools are available so that which gives us report of that data. But, there is some problem may occur while when we are dealing with big data we can take it as a challenge and opportunity also.

Some times when we are working with real world data that time problem may arise. Because there is enormous volume data. Time constraint, speed, size and diversity of the data that attributes need to be considered when study with big data.

One of the most issues occurs while doing visualization is knowledge gap. Most of the researchers are unaware about how to use tools of data visualization. They have lack of knowledge about current technology.

There are some areas where data visualization technique can be issue or challenge:

Area	Uses	Issues or challenges
Visualization in Digital Forensics	In that data which is collected from many sources. They are preserving that data. Analyse it. They are stored that data for investigation purpose.	Investigation on email so that they need one or more computers. Volume of the data is large so that there can be limitation problem occur.
Visualization in Network Security	In that analysing the data from active computers assist with network traffic audit, monitoring and instruction detection	multidimensional data Lots of data, lots of sources scalability and time usage visualization
Visualization in Data Mining	Exploring and analysing large amount of data for creating a pattern	multidimensional, heterogeneous data Scalability, quality of the data Dynamically data changing
Visualizing Knowledge	After gathering the data analyse that data. Expectation, perception and giving opinion on that data.	making mechanism for creating structure, retrieve and visualize the data Quality of the data.
Visualization in Risk Management	To identified, analyse and giving priority according to that	We can decrease the level of the risk using Qualitative

	risk.	assessment techniques: quantitative data need to be completed.
Uncertainty Visualization	Working with uncertain data simulations. Mathematical process on that data and visualize it.	Multidimensional, multilevel, multisource data. Uncertainty in visualization and calculation of the data.
Qualitative Data Visualization	Developed a Qualitative data which is useful.	Qualitative Data visualization gives little bit information so we need to more space for storing that data. Need creative, discipline and structure.

V. CONCLUSION

This research paper work on data visualization techniques concept and issues. Basically data visualization means collecting a data from different sources, analyse that data, structure that data in specific manner according to that take a proper decision. In that first we are dealing with basic steps of that like acquisition, filtering, mapping and Rendering.

Different techniques of data visualization are listed in that paper according to the user requirements and pattern of that data user can use this technique. While dealing with big data there can be issues occurred that issues are mentioned in this paper.

VI. REFERNECES

- [1] Jiaying liu , tao tang ,wei wang , bo xu , xiangjie kong , (SENIOR MEMBER, IEEE), AND feng xia , (SENIOR MEMBER, IEEE) "A Survey of Scholarly Data Visualization"
- [2] Zhao Kaidi School of Computing, National University of Singapore" Data visualization"
- [3] Winnie Wing-Yi Chan Department of Computer Science and Engineering Hong Kong University of Science and Technology Clear Water Bay, Kowloon, Hong Kong "A Survey on Multivariate Data Visualization"
- [4] Ismail Demir, Johannes Kehrer and Rudiger Westermann Computer Graphics and Visualization Group, Technische Universitat M " unchen, Germany " Screen-space Silhouettes for Visualizing Ensembles of 3D Isosurfaces"
- [5] A. S. Syed Fiaz Assistant Professor, Department of Computer Science and Engineering, Dhirajlal Gandhi College of Technology, Salem, Tamil Nadu, India. VIT University, Vellore, Tamil Nadu, India. D. Sumathi Assistant Professor, SITE, VIT University, Vellore, Tamil Nadu, India A.S. Syed Navaz Assistant Professor, Department of Computer Science, Muthayammal College of Arts & Science, Namakkal, Tamil Nadu, India. "Data Visualization: Enhancing Big Data More Adaptable and Valuable"
- [6] Matthew N. O. Sadiku , Adebawale E. Shadare , Sarhan M. Musa and Cajetan M. Akujuobi "data visualization"
- [7] Thomas NOCKE, Till STERZEL, Michael BÖTTINGERandMarkusWROBEL "Visualization of Climate and Climate Change Data: An Overview"
- [8] Malu A. C. Gatto "Making Research Useful: Current Challenges and Good Practices in Data Visualisation"
- [9] Viktorija STASYTYTĖ Vilnius Gediminas Technical University "RISK IDENTIFICATION AND VISUALIZATION TECHNIQUES FOR REASONABLEENTERPRISERISK MANAGEMENT"
- [10]Kigongo UC Berkeley – School of Information akigongo Vanessa McAfee UC Berkeley – School of Information Vanessa" Visualizing and Exploring Qualitative Research: Interview Transcripts"
- [11]Aileen R. Buckley Department of Geography University of Oregon Mark ,Gahegan Department of Geography The Pennsylvania State University State College, PA 16802, Keith Clarke Geography Department University of California, Santa Barbara Ellison Hall 3611 Santa Barbara, CA 93106-4060 "GEOGRAPHIC VISUALIZATION"

- [12] Satish Kumar Panjab University SSG Regional Centre Hoshiarpur, Punjab (India) "A Review of Recent Trends and Issues in Visualization"
- [13] David H. S. Chung Submitted to Swansea University in fulfilment of the requirements for the Degree of Doctor of Philosophy "High-dimensional Glyph-based Visualization and Interactive Techniques"
- [14] Steven Parker, Michael Parker, Yarden Livnat, Peter-Pike Sloan, Charles Hansen, Peter Shirley "Interactive Ray Tracing for Volume Visualization"
- [15] Book Author: Usama M. Fayyad, Andreas Wierse, Georges G. Grinstein
Book Name: Information visualization in data mining and knowledge discovery