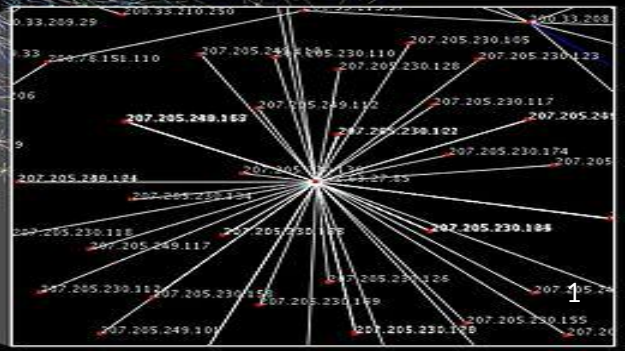
Article presentation Unit 1: Basics



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The Structure of the Information Visualization Design Space

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Research

This research is based on analyzing portion of design space so that we can understand the difference among designs and suggest new possibilities. Here in this paper we will see for designing new visualizations and augmenting existing designs.

Introduction:

Information visualization presumes that visual representations and interaction techniques take advantage of the human eye’s broad bandwidth pathway into the mind to allow users to see, explore and understand large amount of information at once. Information Visualization focused on the creation of approaches for conveying abstract information in intuitive ways.

Paper organization

Title, author(s), abstract, keywords

Introduction

Body:

- Objectives
- Variables declaration,
- Examples of visualizations containing:
  - experiment description
  - graphic
  - table

Conclusion and future work

References

Distinction with data:

Data Distinction can be done by its values. These values can be:

1. Nominal (are only = or > to other values)
2. Ordered (obey a < relation), or are
3. Quantitative (can be manipulated by arithmetic)

The notation of above three values can be done as Nominal=N, Ordered=O, Quantitative=Q.

Visualization Processing:

Human Visual Processing works on two levels:

1. Automatic Processing: works on visual properties such as position and color
2. Controlled Processing: works on for example text

Symbols used in Visualization processing:

D-Datatype || F-Filter for record data || D*-Recorded data type || XYZT-Position in space time || R-Retinal properties || []-Enclosure || CP-Control processing || P,L,A,S,V-Mark types

Data			*Automatic Properties*						*Controlled*	
Variable	D	F	D’	X	Y	Z	T	R	—	[]	CP

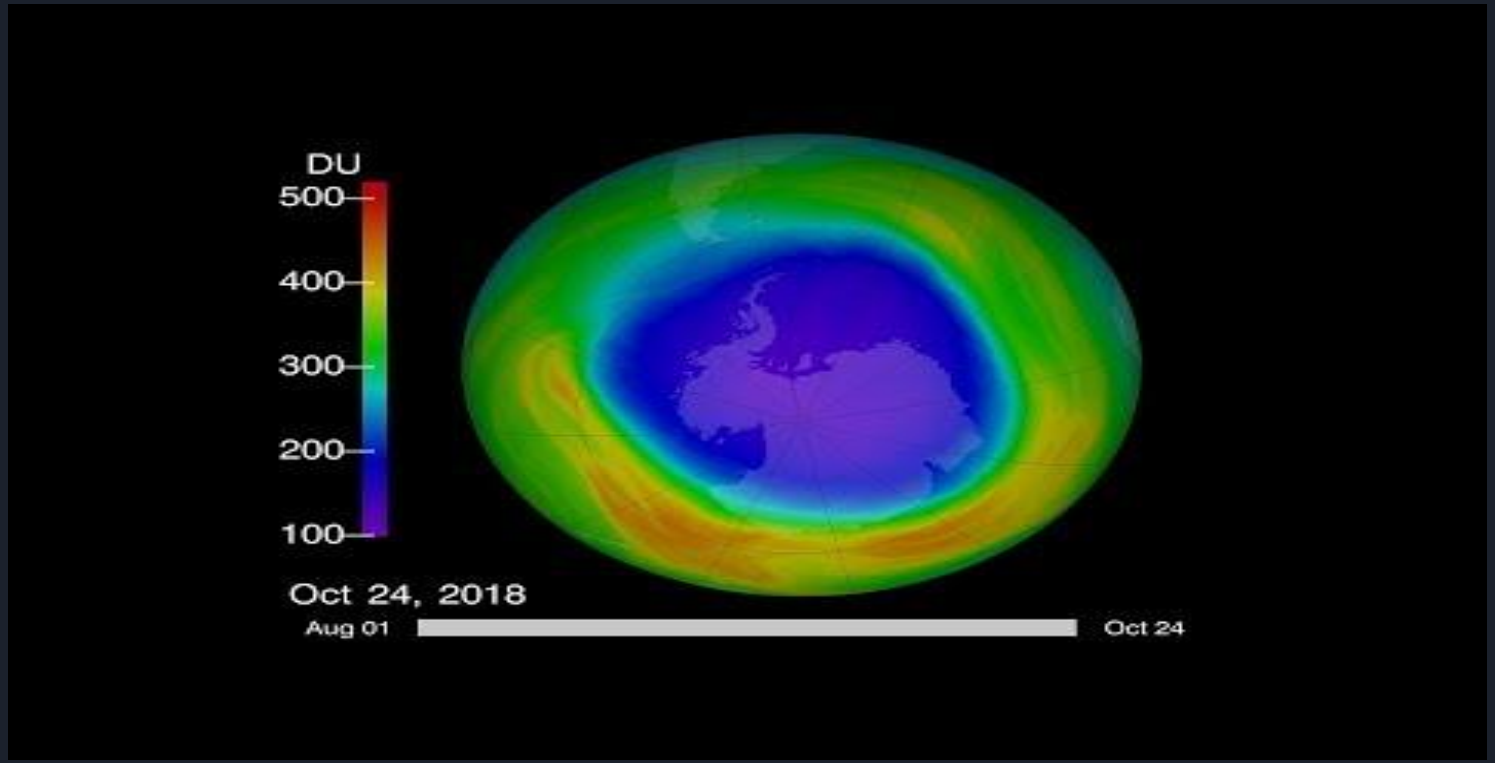
Scientific Visualization:

It starts from data whose variables are intrinsically spatial.

Spatial notations : QX & QY (Quantitative Variables)

Earth Coordinates: QXlon & QYlat

Scientific Visualization for Ozone layer:



Multi-Dimensional Scatter graphs:

These type of Visualizations take variables which are not intrinsically spatial and map them onto X and Y,

Q-->X:P

Ordinal variables can be placed on sliders, [O-->sl]

the sliders used to control the variables for filters

Examples for MDS graph:

Example:

1. World within worlds:

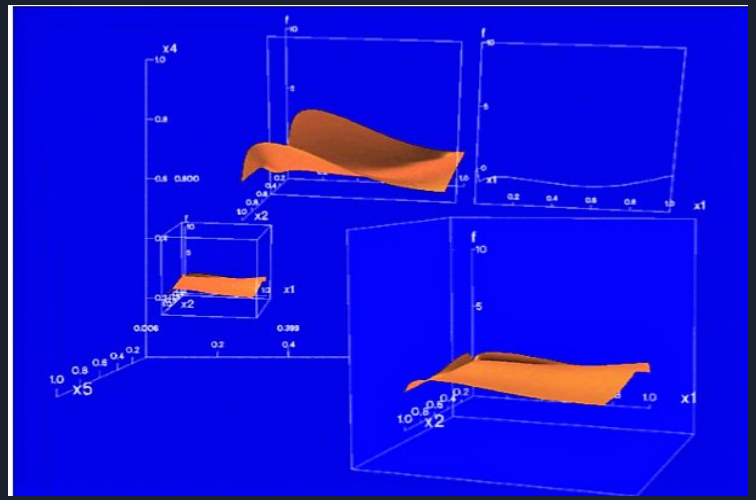


Fig: World within worlds

Name	D	F	D'	X	Y	Z	T	R	—	[]	CP
V1	Q	f	P	P							
V2	Q	f	P		P						
V3	Q	f	P			P					
V4	Q	f▷	Q	S							
V5	Q	f▷	Q		S						
V6	Q	f▷	Q			S					
V7	Q		Q					C			

Table: World within worlds

Node & Link diagrams:

Node and link diagram allow the encoding of linkage information between entities. They can be thought of as a mapping from a set of Nominal variables into itself {N*N}.These are then mapped into X,Y coordinates.

QXlon-->X:P

QYlat-->Y:P

and the links are mapped into connection lines:

N*N→ X:* , Y:* , Connection : Lines.

Example for N & L diagram:

1. Internet Traffic on Earth:

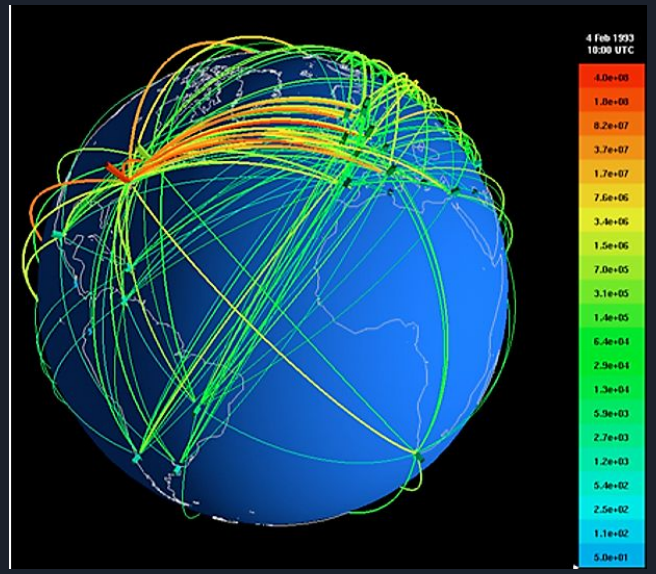


Fig: N & L diagram for Internet traffic

Name	D	F	D'	X	Y	Z	T	R	—	[]	CP
Lon.	QX lon		Q	P							
Lat.	QY lat		Q		P						
Set	NX N	f	xXy	*	*				L		
Type	O		O					C			

Table: Internet traffic on earth

Trees:

S & C proposed a space filling form of enclosure tree called Tree-Maps.

At one level in a tree, the children of a node divide up the X dimension of the visualization, at the next level they divide up the Y dimension of the node in which they are enclosed.

The division proceeds alternating between X and Y until the leaves of the tree are reached.

Q→ X (half time)

Q→ Y (half time)

Example for Tree Visualization:

1. Hyperbolic Browser:

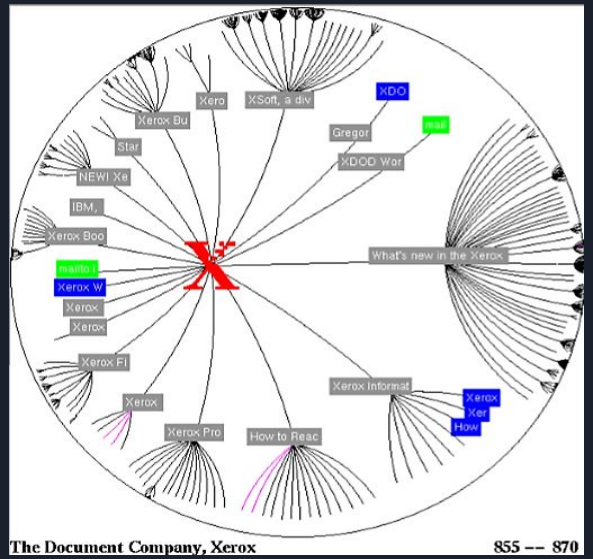


Fig : Hyperbolic Browser

Name	D	F	D'	X	Y	Z	T	R	—	[]	CP
Set	Nx N	hb	xXy	*	*				L		

Table : Hyperbolic browser

Special Data Transforms: Text

Text can also be visualised directly :

Q-->CP

But this does not work with large amount of text and the text has to be processed with Controlled instead of with automatic processing.

One approach to visualize large amount of text is to map it line by line on to long strips:

Q-->Y:P

Example for Text Visualization:

1. Seesoft:

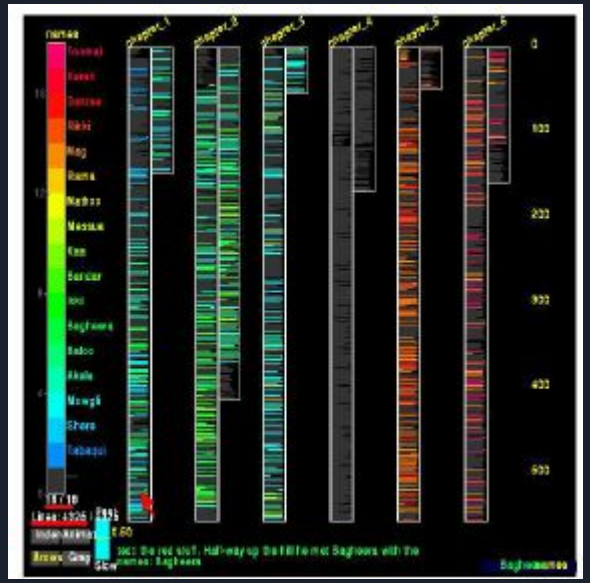


Fig: Seesoft (text visualisation)

Name	D	F	D'	X	Y	Z	T	R	—	[]	CP
Line#	Q		Q	*	P						
Type	O	>	O					C			
Type	O	sl>	O					C			

Table:Seesoft (text visualisation)

Conclusion and impact for the future

- Information visualization: mainstream use
- Information will be learned to guide new designs or apply established techniques

Thanks for your attention

References

- S. K. Card, J. D. Mackinlay. The Structure of the Information Visualization Design Space. *Proceedings of IEEE Symposium on Information Visualization (InfoVis '97)*, Phoenix, Arizona, 92-99 Color Plate 125, 1997.
- Wikipédia: Stuart Card, Jock D. Mackinlay, Xerox PARC
- J. Bertin, *Graphics and Graphic Information-Processing*. Berlin: Walter de Gruyter, 1977/1981.