Informations Visualisierung SoSe 19

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Contents

1 1. Lecture

1.1 Orga

- Website: st.uni-trier.de/lectures/S19/IV/

- Tutorial: TBD (beginning: 22.-26.04.)

- Final exam: Do, 11.07. (elfths of July) 12-14 (H12)

1.2 Visualisation-Basics

- Combine different kinds of information in one graphic (geographical, temporal, historical, numeric, etc.)

- Sharing and visualising abstract data, without physical representation

- Visualisation is not:
    - scientific visualisation (non-abstract data)
    - computer graphics
    - graphic design

- **Example** Treemap
    - representation of a hierarchy of a filesystem
    - no border used for a square (compression)
    - light effect shows curvature, indicating where the squares/areas end
    - $\Rightarrow$ only 4 pixels needed instead of 9
    - Several drawbacks (alternative: tree view)

Abstract Data

- Text, table

- Hierarchy

- Composed data (Multivariate data): Example Napoleon (Slide 1)

- Time series: multivariate data with time as a dimension

Definition: Visualisation   comprehend and extract data, visualisation produced automatically (not manually by humans)

Visualisation process

- graphical user interface

- interaction to create and manipulate the visualisation (**Visual steering**)

2 2. Lecture

2.1 Diagrams

Pie charts

- applicable to part-whole relation

- Several issues
    - hard to compare values
    - hard to compare different pie charts

Other Diagrams

- Timelines

- Sparklines: Reduction to show trend and the change of values over time

2.2 Metaphors and Symbols

Make constructs/concepts more accessible/imaginable

2.3 Symbols

highly simplified representation of objects and acitvities

Isotype   Present quantity/value by number of pictograms

2.4 Infographics

- Eyecatcher to get people interested in the presented data

- Contain few text

- Self-explanatory

- Should tell a **story** ⇒ express an opinion

3 3. Lecture

3.1 Visual Memory

- The brain fills empty gaps

- Distraction by environment (contrast/structure)

- ⇒ visual perception is selective

3.2 Visula Information Processing

3 Phases of processing

1. Simple patterns and colors are recognized

2. Action system: reflexes

3. Visual working meomry/visual query

Human Eye

Usage of the properties of visual perception (Anticipation, pattern recognition)

- Eye Tracking (works by measuring the reflection form the eye's curvature)

3.3 Color Perception

3-Color-Theory

- Each color consists of rgb

Opponent-Color-Theory

- After image effect: color-receptors are getting exhausted, so white cannot be 'produced'

- three chemical processes with two opponent colors each

- Color is perceived by the difference between the opponent colors

$\Rightarrow$ Color and brightness are relative

Design Recommendations

- Emphasize with color

- differences brightness

- coding of categories: max 6 to 12 different colors

- Color scales should vary in color and brightess

- Color perception depends on culture

Preattentive vision

- detect patterns before an eye movement

- Motion is preattentive

- $\Rightarrow$ Use preattentive patterns to encode information (spot an outlier)

Pattern Recognition

- Edge detection

- Simple patterns (detect small distortions)

- Complex patterns

- Object recognition (compare observation with learned patterns to recognise an object)

3.4 Motion recognition

Different elements perform similar motions

- Recognize patterns to identify object

- Recognize change after each frame