

The 7 basic datatypes

• • • According to Schneiderman

• 1,2,3-dimensional

• multi-dimensional

• Temporal

• Tree

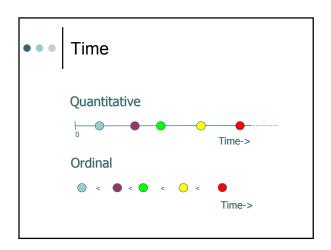
• Network

• Notes

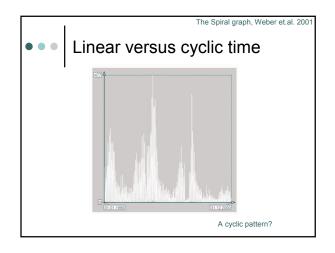
• Temporal of high importance

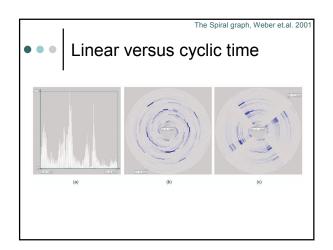
• Spatial is missing as basic type

Two questions?
What is time?
And how does this impact information visualization?



Clinear time versus cyclic time
 Linear time
 Assumes a starting point and used this as reference to define elements before and after
 Cyclic time
 Describes phenomena or natural processes which are periodic, where ordering doesn't make sense

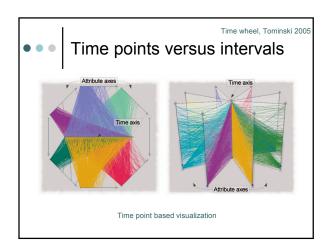


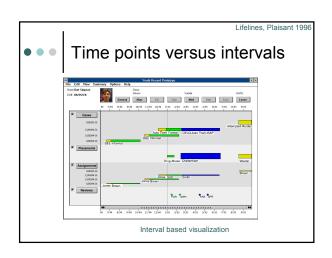


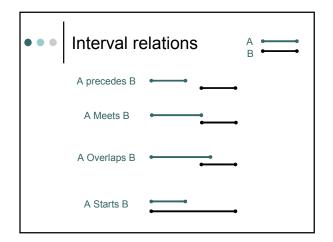
• • • Linear versus cyclic time

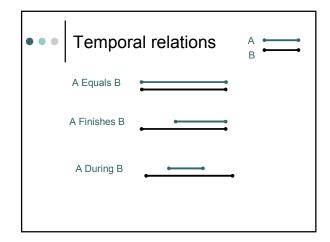
- To see the pattern the right cycle has to be chosen
 - Use analytical methods
 - Animate smoothly through different parameter settings

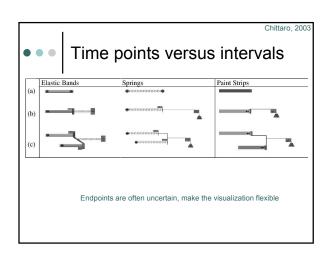
Three characterizations Time points versus intervals Time points Discrete points in time comparable to discrete points in Euclidean space. Intervals Defined on an interval-scaled time domain with a basic duration like days, months, or years.

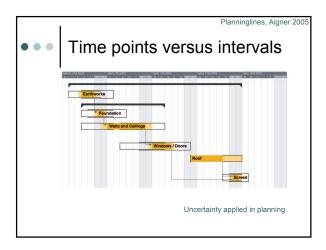






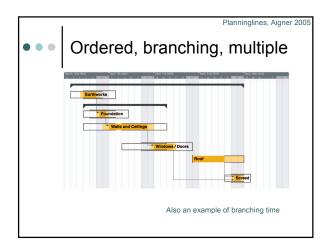


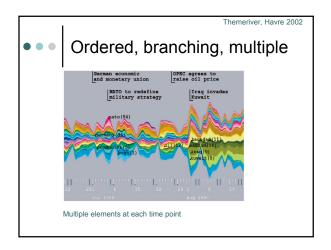


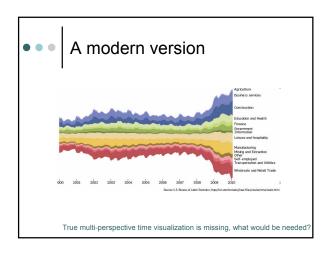


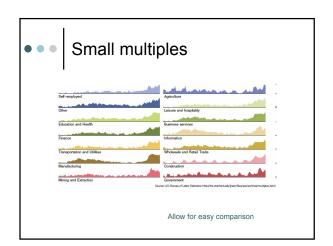
Three characterizations

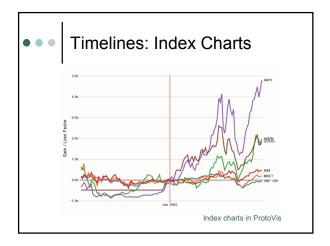
Ordered time, branching time, multiple perspective time
Ordered time
Things that happen one after the other.
Branching time
Multiple strands of time branching out, facilitating description and comparison of alternative scenarios.
Multiple perspective time
More than one point of view at observed facts.

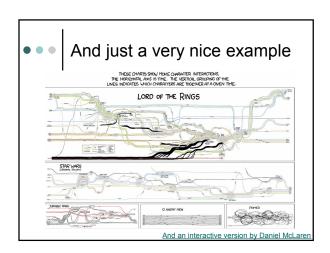


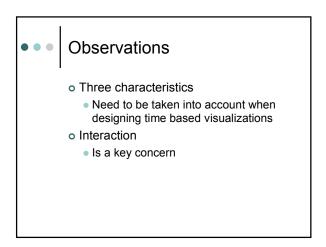












• • Analyzing time-oriented data

- o The Schneiderman Mantra
 - Overview first
 - Zoom and filter
 - Details on demand

Analyzing time-oriented data

Visual Analytics, Keim, 2008

- o Compare to Keim's mantra
 - Analyze first
 - Show the important
 - Zoom and filter
 - Analyze further
 - Details on demand

Two techniques

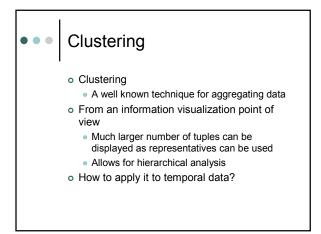
- o Temporal data abstraction
 - Reduce quantitative variables to qualitative variables
- Clustering
 - Group the data and find representatives

Temporal data abstraction

- General definition
 - "to create an abstraction that conveys key ideas while suppressing irrelevant details" (Thomas 2005)
- General tasks
 - Selecting relevant information
 - Filtering out unneeded information
 - Performing calculations
 - Sorting
 - Clustering

Temporal data abstraction

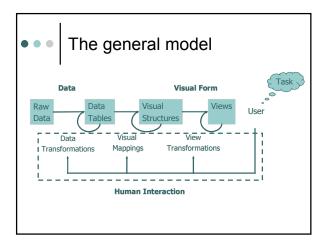
- Basic temporal abstraction
 - State
 - From output values to an ordinal variable
 - Gradient
 - · Sign of the derivative
 - Rate
 - From magnitude of the derivative in an interval to an ordinal variable

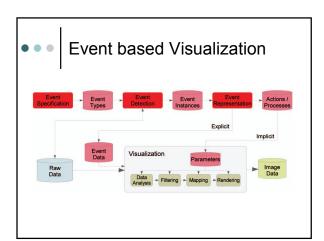




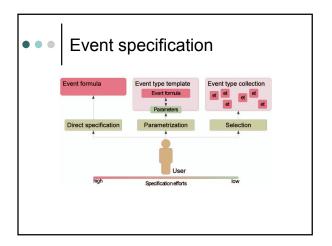
Event based visualization

 Events (one definition)
 occur if user-defined conditions, which are expressed with respect to entities of a dataset, come true





Event specifications
 Tuple events
 Detect interesting data tuples
 Attribute events
 Detect interesting attributes
 Sequence events
 Specific temporal patterns



• • • Event detection

- o Identify relevant portions of the data
 - Apply the specified patterns as predicates to the data

• • • Event representation

- Tasks
 - Communicate the fact that something interesting has been found.
 - Emphasize interesting data among the rest of the data.
 - Convey what makes the data interesting.

Event representation

- Two approaches
 - Explicit event representation
 - · Visualize the events only
 - Implicit event representation
 - Automatically set visualization parameters to optimally display the events within the data

