

# Discovering the Covered: Ghost-Views in Information Visualization

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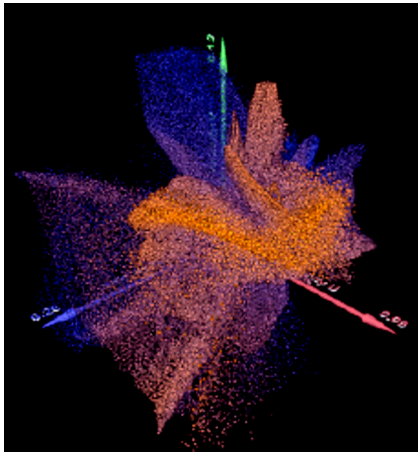


# A g e n d a

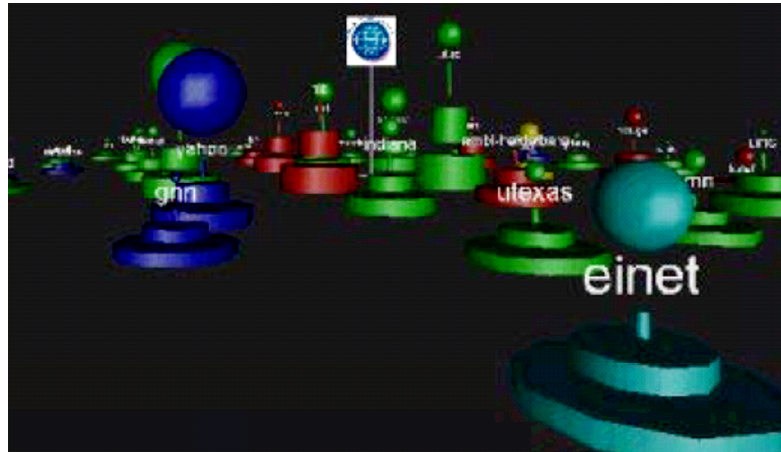
- Motivation
- Background
- General Approach
- Application Examples
- Conclusion & Outlook



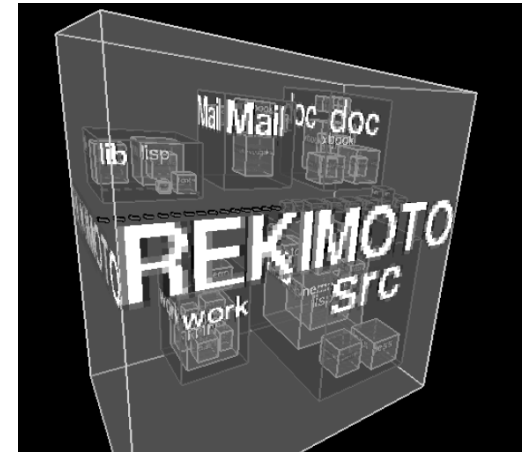
# Motivation



[Piringer et.al. 2004]

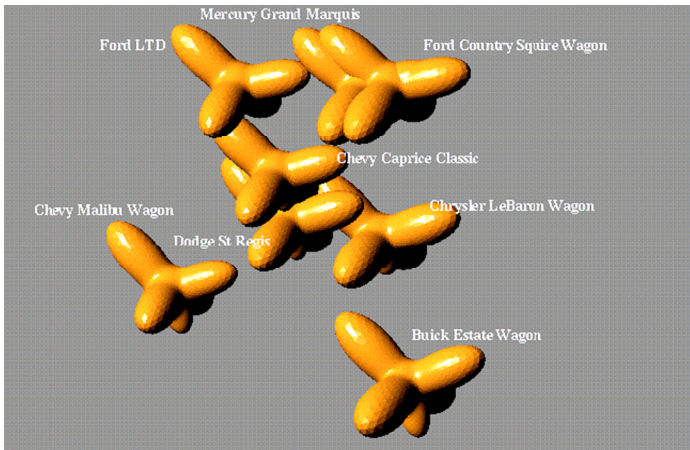


[Benford et.al. 1999]

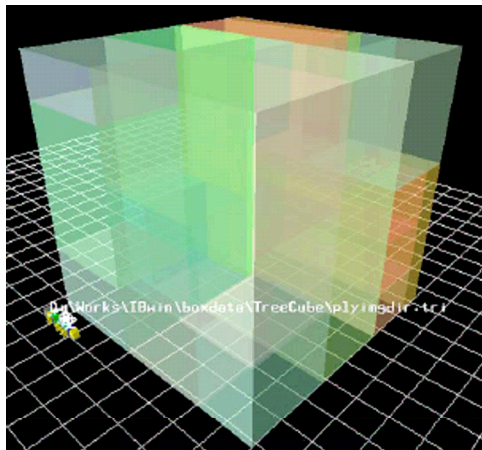


[Rekimoto et.al. 1993]

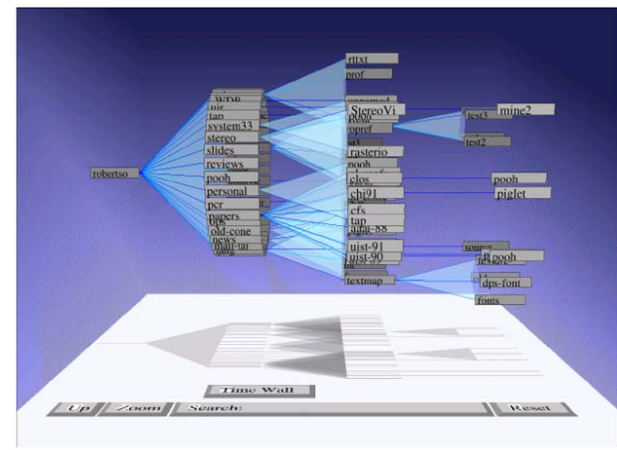
[Theisel et.al. 1998]



[Tanaka et.al. 2003]



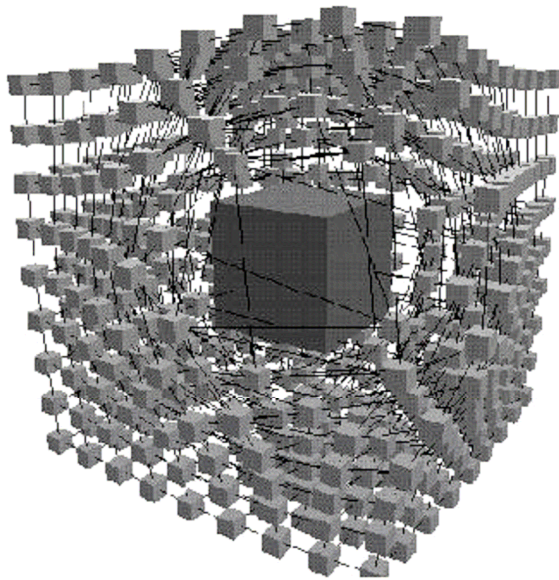
[Robertson et.al. 1991]



# Motivation

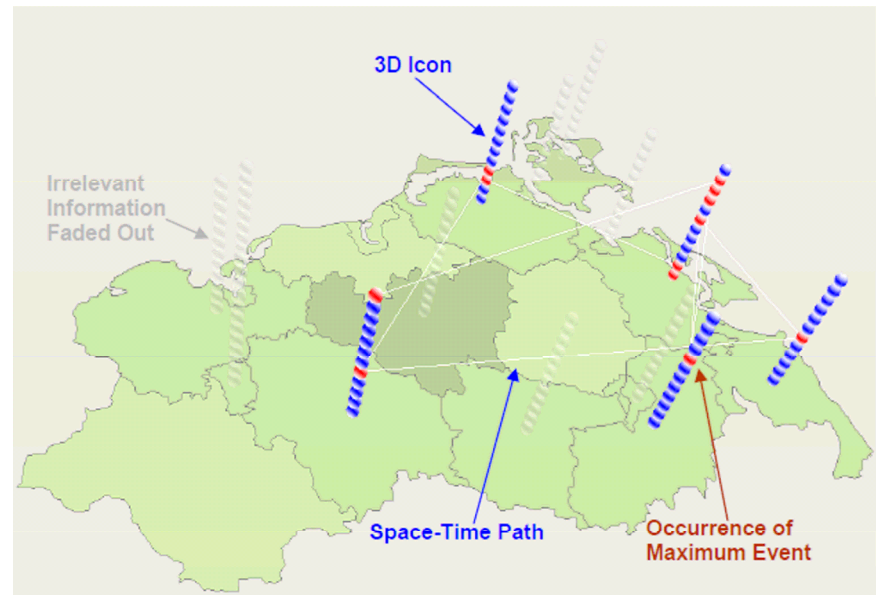
- Occlusion is a major problem in 3d-visualization [Card et.al. 1999]
- Two main strategies:

## Distortion



[Sheelagh et.al. 1996]

## Information Hiding

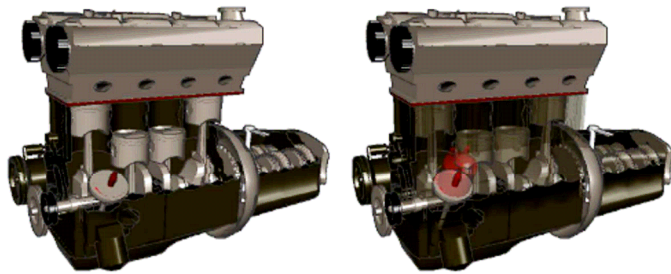


[Tominski et.al. 2005]

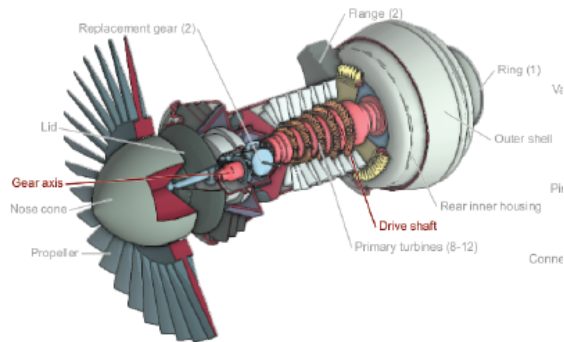


# Background

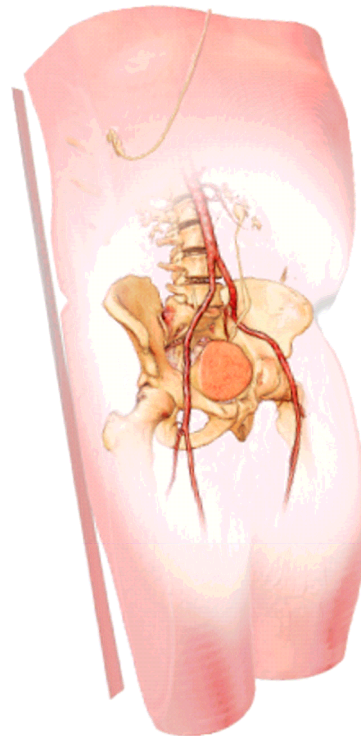
- Technical and medical illustrations



[Diepstraten 2005]



[Li et al. 2007]



[Rautek et al. 2007]



[Viola et al. 2005]

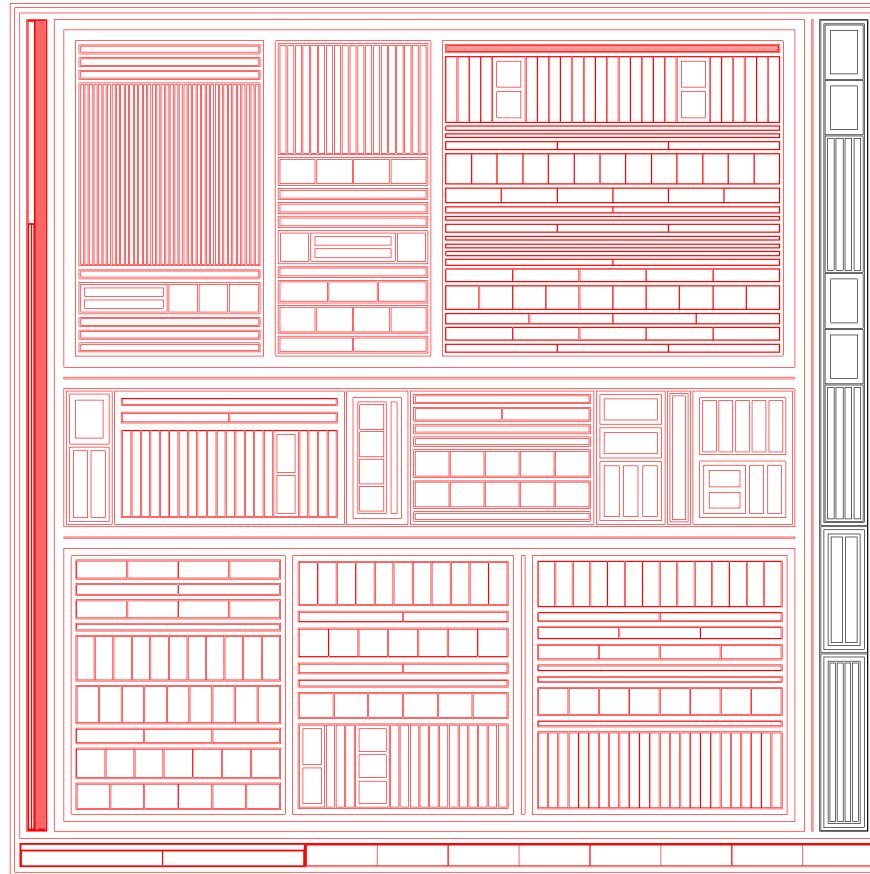
# General Approach



Two-pass rendering:

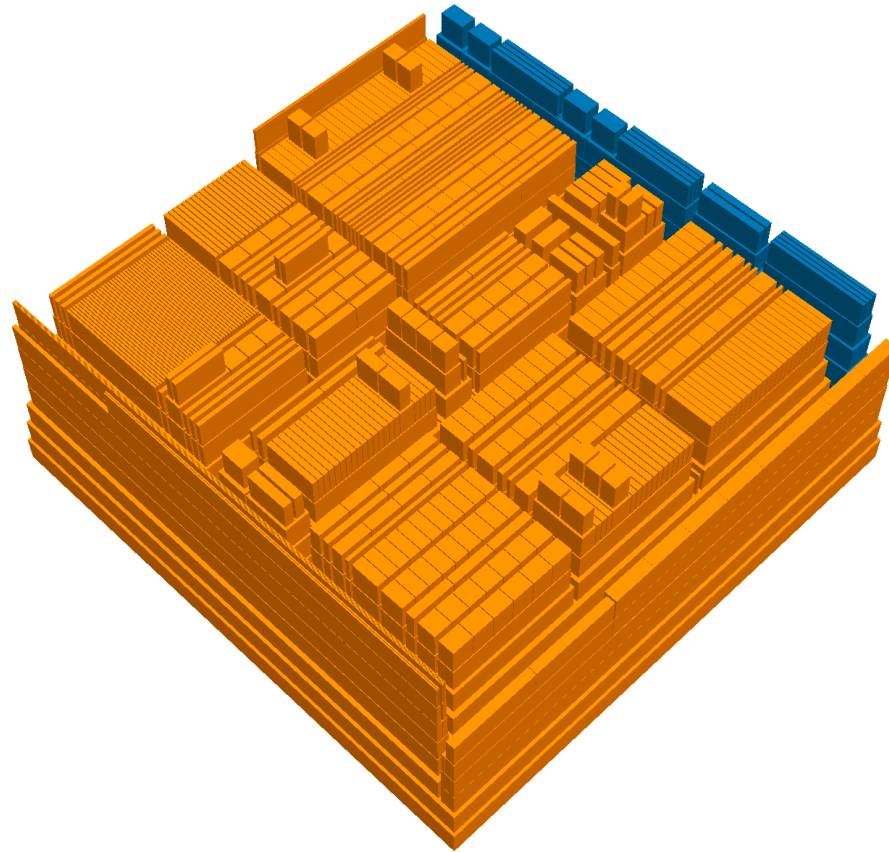
- Generate an importance map by rendering the objects of interest into a 0/1 texture.
- Use this importance map in the final rendering step to determine whether objects are occluders or not. In case of occlusion, the objects transparency is adapted locally.

# General Approach



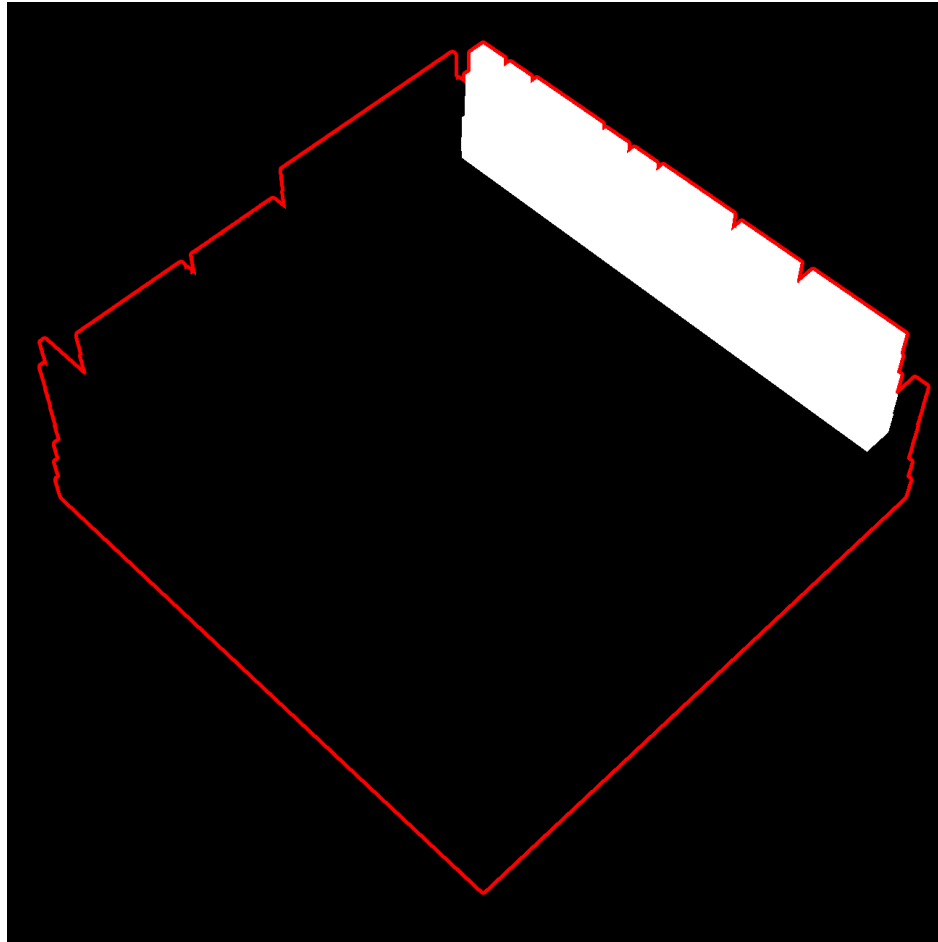
[phylogenetic dataset  $\approx$  580 nodes]  
Treemap [Shneiderman 1992]

# General Approach



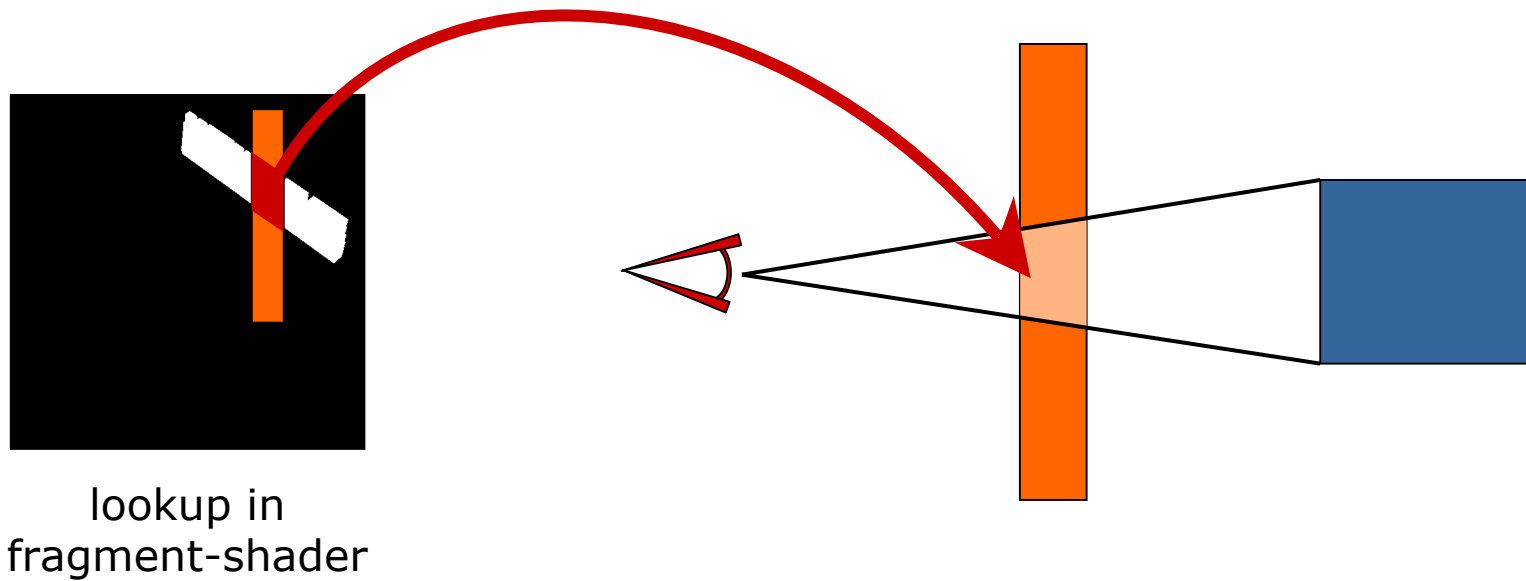
Steptree [Bladh et. al. 2004]

# General Approach

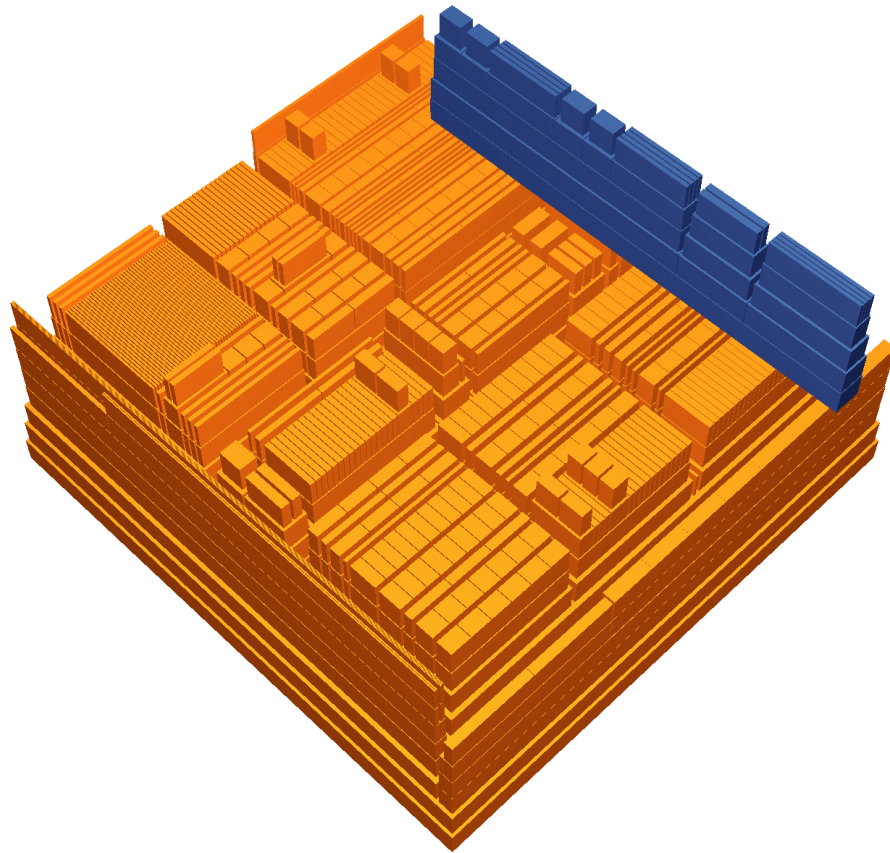




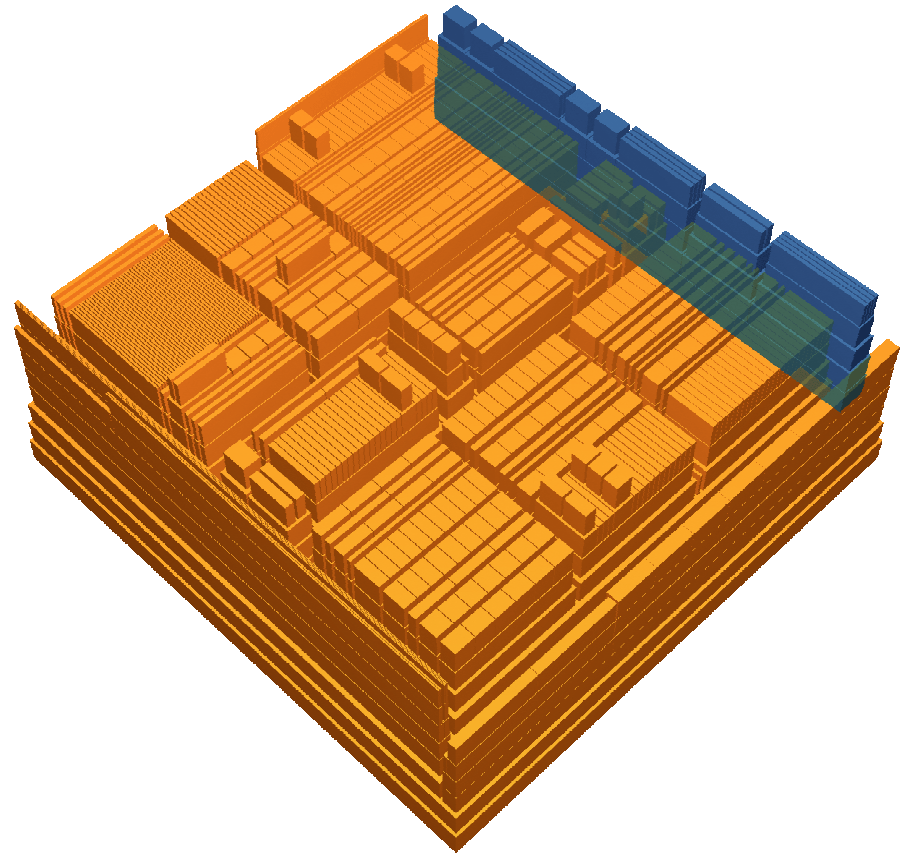
# General Approach



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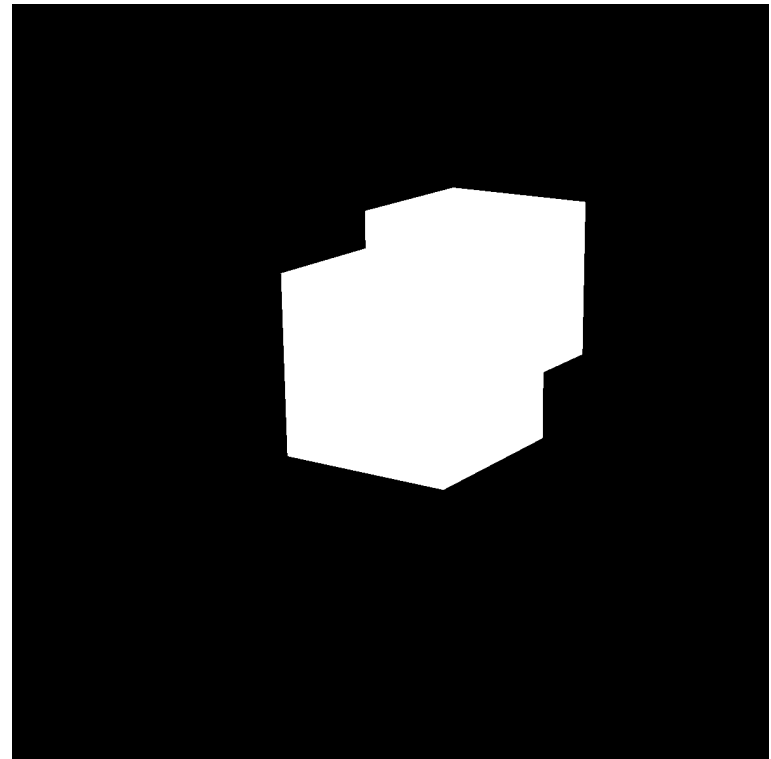
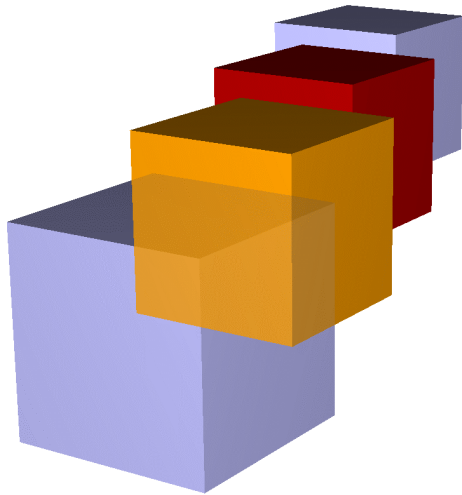


Cut-away

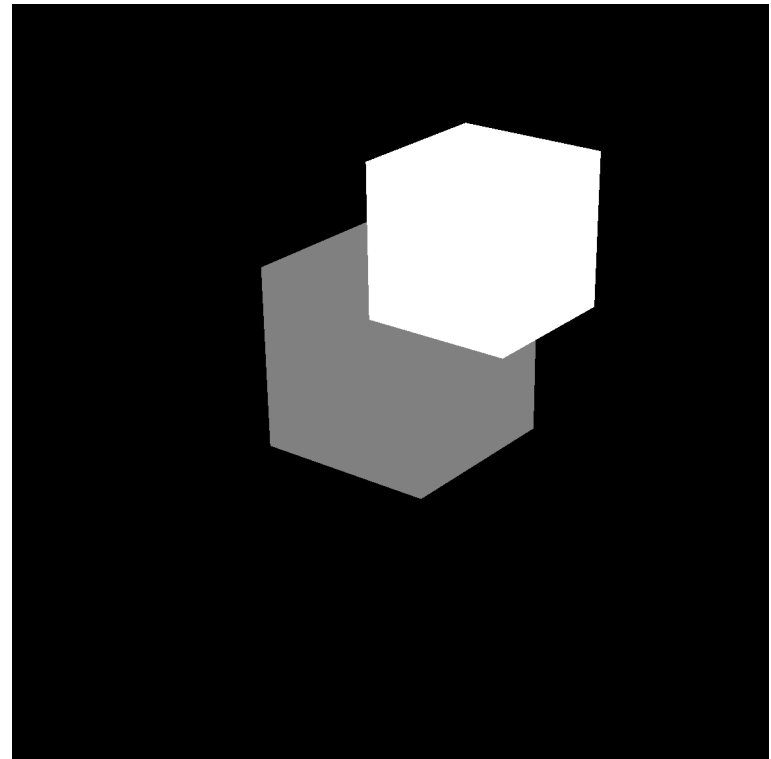
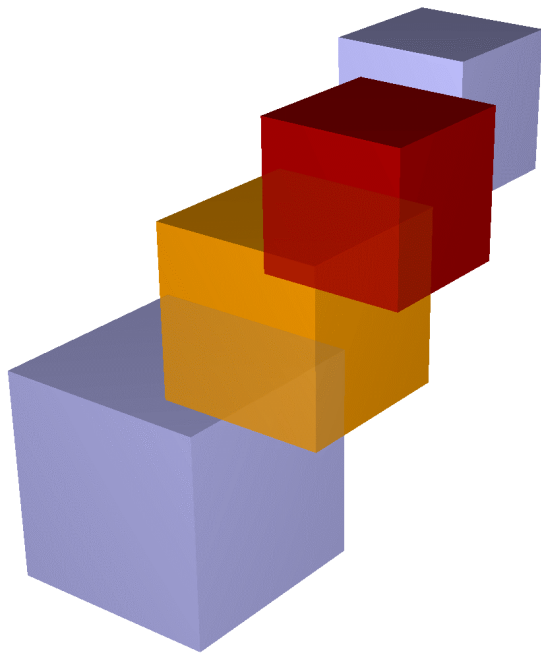


Ghost

# General Approach



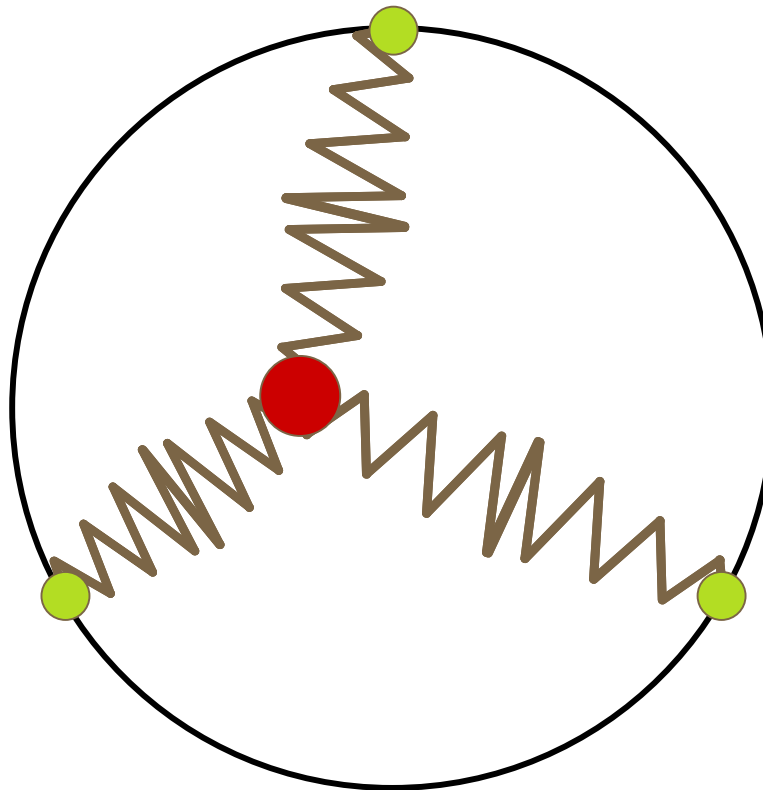
# General Approach



non-binary importance map allows gradual differences

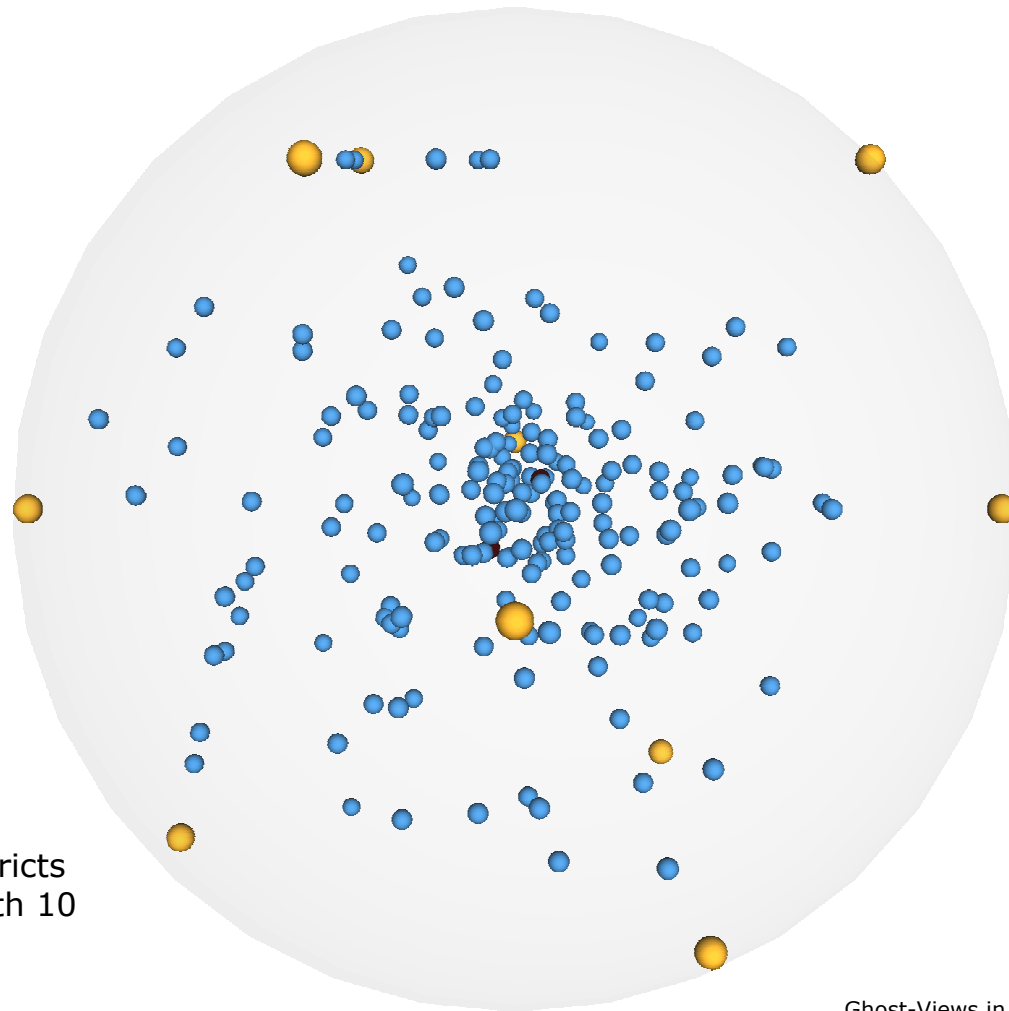
# Application Examples

- Spring-based visualization (principle 2D):



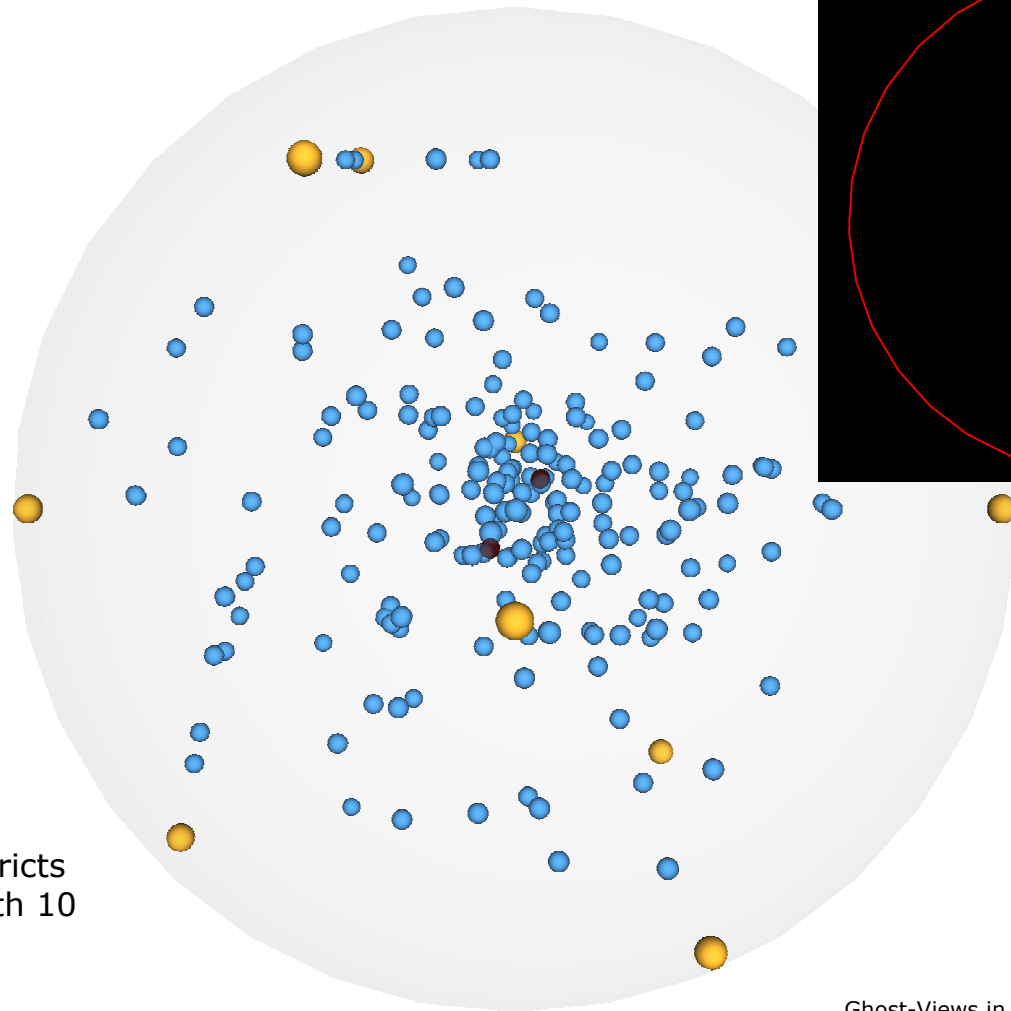


# Application Examples



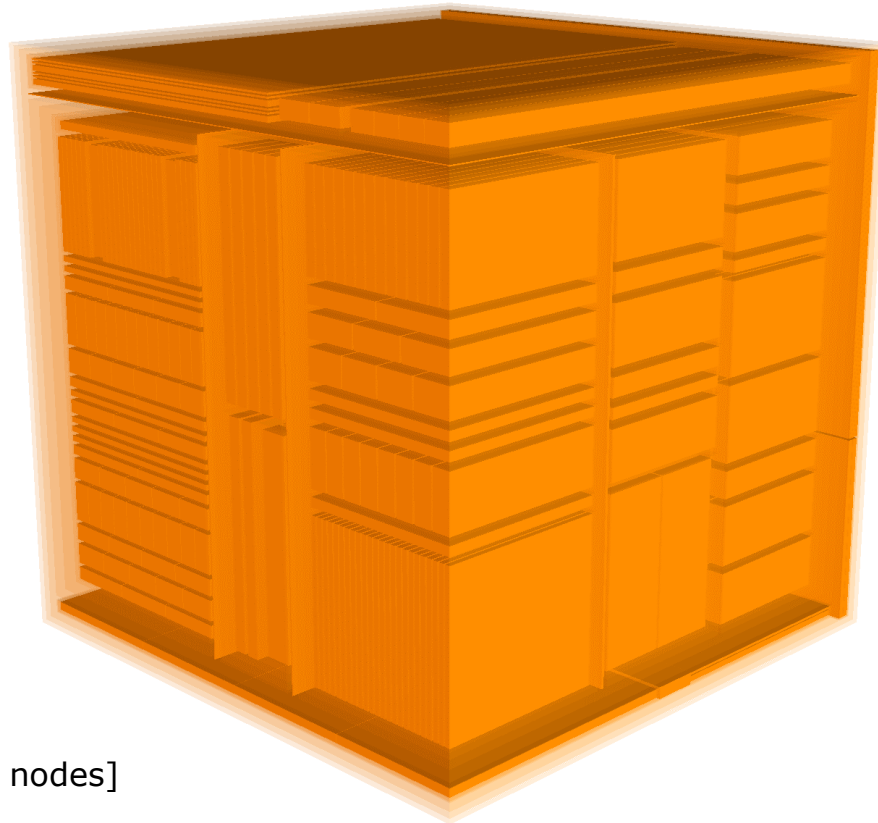
[health data:  $\approx$  230 districts  
of northern Germany with 10  
different attributes]

# Application Examples



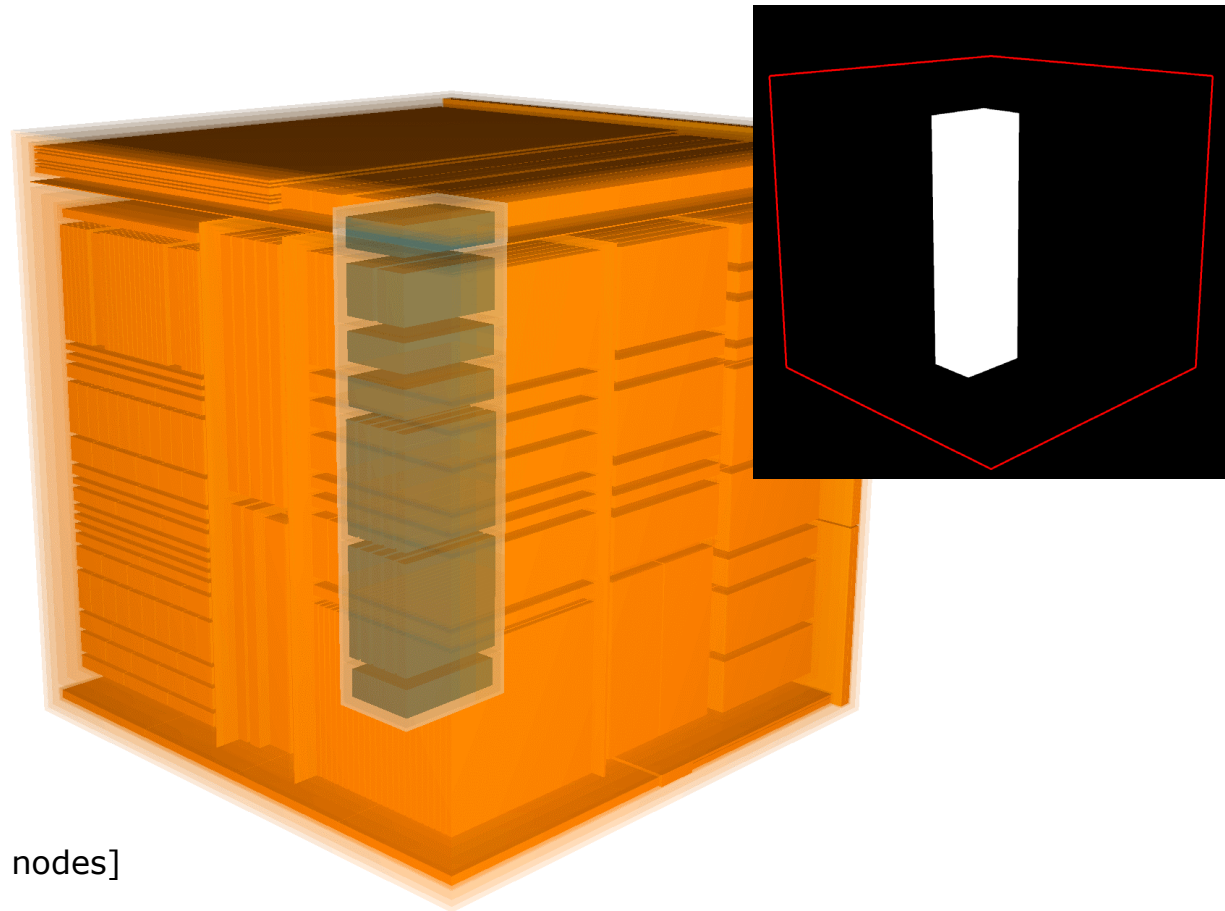
[health data:  $\approx$  230 districts of northern Germany with 10 different attributes]

# Application Examples



[phylogenetic dataset  $\approx$  580 nodes]

# Application Examples



[phylogenetic dataset  $\approx$  580 nodes]

# Conclusion & Outlook

- Ghost-Views ...
  - ... ensure the visibility of important objects without distortion or global information hiding
  - ... adjust transparency locally
  - ... hide the near context of important objects
  - ... are easy to implement (for InfoVis-purposes)
  - ... are easy to apply to existing 3d-techniques
- Outlook
  - combination with distortion-techniques
  - multiple importance-maps
  - other visual clues than transparency (silhouettes...)





# Video

3D spring-based visualization

Ghost-view: *on* / **off**



# R e m a r k



For high-resolution video and images visit:

<http://www.informatik.uni-rostock.de/~malub/>

