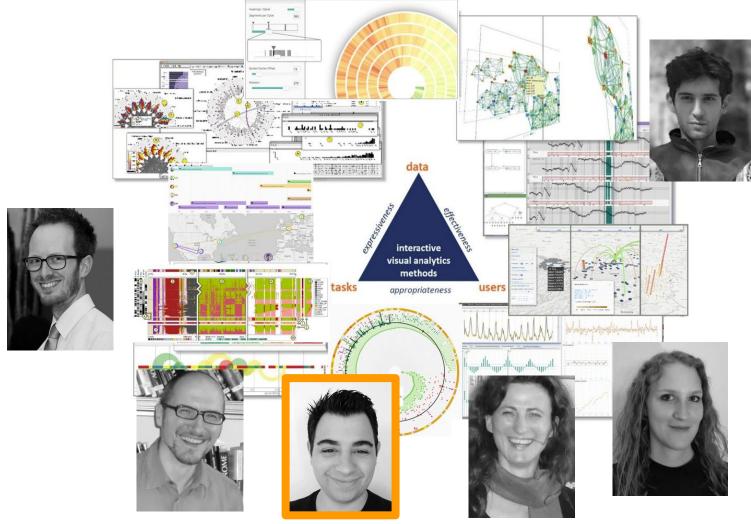
Dynamic Perspectives: Visualizing Time and Networks for Analytical Insights

Velitchko Filipov









ArtVis: Dynamic Network Perspectives on Digital Art History

Transdisciplinary collaboration with University of Vienna

Visual Analytics methods to understand interactions between components of the art system

Identifying patterns and temporal developments

Artists' social networks and exhibiting behaviors







https://www.cvast.tuwien.ac.at/projects/artvis

SANE: VA for Event-based Diffusion on Networks

Collaboration with University of Cologne & Newcastle University

Visual Analytics for studying information diffusion processes over networks

Tackling the dynamic and stochastic nature of diffusion processes in real-world scenarios















https://www.cvast.tuwien.ac.at/projects/sane

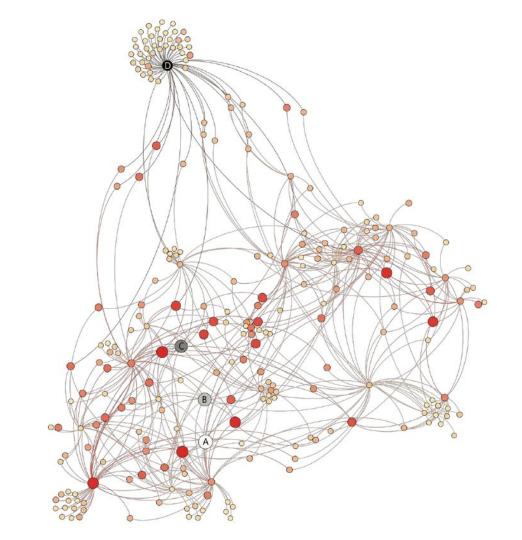
Visual Analytics

"...the science of analytical reasoning facilitated by interactive visual interfaces."

Illuminating the path J. J. Thomas and K. A. Cook [2005]

Cognitive & Perceptual Analysis Interaction Visualization

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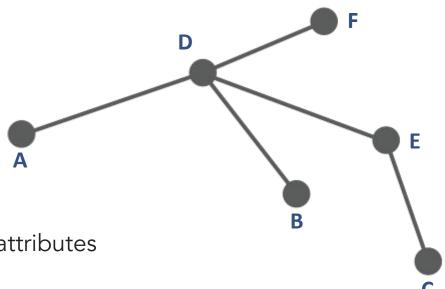
Networks (*Graphs*)

$$G = (V,E)$$

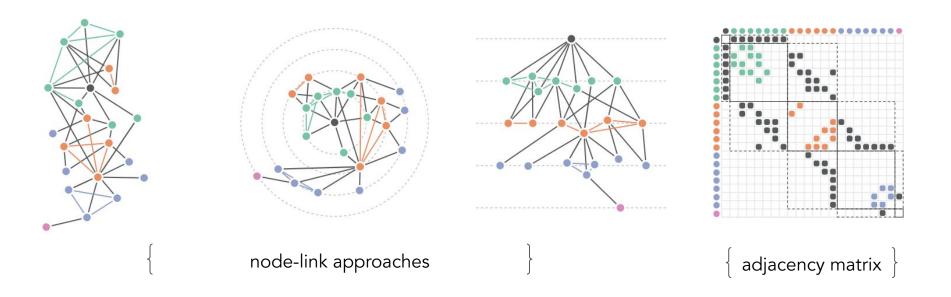
Very abstract and widely applicable

Gets complex with dynamics, multiple attributes

... and scale



Visualizing Networks



Dynamic Networks

Time-Varying Networks

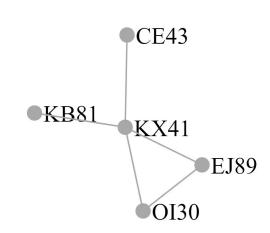
nodes (entities) and edges (connections) change over discrete or continuous time intervals

Temporal Analysis

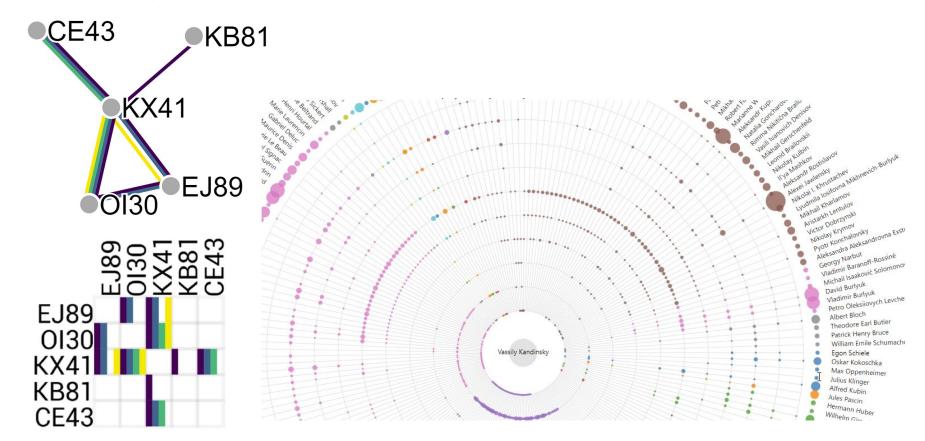
Evolution, Change, Patterns/Trends, Anomalies

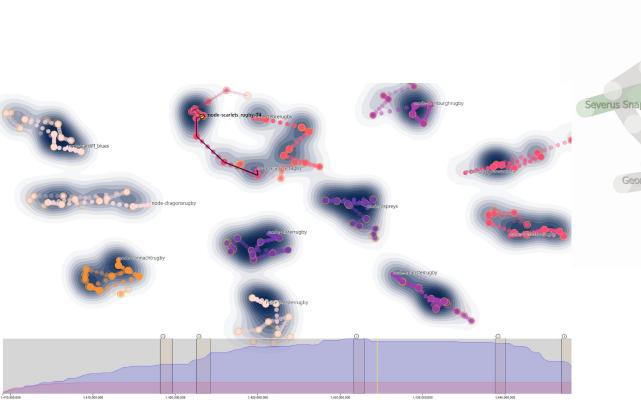
Visualization

Animations, Dynamic Layouts, Interactions

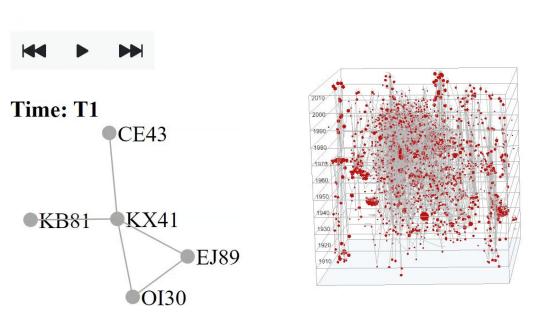














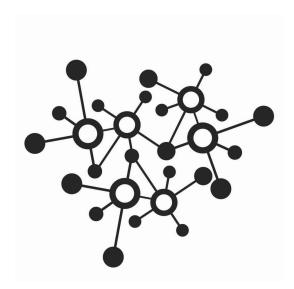
Connection to Materials Sciences

Networks of atoms, molecules, and defects within materials

Similar (same) (sub-)structure detection

Diffusion of atoms within a material

Materials design and simulation



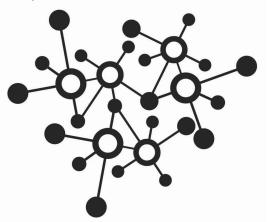
Connection to Materials Sciences

Analyze and visualize the *structural evolution*

Formation and dissolution of defects in materials

Visualize dynamic processes (temperature, pressure, composition)

Structural changes under stress over time

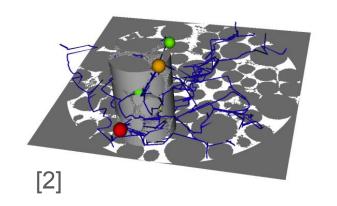


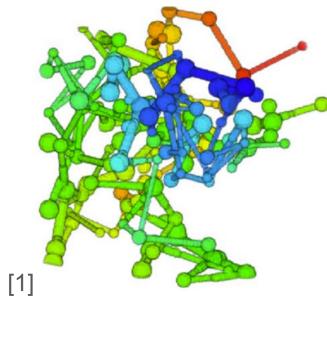
(Dynamic?) Networks in Materials Sciences

Pore Networks & Structures

Simulation & Modeling

Decision-making





^[1] S. Grau et al. "Exploration of porous structures with illustrative visualizations", Computers & Graphics (2010)

^[2] Ushizima et al. "Augmented Topological Descriptors of Pore Networks", IEEE TVCG (2012)

Dynamic Perspectives: Visualizing Time and Networks for Analytical Insights

Thank you

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