Geography and Other Indispensable Points of View
A Synoptic Approach to Modelling and Visualizing Arts and Humanities Topics

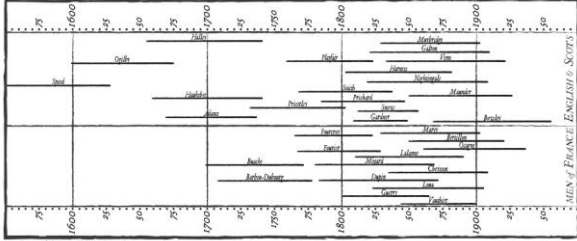Florian Windhager, Saminu Salisu, Nicole High-Steskal & Eva Mayr

Department for Arts and Cultural Studies, Danube University Krems

All models are wrong, but some are useful.

A Specimen of Chart-maker Biography.

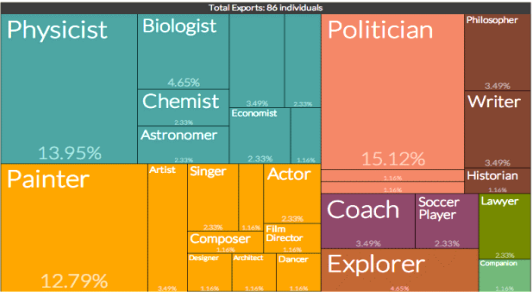historically newer, non-geographic
spatialization techniques

2 chronography

* Priestley, 1765
Andrews, 2017

time & moving targets? [2]
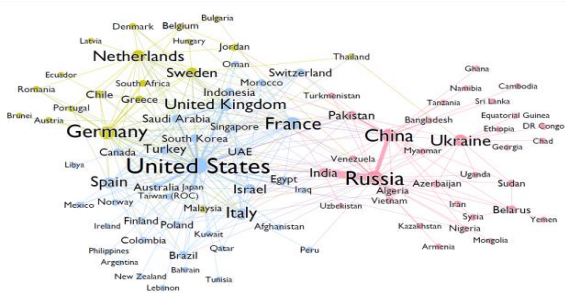
cultural categories? [3]

human relations? [4]

Total Exports: 86 individuals

3 categography

* Shneiderman, 1999
Hidalgo et al. 2013+

?

?

?

4 relatiography

* Moreno, 1933
Ng & Soo, 2016

1 geography ✔

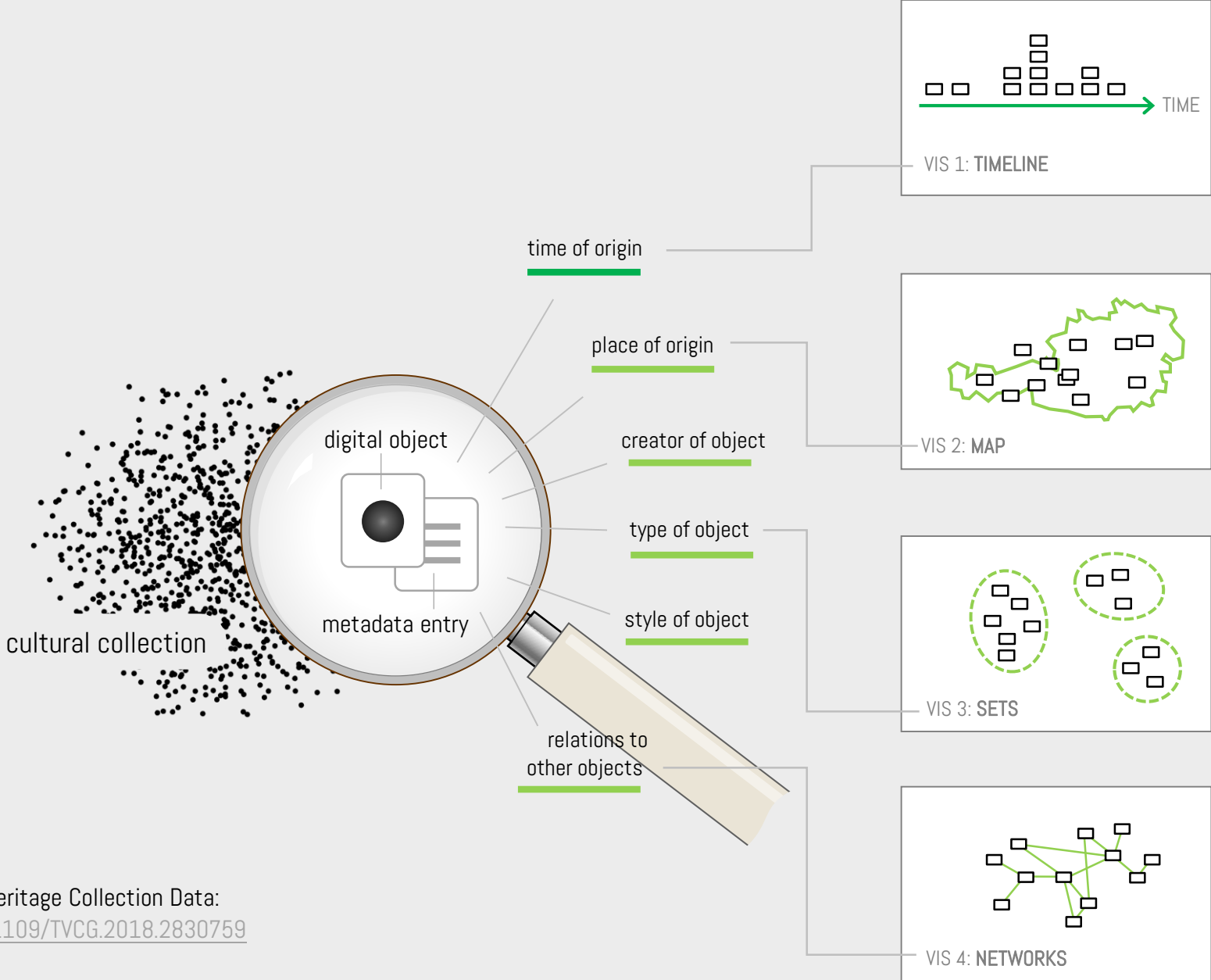* 500 BCE

and its known
imitations

maps?

timelines?

sets?

graphs?

A **bigger picture** of your complex DH subject matter -

do you also sometimes struggle to assemble coherent

representations for your multi-faceted research topic?

The Case of Cultural Collections

TIME

VIS 1: TIMELINE

VIS 2: MAP

VIS 3: SETS

VIS 4: NETWORKS

Digitization endeavors trans-
late **cultural collections**
into multi-dimensional
datasets, which become
increasingly **visualized**
by multiple methods of
distant reading and viewing.*

cultural collection

digital object

metadata entry

time of origin

place of origin

creator of object

type of object

style of object

relations to
other objects

Looking at the multi-faceted interfaces of **visual analysis**,
we feel reminded of the ancient fable with the
**elephant and the blind men *** – and wonder:

Is there a synoptic design strategy to
draw multiple visualization perspectives
together into a **bigger picture** of a
complex dataset, to better integrate
some of the fragmented standard
perspectives of **visual cultural analytics**?

In other words: shouldn't we also conceive
visual synthesis technologies, when
working with complex DH data to support
information integration and synoptic reasoning?

It's a fan!   It's a wall!   It's a rope!
It's a spear!
It's a snake!   It's a tree trunk!
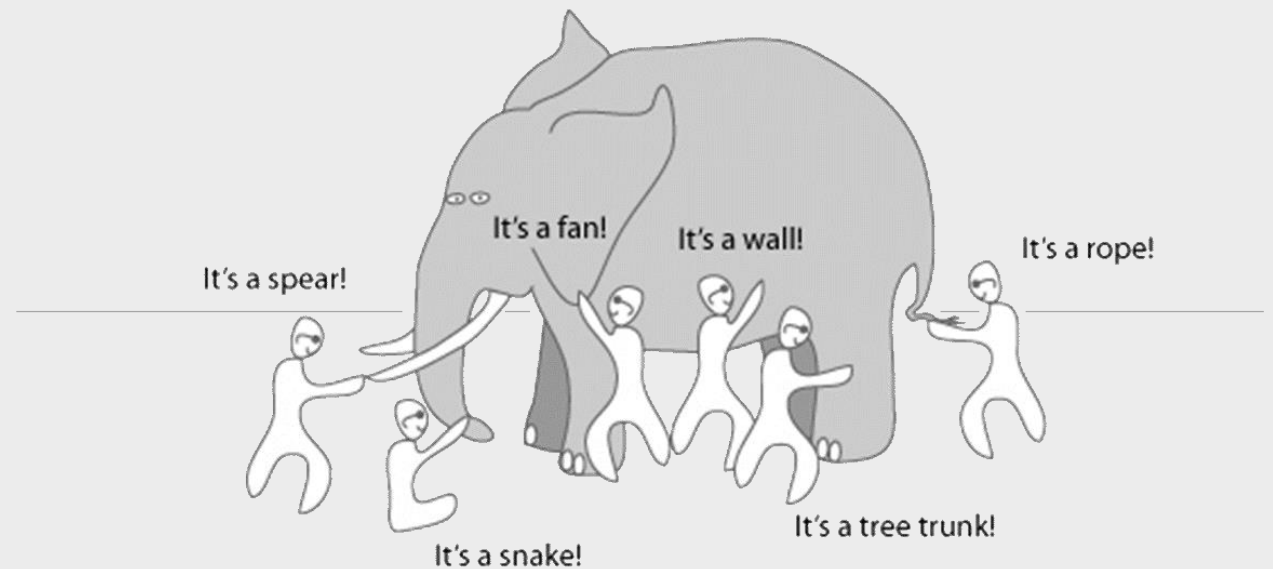
As an early reflection on complex subject matters, the
fable emphasizes that complexity allows only selective
and partial observations, which can even contradict each
other, but the fable finds solace and a solution in either

    a) communication between the blind men, or in the
    b) visual synthesis of a seeing man, who can resolve
    the conflict between the conflicting local perspectives
   by re-assembling them as adjacent pieces in 3 dimensions.
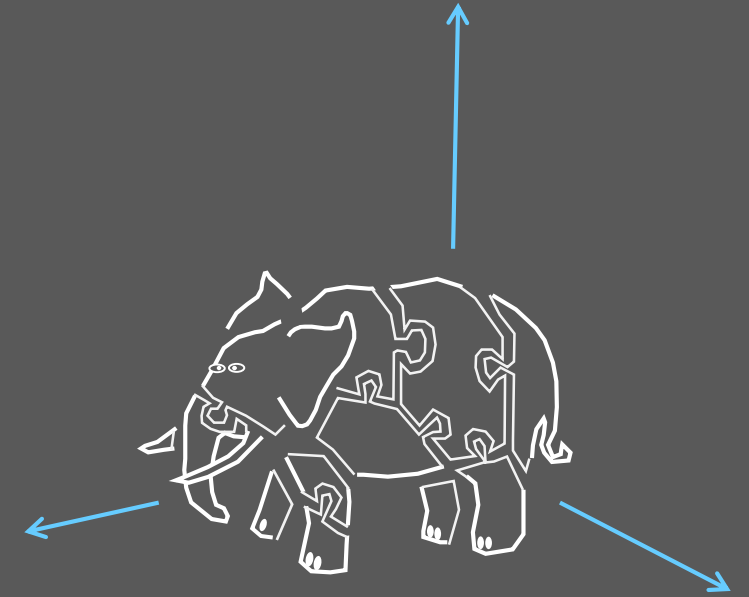
Unfortunately, this cannot be done with information visualizations,
which are non-naturalistic representations of mostly non-spatial data.
So how can visualizations be interconnected to bigger pictures?

Six blind elephants were discussing what men were like. After arguing they decided to find one and determine what it was like by direct experience. The first blind elephant felt the man and declared, 'Men are flat.' After the other blind elephants felt the man, they agreed.

We consider **"coherence techniques"** to support the integration of information from multiple visualizations and strive for their systematic collection* - and their orchestrated use, e.g. by the "PolyCube" framework.

utilizing space
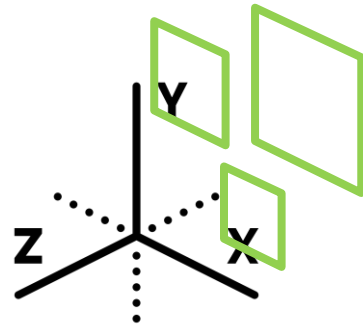
utilizing time
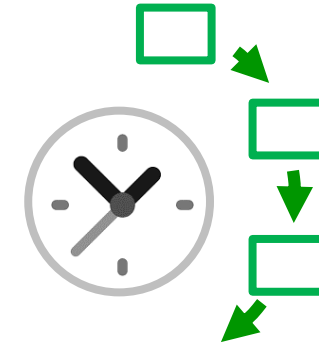
- Coordinated Multiple Views (Roberts, 2007, link) ✓
- Synoptic Encoding (Mayr et al., 2018, link) ✓
- Rich Pictures (Monk & Howard, 1998, link) ✓
- Data Comics (Bach et al., 2017, link) ✓
- Polycubism (Windhager et al., 2020, link)

- Narrative Visualization (Segel & Heer, 2010, link) ✓
- Sequential Presentation (standard technique)
- Film / Animation (standard technique) ✓
- Interaction (standard technique) ✓
- Animated transitions (Heer & Robertson, 2007, link) ✓

When dealing with complex phenomena, arguably "**One view is not enough!**" (Dörk et al., 2018, link)

The use of **multiple views** is a well-established and relevant design principle "in order to maximise insight, balance the strengths and weaknesses of individual views, and avoid misinterpretation" (Kerracher, 2014, link)

interface design strategy of **"multiperspectivity"**

- "generosity" (Whitelaw, link)
- "parallax" (Drucker, link)
- "triangulation" (Brandes et al., link)
- "plurality" (Dörk et al., link)

every visualization method has its **strengths**,
every visualization method has its **limitations**

Thus advanced interface design is well advised to **combine multiple views** and representation techniques – and to utilize further coherence techniques, as exemplified by the prototypical **PolyCube framework** (link).
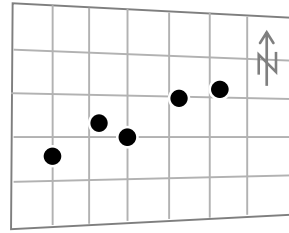
Torsten Hägerstrand

1916 – 2004
Swedish Geographer
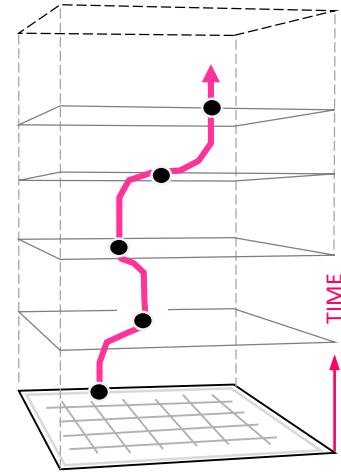Work on migration, cultural diffusion, and time-geography

Image: Claes Hall / Hagblom Foto

Chronography + Geography = "Chronogeography / Time Geography"

Building on the space-time cube, we introduce an integrated multi-perspective approach to the visualization of event-based data. The PolyCube visualization framework is a web-based visualization system, which draws together multiple perspectives to convey a bigger picture for complex, time-oriented data, and to support synoptic exploration of the data, as well as navigation between specific perspectives for expert and casual users alike. The system provides:

- multiple spatialized (i.e. geographic and non-geographic) overview perspectives (including a map-based, a set-based, and a network-based view),

- multiple perspectives on the temporal data dimension (including space-time cube representation, juxtaposition, animation and superimposition views)

- close-up access to single events or objects on demand, together with

- animated canvas transitions, supporting the switching between various views.

By the use of multiple coordinated cubes (= „PolyCube"), it generates a synoptic representation for event-based data and displays development patterns for geo-temporal, categorial-temporal, and relational-temporal information which would remain scattered across multiple views otherwise. Thus it is one design strategy, to put the whole elephant onto the screen.

geo-temporal VIS

categorial-temporal VIS

relational-temporal VIS
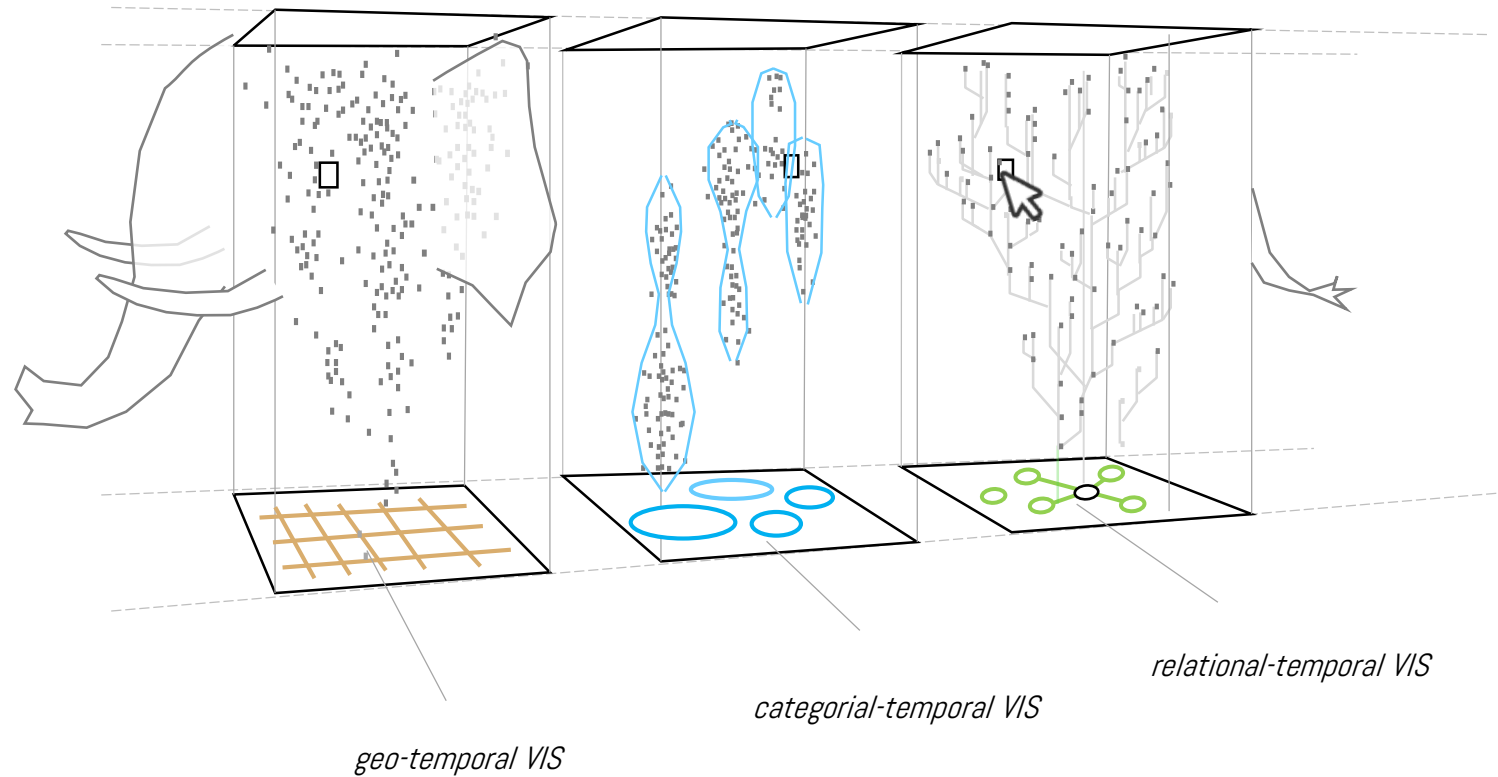
demo & case studies

System architecture and implementation by a team of Visual Analytics specialists
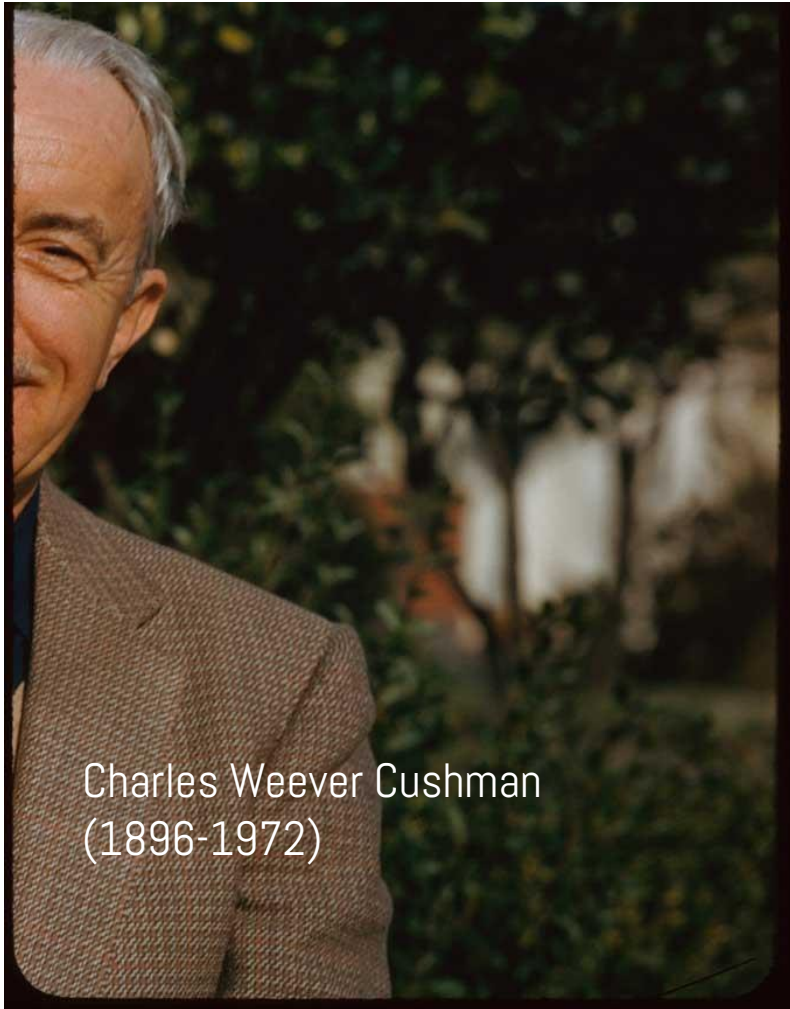

Saminu Salisu

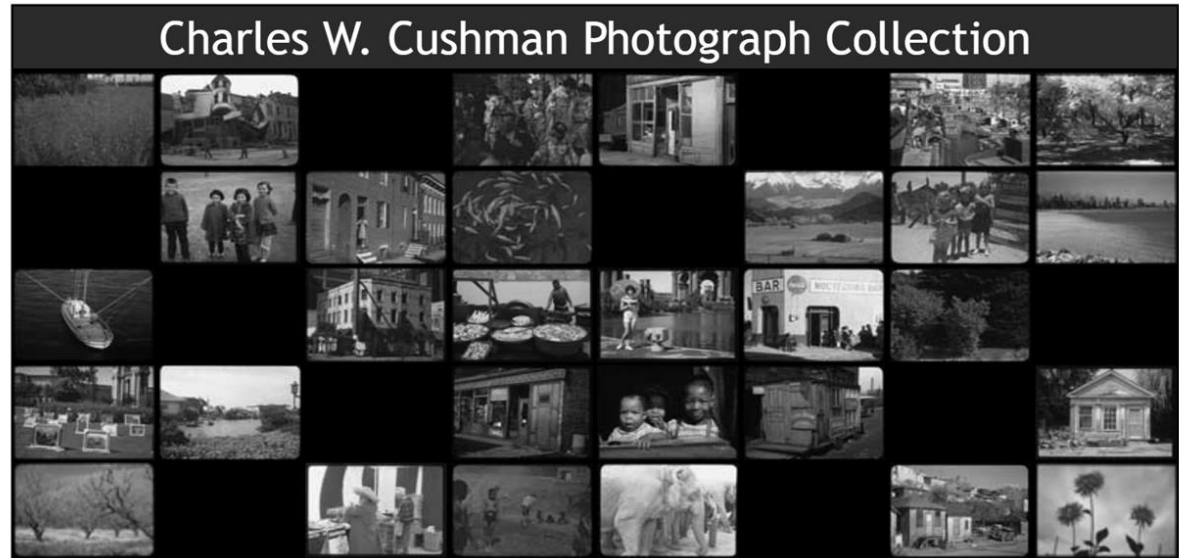Velitchko Filipov

Roger A. Leite

Silvia Miksch

CVAST, Vienna University of Technology (link)

Case Study No. 1: A Photography Collection


Charles Weever Cushman
(1896-1972)

Image: http://webapp1.dlib.indiana.edu/collections/cushman/full/P09034.jpg

Charles W. Cushman Photograph Collection

home | overview | browse | search | highlights | project info | site guide

Charles Weever Cushman, amateur photographer and Indiana University alumnus, bequeathed approximately 14,500 Kodachrome color slides to his alma mater. The photographs in this collection bridge a thirty-two year span from 1938 to 1969, during which time he extensively documented the United States as well as other countries.

Indiana University's Digital Library Program and the Indiana University Archives invite you to explore what Cushman saw. Here you can view his photographs as well as read contextual information about Cushman's life and work.

The Photography Collection: https://webapp1.dlib.indiana.edu/cushman/index.jsp
Preprocessing by Miriam Posner: https://miriamposner.com/blog/getting-started-with-palladio/
Case Study: Visualizing Biographical Trajectories by Historical Artifacts. DOI: 10.17605/OSF.IO/E62X4

categorical-temporal perspective
showing categories of photographs over time
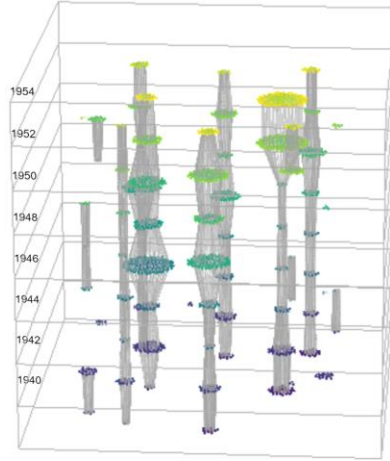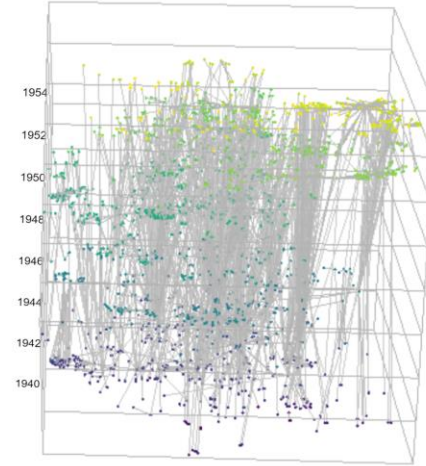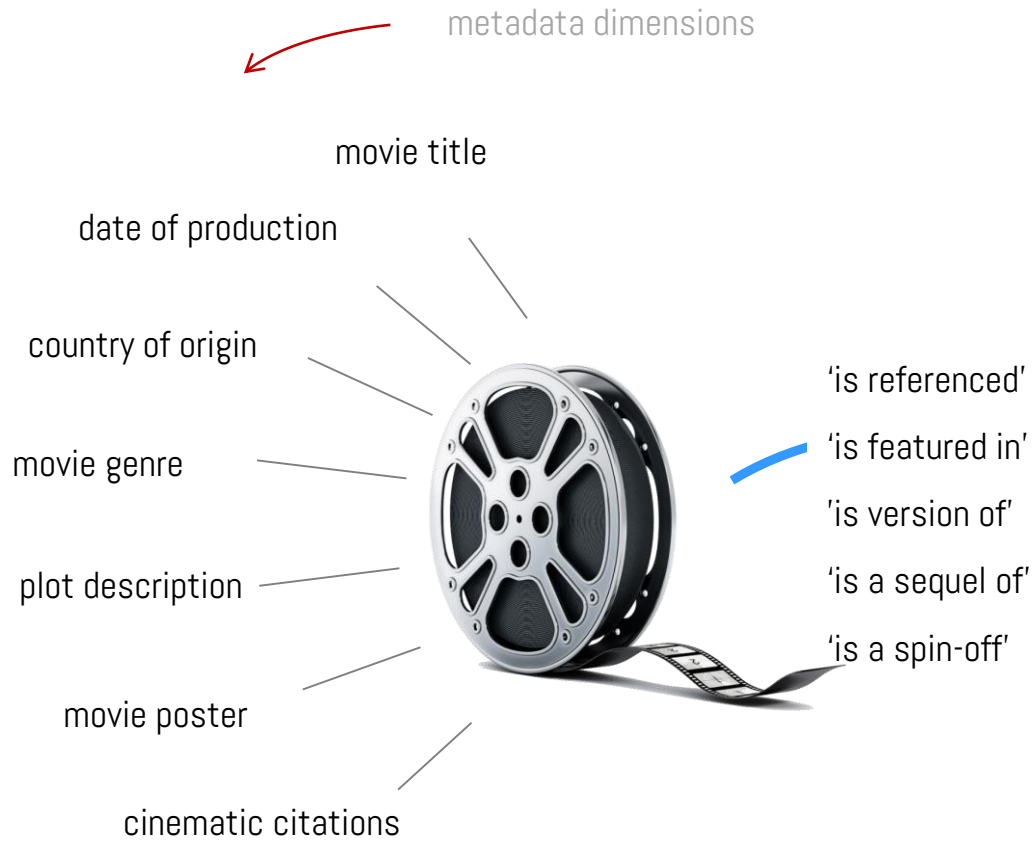
time axis
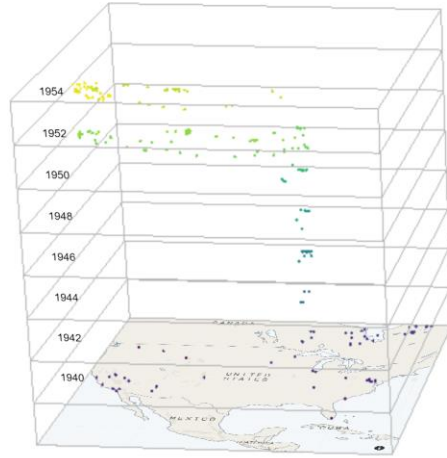
geo-temporal perspective
showing geo-temporal distribution of photographs

relational-temporal perspective
showing calculated similarity of photographs

Interactive Demo: https://danubevislab.github.io/polycube/cga2020/

Case Study No.2: Highly Cited IMDB Movies *

metadata dimensions

movie title

date of production

country of origin

movie genre

plot description

movie poster

cinematic citations

'is referenced'

'is featured in'

'is version of'

'is a sequel of'

'is a spin-off'

* movie corpus extracted from the IMDB by Spitz & Horvat (2014)
for about 55,000 movies, reduced to the most influential 2,000 movies

Measuring Long-Term Impact Based on Network Centrality: Unraveling Cinematic Citations

Andreas Spitz[1], Emőke-Ágnes Horvát[1,2]*

1 Interdisciplinary Center for Scientific Computing (IWR), University of Heidelberg, Heidelberg, Germany, 2 Northwestern Institute on Complex Systems (NICO), Northwestern University, Evanston, Illinois, United States of America

Abstract

Traditional measures of success for film, such as box-office revenue and critical acclaim, lack the ability to quantify long-lasting impact and depend on factors that are largely external to the craft itself. With the growing number of films that are being created and large-scale data becoming available through crowd-sourced online platforms, an endogenous measure of success that is not reliant on manual appraisal is of increasing importance. In this article we propose such a ranking method based on a combination of centrality indices. We apply the method to a network that contains several types of citations between more than 40,000 international feature films. From this network we derive a list of milestone films, which can be considered to constitute the foundations of cinema. In a comparison to various existing lists of 'greatest' films, such as personal favourite lists, voting lists, lists of individual experts, and lists deduced from expert polls, the selection of milestone films is more diverse in terms of genres, actors, and main creators. Our results shed light on the potential of a systematic quantitative investigation based on cinematic influences in identifying the most inspiring creations in world cinema. In a broader perspective, we introduce a novel research question to large-scale citation analysis, one of the most intriguing topics that have been at the forefront of scientific enquiries for the past fifty years and have led to the development of various network analytic methods. In doing so, we transfer widely studied approaches from citation analysis to the the newly emerging field of quantification efforts in the arts. The specific contribution of this paper consists in modelling the multidimensional cinematic references as a growing multiplex network and in developing a methodology for the identification of central films in this network.

...y cultural, creative, and industrial role in ... addition to providing the foundation of an ...y [1], it is also widely regarded as the seventh art ...n the increasing accessibility of comprehensive data ... films that include detailed information about their ...ception, we are witnessing a rising interest in the quantification ...of various aspects of cinema even beyond film studies and economics. For instance, several recent studies set out to predict the box office takings of films based on 'word of mouth' opinion transmission among the audience [3], critics' endorsements [4,5], forum discussions and online buzz [6], as well as user activity on Wikipedia [7]. Other lines of research concentrated on predicting Academy Award winners from the set of films that were nominated in a given year [8] or analysed the novelty in film plots based on crowdsourced keywords [9].
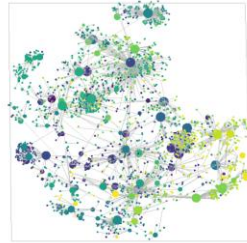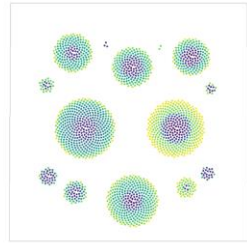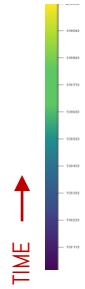
Traditional measures of success in cinema and their shortcomings

As indicated by these examples and given the vast film production accumulated over the past century, our perception of cinema is strongly determined by existing means to evaluate and discriminate between films. Measures that quantify the success of individual films focus primarily on two divergent aspects of success: 1) commercial appeal by considering economic aspects and distinguishing blockbusters, and 2) artistic excellence by adopting an aesthetic point of view and favouring experimental art house films [10]. Financial performance of a film is commonly assessed by indicators such as the inflation adjusted box office revenue, audience numbers based on ticket sales, and DVD rentals. Besides the various issues raised by the computation of these measures, such as the proper estimation of inflation adjusted revenue [11], critics and most film scholars denounce this purely economic approach. By focusing on the artistic merits of individual films instead, they promote recognition in form of established awards, festival presence, and professional critical acclaim. As a result, their suggestions usually distinguish 'difficult' films with
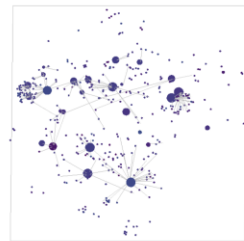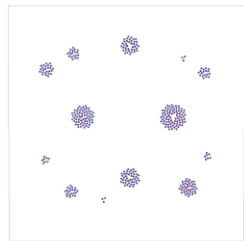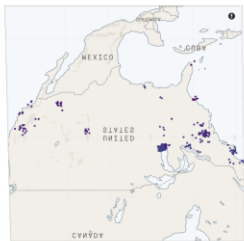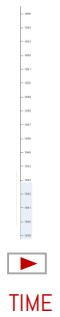
details on demand

showing poster * plot synopsis for selected films

Comedy
Drama
Thriller

21-08-1991, USA, UK

A renowned New York playwright is enticed to California to write for the movies and discovers the hellish truth of Hollywood.

Related objects:

Network degree in: 4
Network degree out: 14
Network degree overall: 18

categorical-temporal perspective

showing movie genres over time

geo-temporal perspective

showing geo-temporal origin of movies

relational-temporal perspective

showing references between movies

time

genre filter

Selected: Comedy

Interactive Demo: https://danubevislab.github.io/polycube/cga2020/

PolyCube offers three additional encodings for the temporal data dimension

TIME

i) color coding

TIME
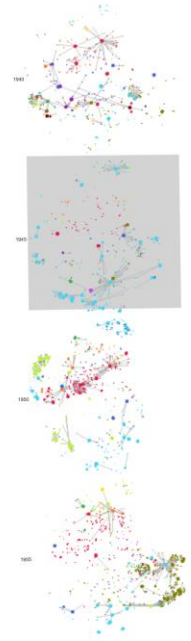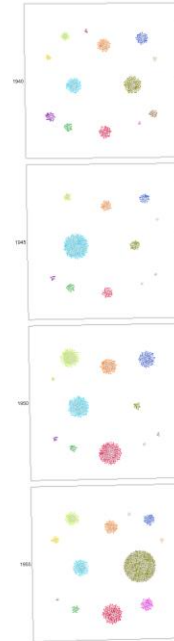
ii) animation

TIME

iii) data comics
(juxtaposition)

Transitions between temporal views are mediated by
   animated canvas transitions, based on space-time cube operations

animation

juxtaposition

space-time cube

superimposition
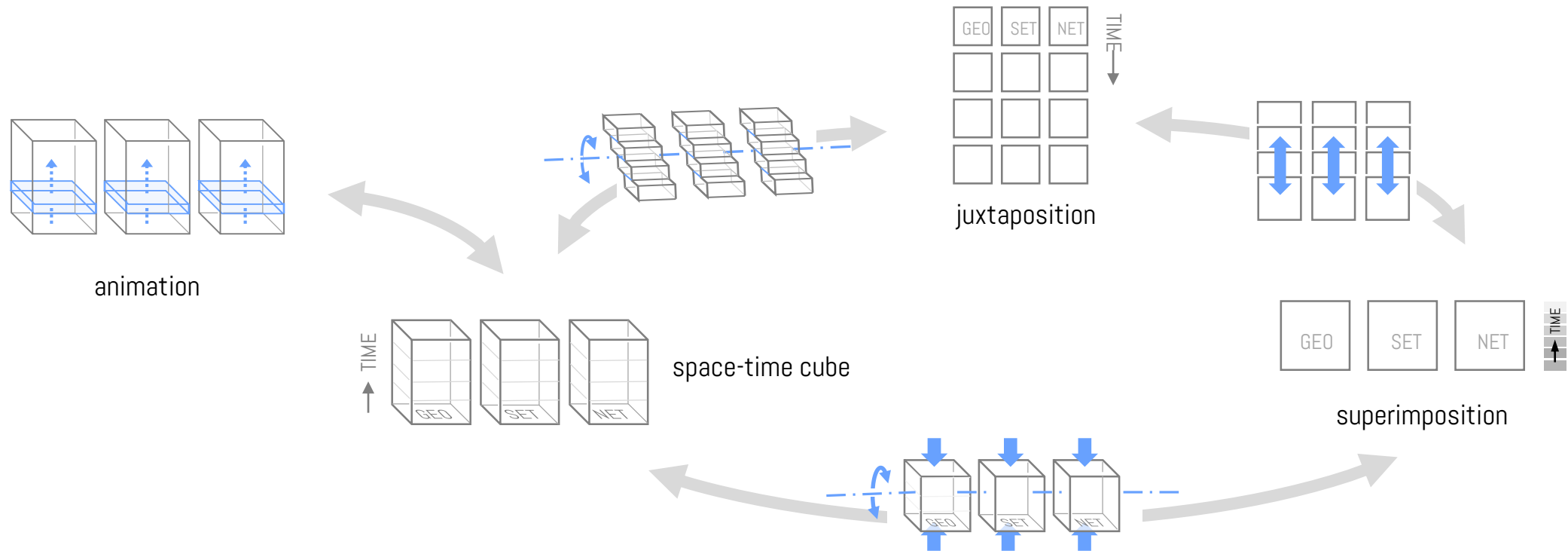
outlook

Aside from cultural collection data, we consider a wide variety of further humanities topics and subject matters to benefit from multi-spatiotemporal representations - and want to adapt the PolyCube framework for that matter.

Transcending the point-like character-istics of cultural collection data, actor and object biographies appear as a valuable analytical topic area.

Polycubistic visualizations of traces and trajectories thus can make the movements of historical entities visually accessible in geographic, categorical and relational space-times.
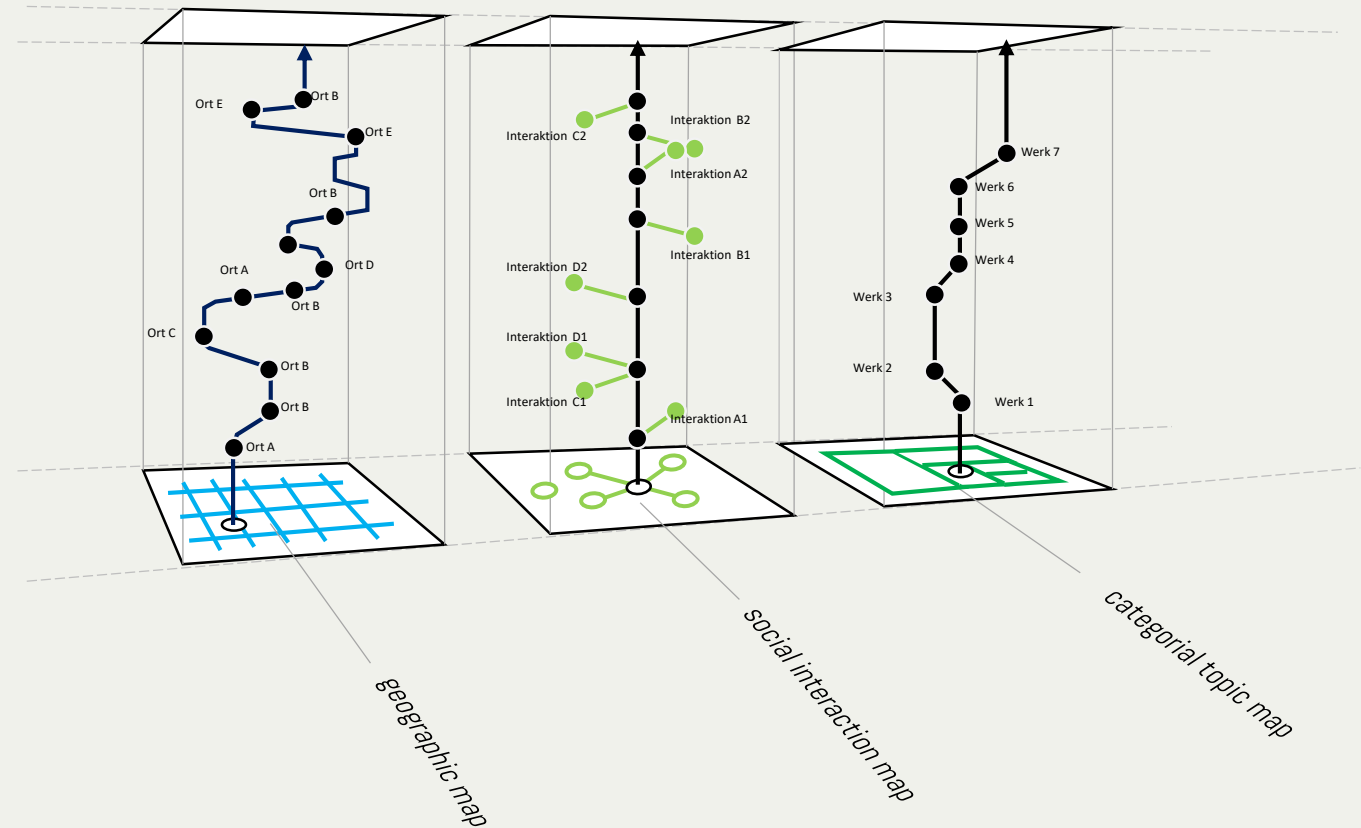
By connecting and contextualizing these morphological elements, data on the trajectories of political territories, on manifold actor networks, on innovation, translation and modernization processes can be remediated and rendered visible within the polycubistic framework.

By creating appropriate line-ups of cubistic representations for each topic, combinatorial "meta-shapes" can appear for scholarly or public audiences, which offer bigger historical pictures for a whole spectrum of analytical or pedagogical scenarios, and around which traditional narrative accounts and argu-mentations can be organized.
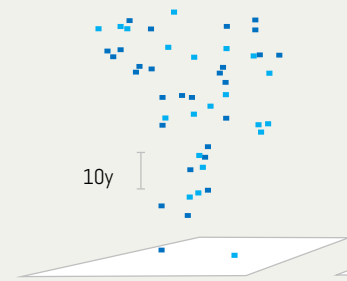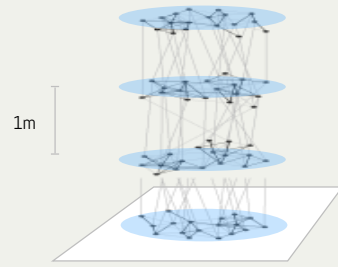

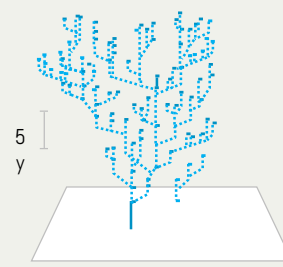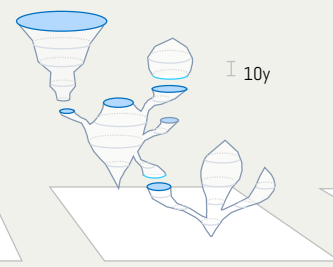event & object collections
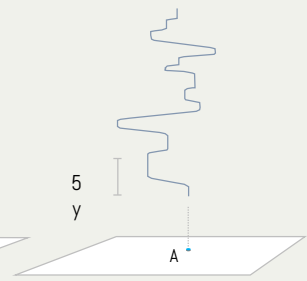
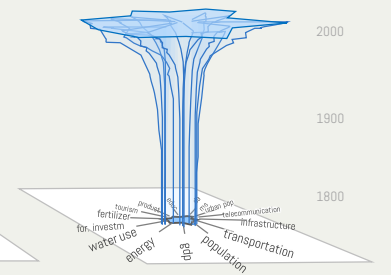individual biographies
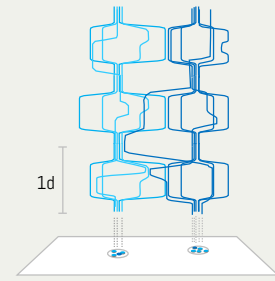
collective biographies
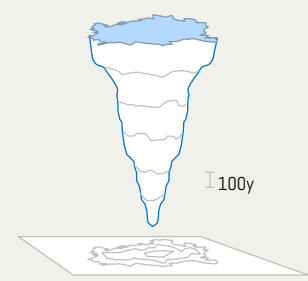
political territories

network dynamics

genealogies & trees

innovation & diffusion

modernization processes

intavia

In/Tangible European Heritage -
Visual Analysis, Curation & Communication

November 2020 – October 2023

Danube University Krems

Free University Amsterdam

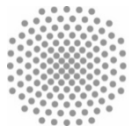Slovenian Academy of Sciences & Arts

Austrian Center for DH & CH

Aalto University

University of Southern Denmark
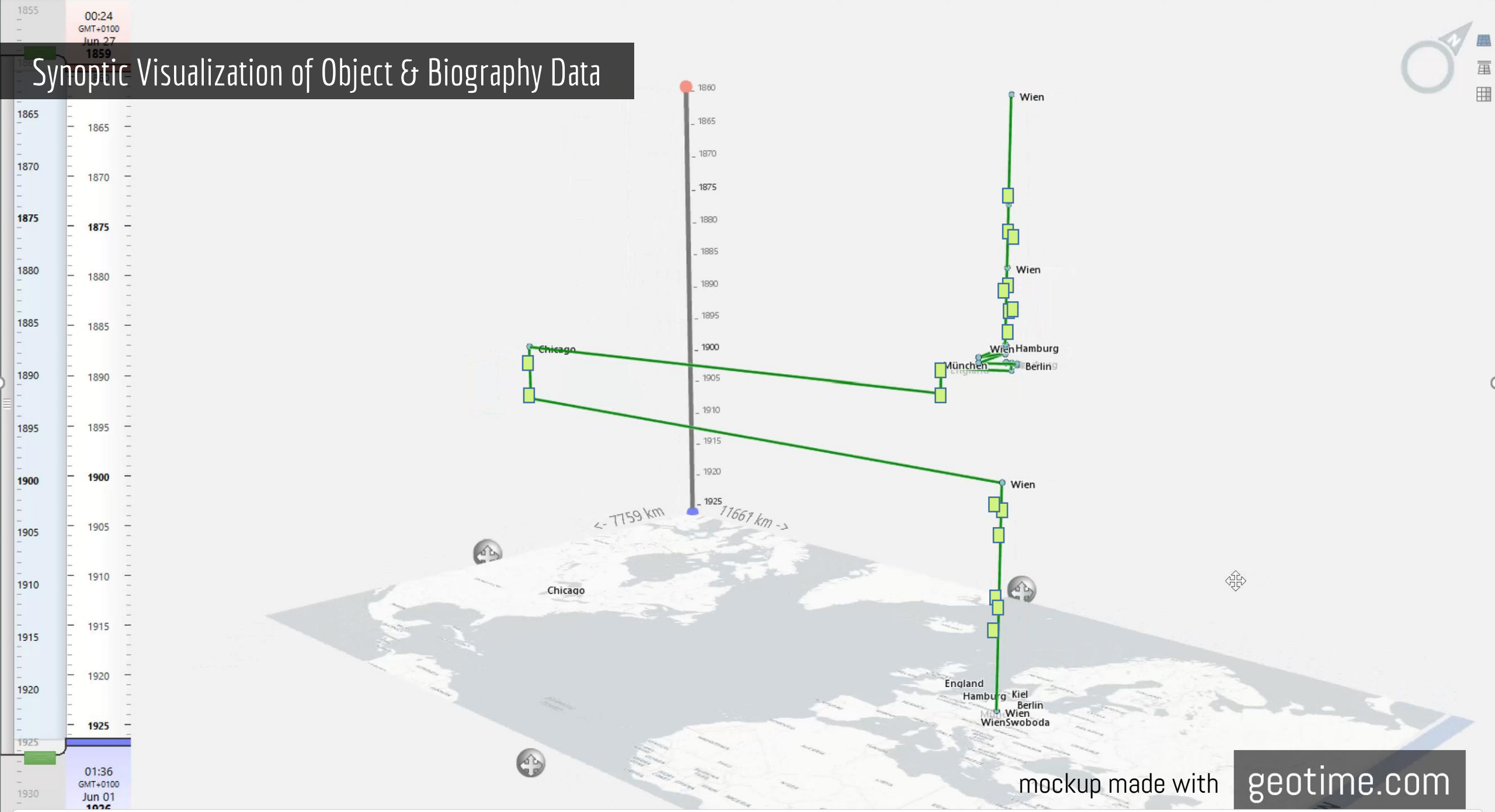

Stuttgart University

Fluxguide GesmbH

University of Helsinki
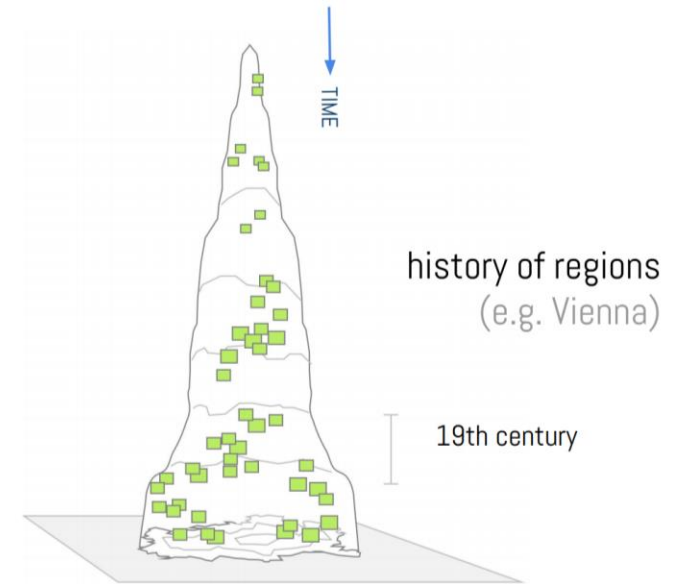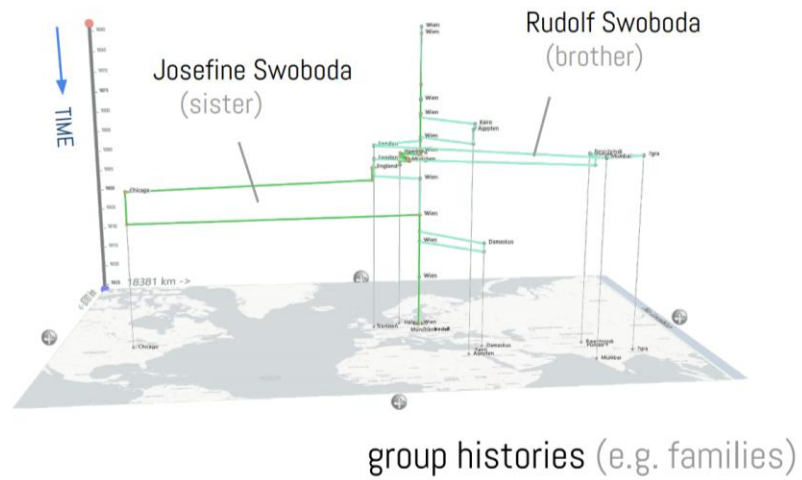
Associated Cultural Heritage Institutions

- Europeana (EU)
- prometheus Bilddatenbank (DE)
- Time Machine Organization (EU)
- Royal Library of the Netherlands (NL)
- Oxford Dictionary of National Biography (UK)
- Albertina Museum (AT)
- Deutsches Museum Munich (DE)
- Edith Cowan University (AU)
- Austrian Gallery Belvedere (AT)
- Huygens ING KNAW (NL)
- NIOD Institute for War, Holocaust & Genocide (NL)
- German Literature Archive Marbach (DE)
- Ghent Centre for Digital Humanities (BE)
- and others

- plus 12 national biography projects

Synoptic Visualization of Object & Biography Data

mockup made with geotime.com

Visualizing Socio-Historical Aggregates

Josefine Swoboda (sister)

Rudolf Swoboda (brother)

group histories (e.g. families)

history of organisations (e.g. art schools)

history of regions (e.g. Vienna)

19th century

Polycube Prototype & Paper: https://danubevislab.github.io/polycube/cga2020/

InTaVia project: https://intavia.eu

Interested in collaborative case studies? – Please get in touch!

mail: florian.windhager@donau-uni.ac.at   twitter: @windhagr