

# Visualisierung

im Bereich Digital Humanities

Stefan Jänicke

[@vizcovery](#)

„Kreativität und Technik“

Leipzig, 30. Mai 2017



UNIVERSITÄT LEIPZIG

**vizcovery.org**

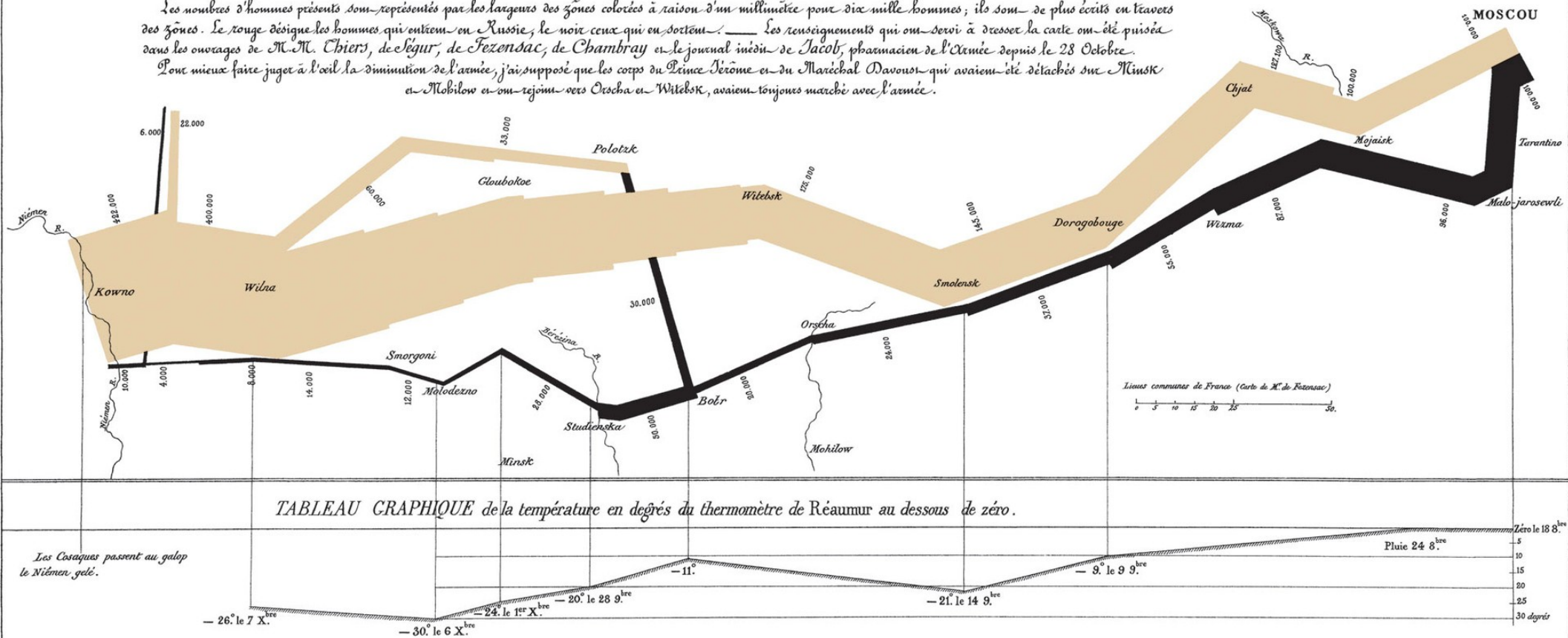
# Visualisierung

## Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813.

Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en travers des zones. Le rouge désigne les hommes qui entrent en Russie, le noir ceux qui en sortent. Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M. M. Chiers, de L'égur, de Fezensac, de Chambray et le journal inédit de Jacob, pharmacien de l'Armée depuis le 28 Octobre.

Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davoust qui avaient été détachés sur Minsk et Mohilow en ont rejoint vers Orscha et Witebsk, avaient toujours marché avec l'armée.

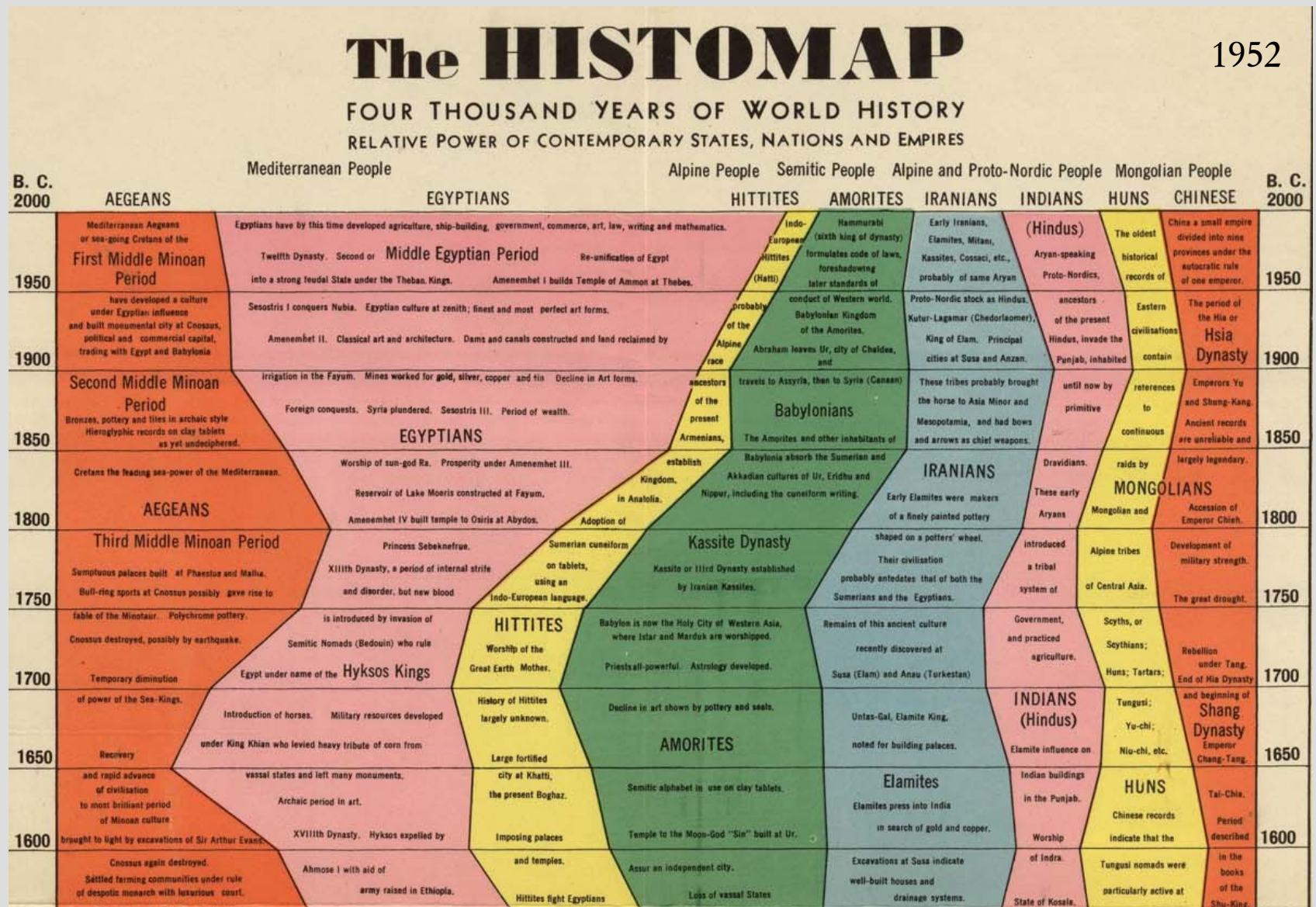


Autog. par Regnier, 8. Par. 5<sup>te</sup> Marie 5<sup>te</sup> O<sup>me</sup> à Paris.

Imp. Lith. Regnier et Desvres.

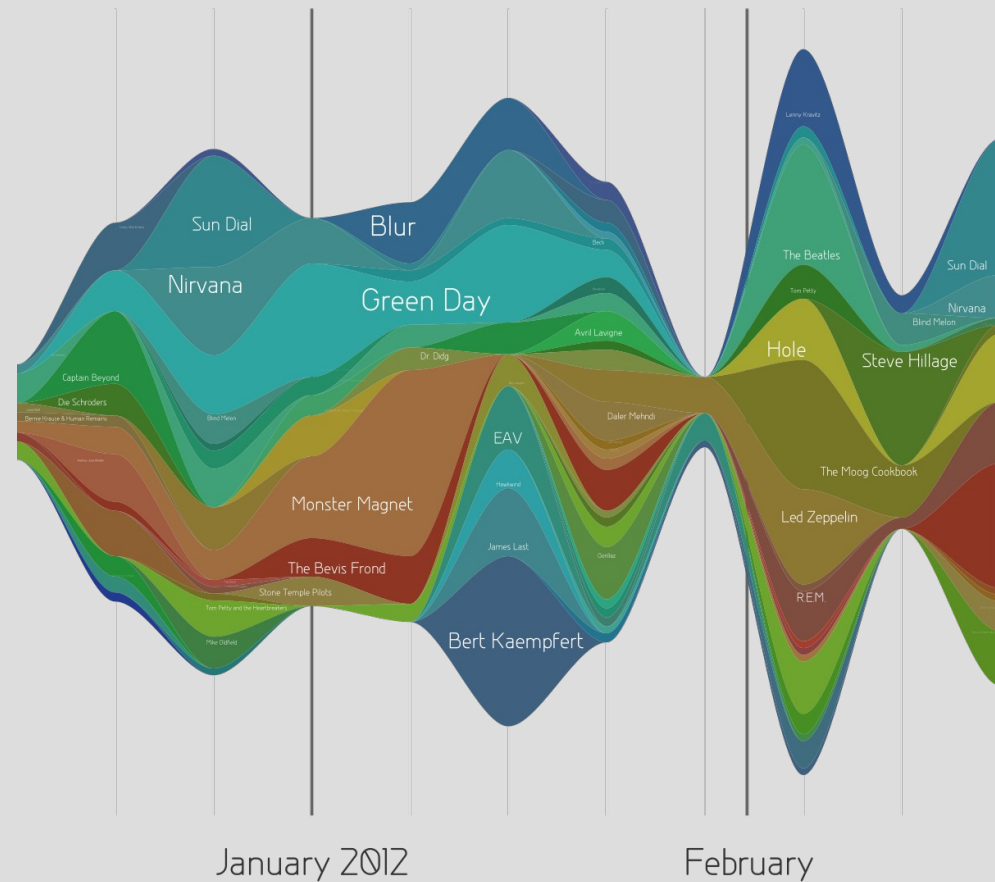
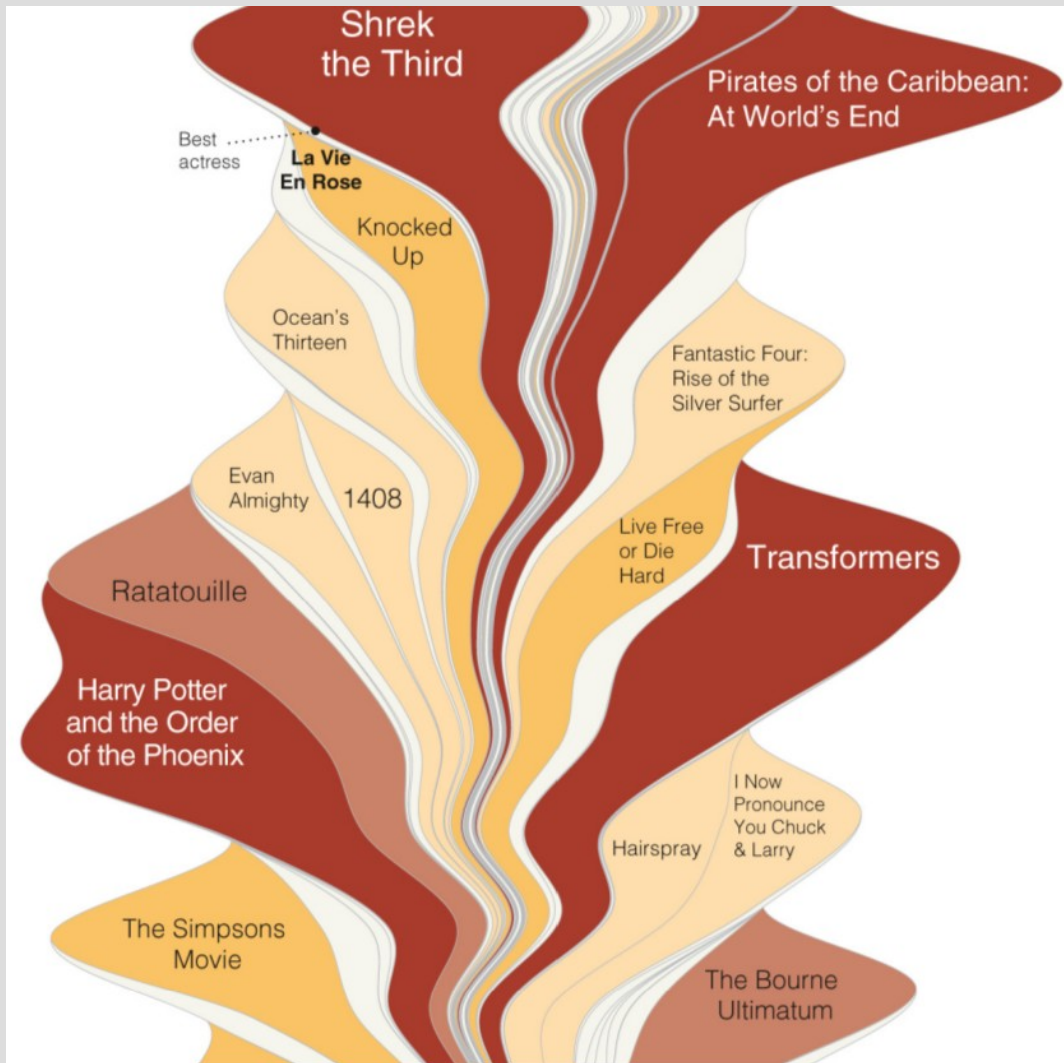


# Visualisierung





# Visualisierung



Byron et al. Stacked Graphs – Geometry & Aesthetics, 2008.





# Visualisierung

Daten sind meist im Kontext von *Raum und Zeit* gegeben



*Beispiel: Goethe's Faust*

*Erstveröffentlichung?*

Tübingen, 1808

*Uraufführung?*

Im alten Opernhaus am Hagenmarkt zu  
Braunschweig am 19. Januar 1829

*Erstes Vorkommen des Wortes „Pudel“?*

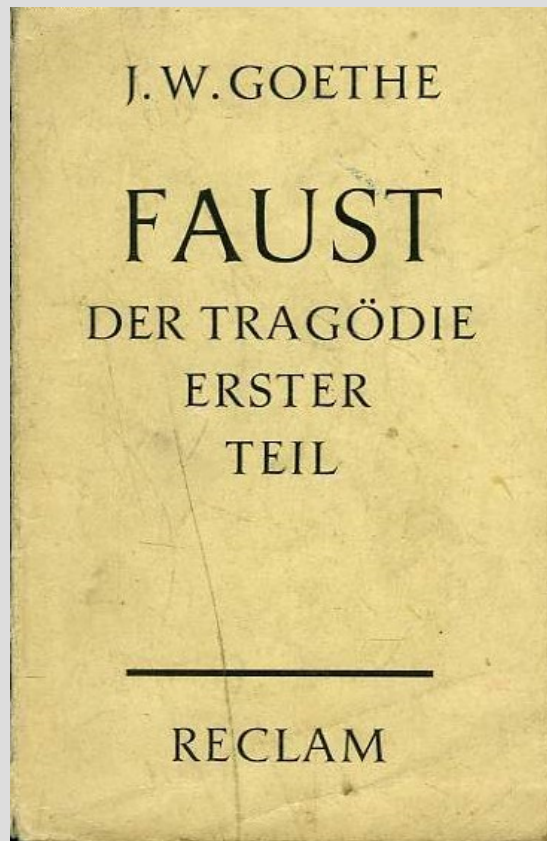
Wagner in „Vor dem Tor“

Seite 54 von 273



# Visualisierung

*Was kann visualisiert werden?*



## **Metadaten:**

- Autor
- Titel
- Datum
- Ort
- Sparte
- Länge
- Struktur
- Sprache
- ...

## **Inhalte:**

- Vokabular
- Stil
- Syntax
- Semantik
- Orte
- Personen
- Zusammenhänge
- Referenzen
- ...

# Digital Humanities



Das Fach **Digital Humanities** (deutsch: „digitale Geisteswissenschaften“) umfasst die Anwendung von computergestützten Verfahren und die systematische Verwendung von digitalen Ressourcen in den Geistes- und Kulturwissenschaften.

*Wikipedia*



Texte, Bilder, 3D Modelle,  
fachspezifische Datenbanken, ...



# Digital Humanities





# Digital Humanities





# Digital Humanities

Geisteswissenschaftler



1 Autor, 1 Schrift, ...



*Fragestellungen:*

Textanalyse

Textkritik

Komparatistik

Rhetorik

Stilistik

...

# Digital Humanities



Digitalisierung von Büchern



HATHI  
TRUST  
Digital Library



PERSEUS  
DIGITAL LIBRARY

Digitale Bibliotheken



# Digital Humanities

Digitaler  
Geisteswissenschaftler



1 Genre,  
1 Epoche,  
...

*Fragestellungen:*

*(quantitative)*

Textanalyse

Textkritik

Komparatistik

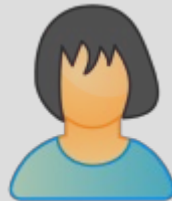
Rhetorik

Stilistik

...

# Digital Humanities

Geisteswissenschaftler



1 Autor, 1 Schrift, ...



Digitaler  
Geisteswissenschaftler



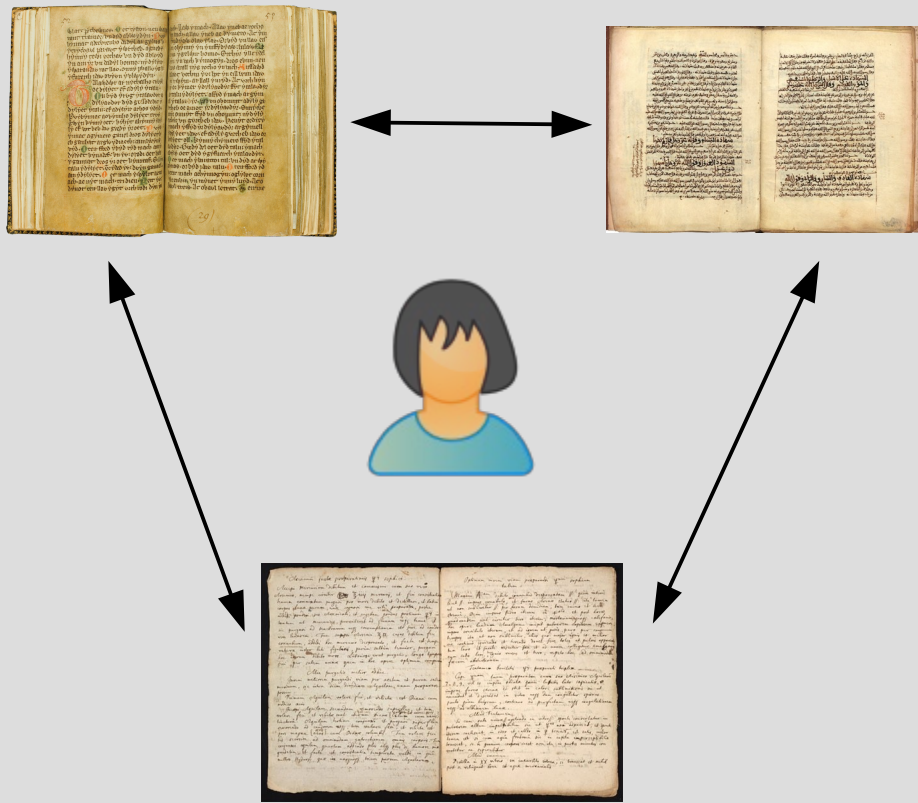
1 Genre,  
1 Epoche,  
...



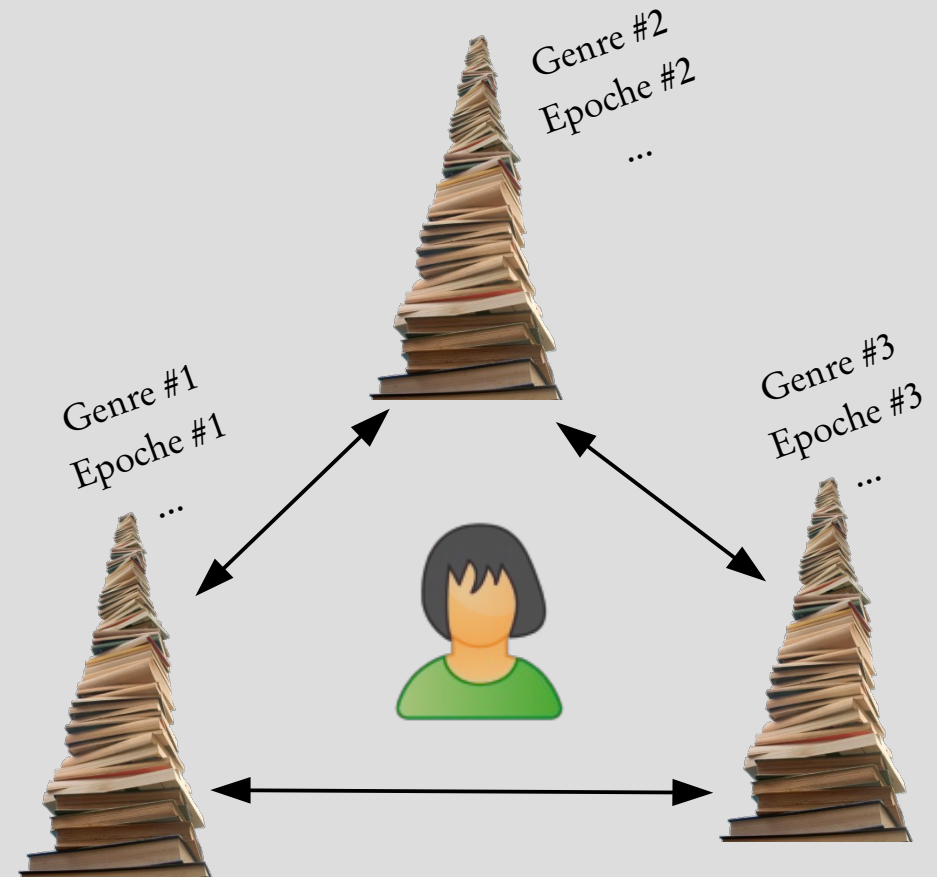
# Digital Humanities

## *Beispiel 1: Komparatistik*

traditioneller Ansatz



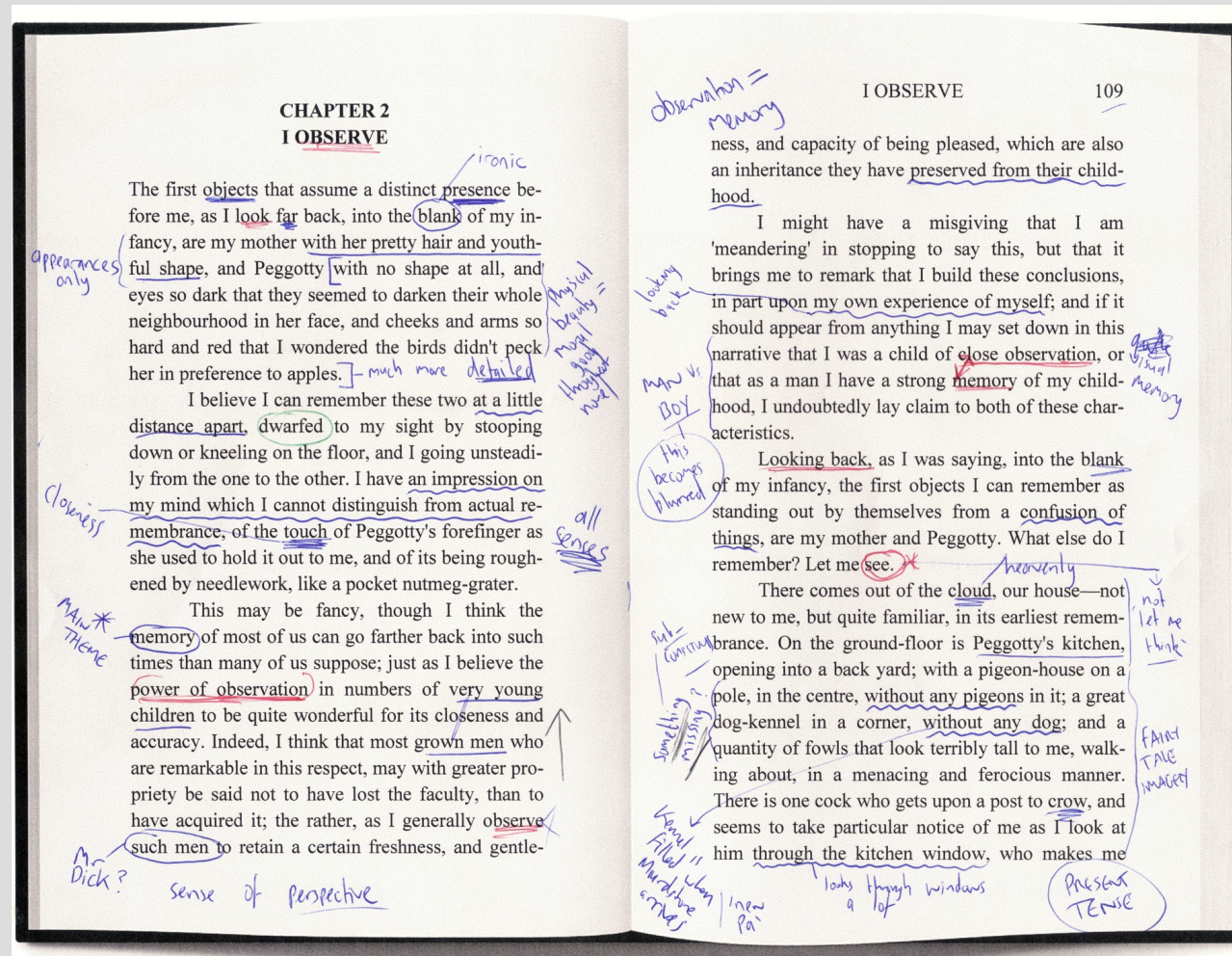
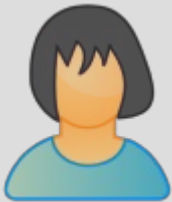
Digital Humanities Ansatz





# Digital Humanities

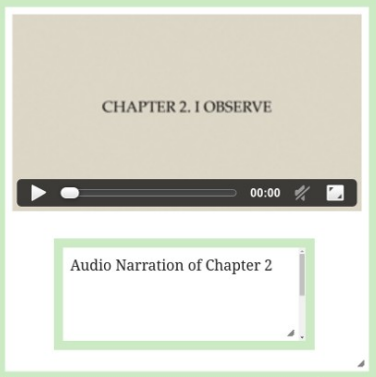
## Beispiel 2: Textanalyse, traditionelles Close Reading





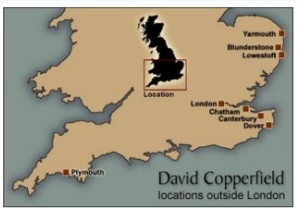
# Visualisierung & Digital Humanities

## Beispiel 2: Textanalyse, digitales Close Reading



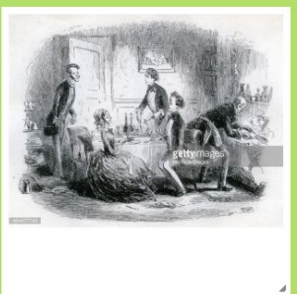
CHAPTER 2. I OBSERVE

Audio Narration of Chapter 2



David Copperfield  
locations outside London

David seems to remember a lot from his childhood stay at various places



### CHAPTER 2. I OBSERVE

The first objects that assume a distinct presence before me, as I look far back, into the blank of my infancy, are my mother with her pretty hair and youthful shape, and **Peggotty** with no shape at all, and eyes so dark that they seemed to darken their whole neighbourhood in her face, and cheeks and arms so hard and red that I wondered the birds didn't peck her in preference to apples.

I believe I can remember these two at a little distance apart, dwarfed to my sight by stooping down or kneeling on the floor, and I going unsteadily from the one to the other. I have an impression on my mind which I cannot distinguish from actual remembrance, of the touch of Peggotty's forefinger as she used to hold it out to me, and of its being roughened by needlework, like a pocket nutmeg-grater.

This may be fancy, though I think the **memory** of most of us can go farther back into such times than many of us suppose; just as I believe the power of **observation** in numbers of very young children to be quite wonderful for its closeness and accuracy. Indeed, I think that most grown men who are remarkable in this respect, may with greater propriety be said not to have lost the faculty, than to have acquired it; the rather, as I generally observe such men to retain a certain freshness, and gentleness, and capacity of being pleased, which are also an inheritance they have preserved from their **childhood**.

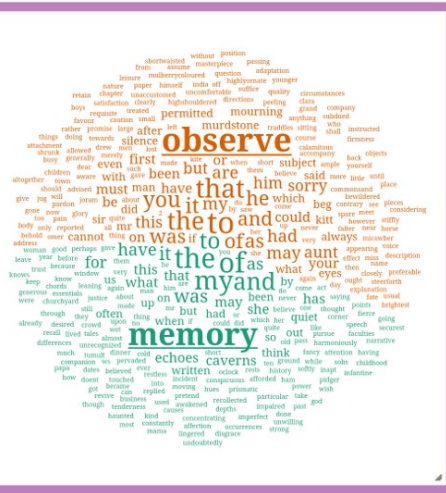
I might have a misgiving that I am 'meandering' in stopping to say this, but that it brings me to remark that I build these conclusions, in part upon my own experience of myself; and if it should appear from anything I may set down in this narrative that I was a child of close observation, or that as a man I have a strong memory of my childhood, I undoubtedly lay claim to both of these characteristics.

Looking back, as I was saying, into the blank of my infancy, the first objects I can remember as standing out by themselves from a confusion of things, are my mother and Peggotty. What else do I remember? Let me see.


There comes out of the cloud, our house -- not new to me, but quite familiar, in its earliest remembrance. On the ground-floor is Peggotty's kitchen, opening into a back yard; with a pigeon-house on a pole, in the centre, without any pigeons in it; a great dog-kennel in a corner, without any dog; and a quantity of fowls that look terribly tall to me, walking about, in a menacing and ferocious manner. There is one cock who gets upon a post to crow, and seems to take particular notice of me as I look at him through the kitchen window, who makes me shiver, he is so fierce. Of the geese outside the side-gate who come waddling after me with their long necks stretched out when I go that way, I dream at night; as a man environed by wild beasts might dream of lions.


Here is a long passage -- what an enormous perspective I make of it! -- leading from **Peggotty's kitchen** to the front door. A dark store-room opens out of it, and that is a place to be run past at night; for I don't know what may be among those tubs and jars and old tea-chests, when there is nobody in there with a dimly-burning light, letting a mouldy air come out of the door, in which there is the smell of soap, pickles, pepper, candles, and coffee, all at one whiff. Then there are the two parlours: the parlour in which we sit of an evening, my mother and I and Peggotty -- for Peggotty is quite our companion, when her work is done and we are alone -- and the best parlour where we sit on a Sunday; grandly, but not so comfortably. There is something of a doleful air about that room to me, for Peggotty has told me -- I don't know when, but apparently ages ago -- about my father's funeral, and the company having their black cloaks put on. One Sunday night my mother reads to Peggotty and me in there, how Lazarus was raised up from the dead. And I am so frightened that they are afterwards obliged to take me out of bed, and show me the quiet churchyard out of the bedroom window, with the dead all lying in their graves at rest, below the solemn moon.

Is memory = observation here?



Seems to be thinking about a fantasy from past. May be has fear from animals (dogs, crow etc)?





# Visualisierung & Digital Humanities

## *Distant Reading:*

### *Wortfrequenzen in Charles Dickens' „David Copperfield“*

13532	the
12274	i
11958	and
10321	to
8635	of
7841	a
...	
217	hands
217	morning
214	half
213	believe
213	sure
213	uriah
212	every
212	friend
212	tell
211	once
211	seen
...	

54	church
54	dare
54	david
54	foot
54	greater
54	happened
54	power
54	stand
54	story
...	
1	youngster
1	your'n
1	yourself'
1	youths
1	zeal
1	zealous
1	zealously
1	zigzag

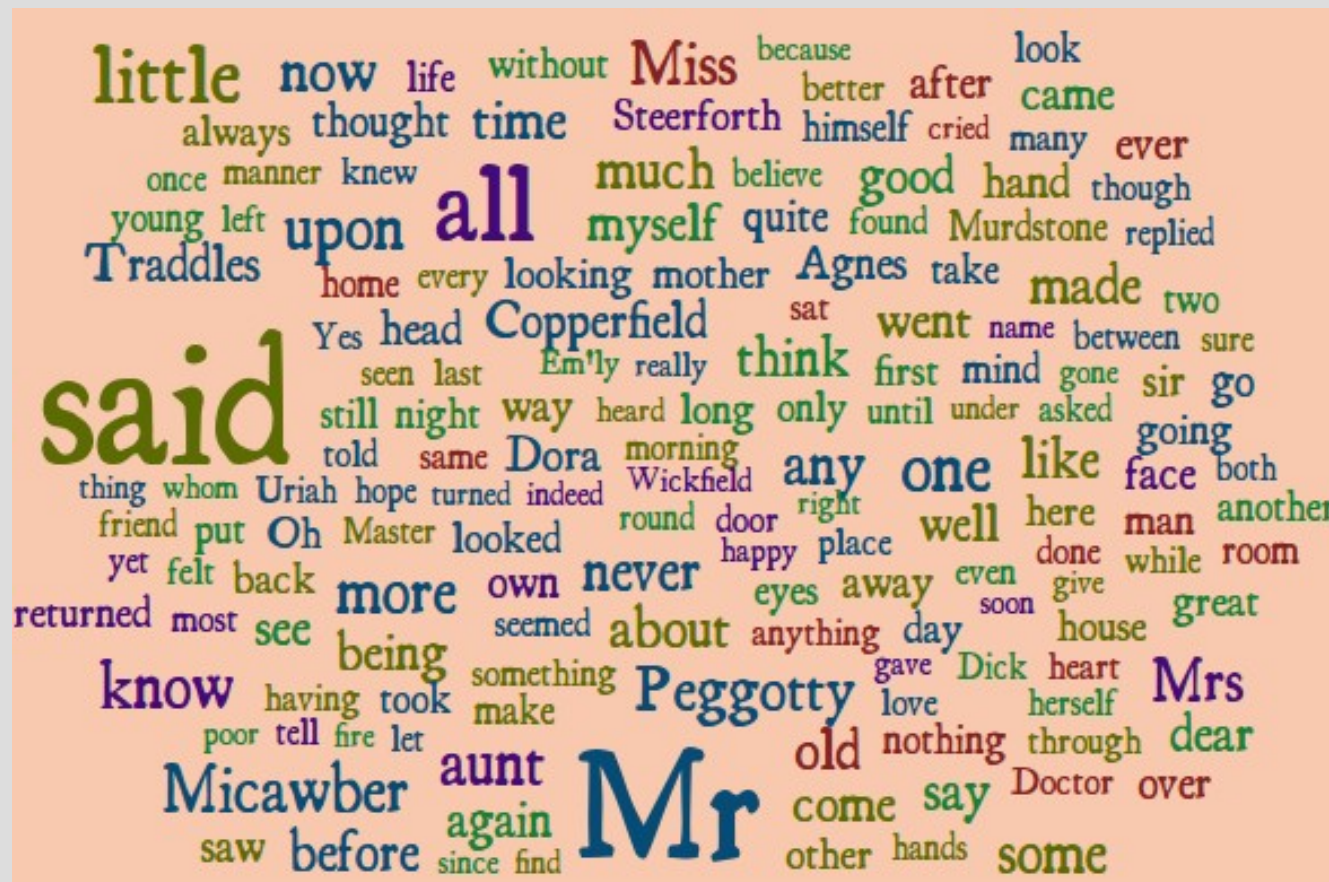




# Visualisierung & Digital Humanities

## *Distant Reading:*

# Wortfrequenzen in Charles Dickens' „David Copperfield“



# Visualisierung & Digital Humanities




## *Distant Reading: Komparatistik?*


# Wortfrequenzen in Shakespeare Werken








# Visualisierung & Digital Humanities

  
PDF

  
Info

  
References

  
Figures

**COMPUTER GRAPHICS  
forum**  
*Explore this journal >*

Article


**Visual Text Analysis in Digital Humanities**

S. Jänicke, G. Franzini, M. F. Cheema, G. Scheuermann

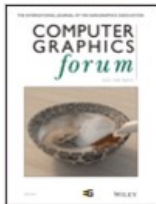
First published: 20 June 2016 [Full publication history](#)

DOI: 10.1111/cgf.12873 [View/save citation](#)

Cited by (CrossRef): 0 articles [Check for updates](#) [Citation tools](#) ▼

 score **1**


**Early View**




[Browse Early View Articles](#)  
Online Version of Record  
published before inclusion  
in an issue

**Abstract**

In 2005, Franco Moretti introduced Distant Reading to analyse entire literary text collections. This was a rather revolutionary idea compared to the traditional Close Reading, which focuses on the thorough interpretation of an individual work. Both reading techniques are the prior means of Visual Text Analysis. We present an overview of the research conducted since 2005 on supporting text analysis tasks with close and distant reading visualizations in the digital humanities. Therefore, we classify the observed papers according to a taxonomy of text analysis tasks, categorize applied close and distant reading techniques to support the investigation of these tasks and illustrate approaches that combine both reading techniques in order to provide a multi-faceted view of the textual data. In addition, we take a look at the used text sources and at the typical data transformation steps required for the proposed visualizations. Finally, we summarize collaboration experiences when developing visualizations for close and distant reading, and we give an outlook on future challenges in that research area.

 Text size

 Share

**Abstract**

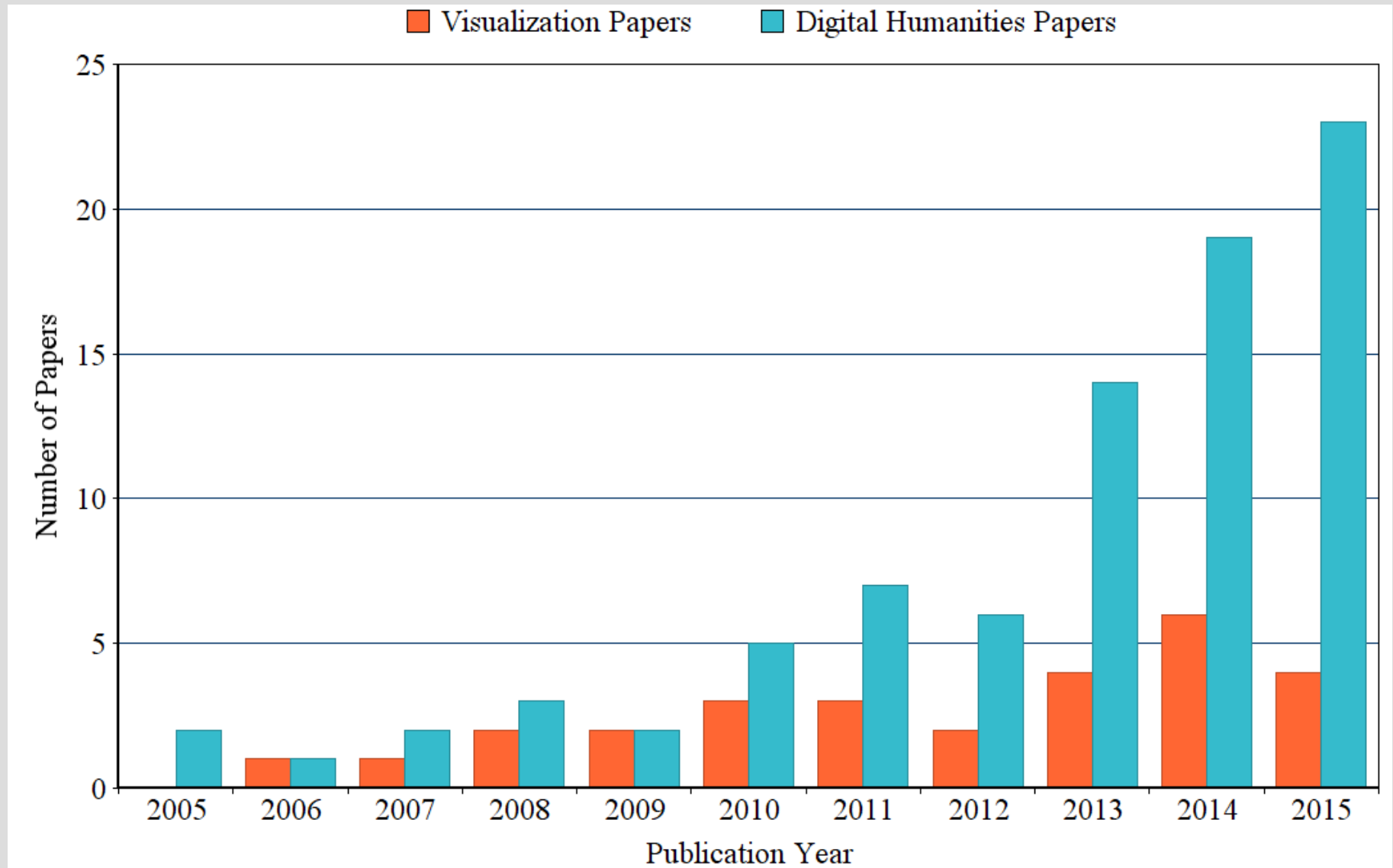
1. Introduction
2. Means of Visual Text Analysis
3. Visual Text Analysis
4. Scope
5. Text Sources
6. Data Transformation Aspects
7. Taxonomy
8. Applied Visualization Techniques
9. Collaboration Experiences
10. Future Challenges
11. Conclusion

[References](#)

[Related Content](#)

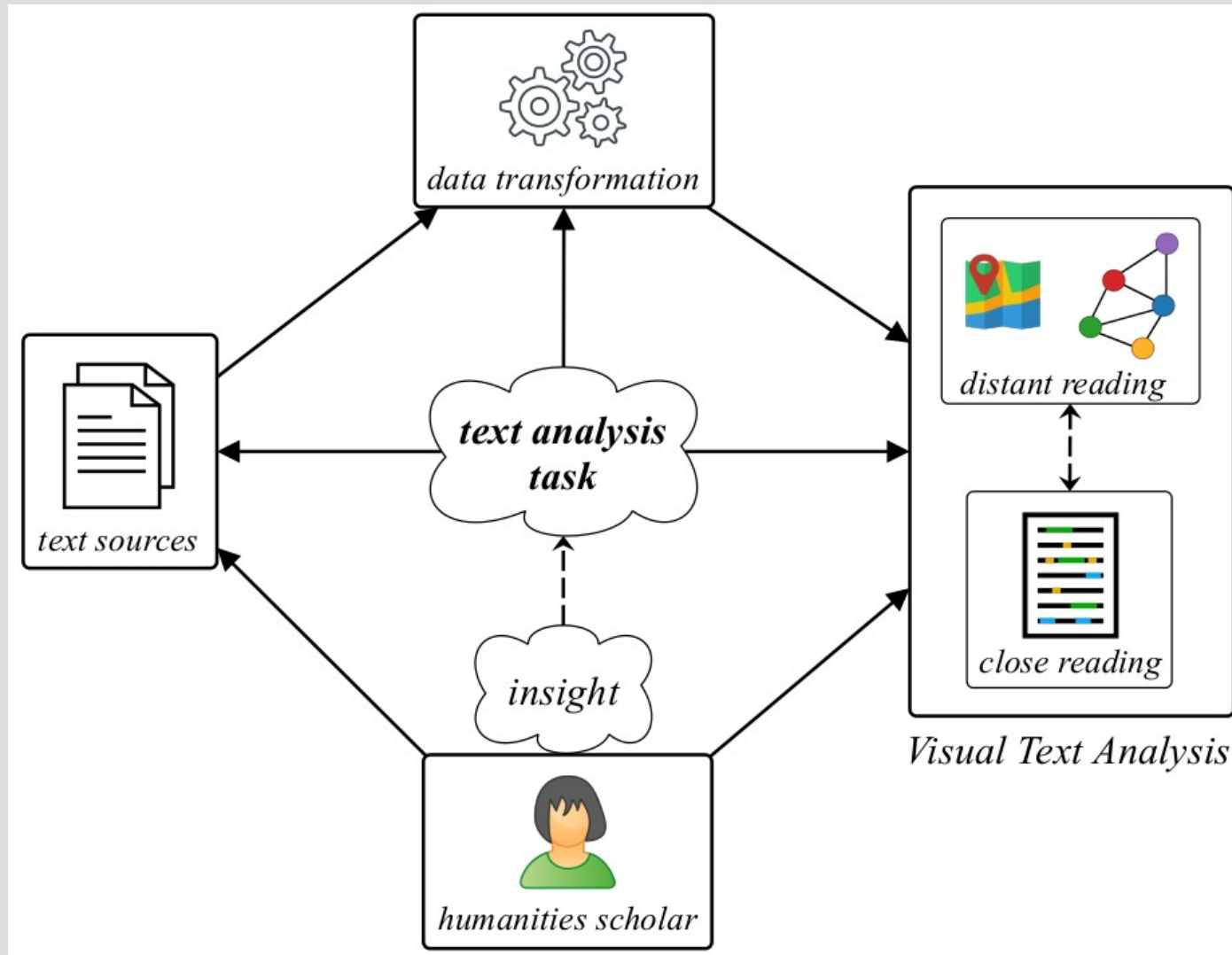


# Visualisierung & Digital Humanities



# Visual Text Analysis Process

S. Jänicke, G. Franzini, M. F. Cheema and G. Scheuermann (2016),  
Visual Text Analysis in Digital Humanities. *Computer Graphics Forum*.



# Visual Text Analysis Process

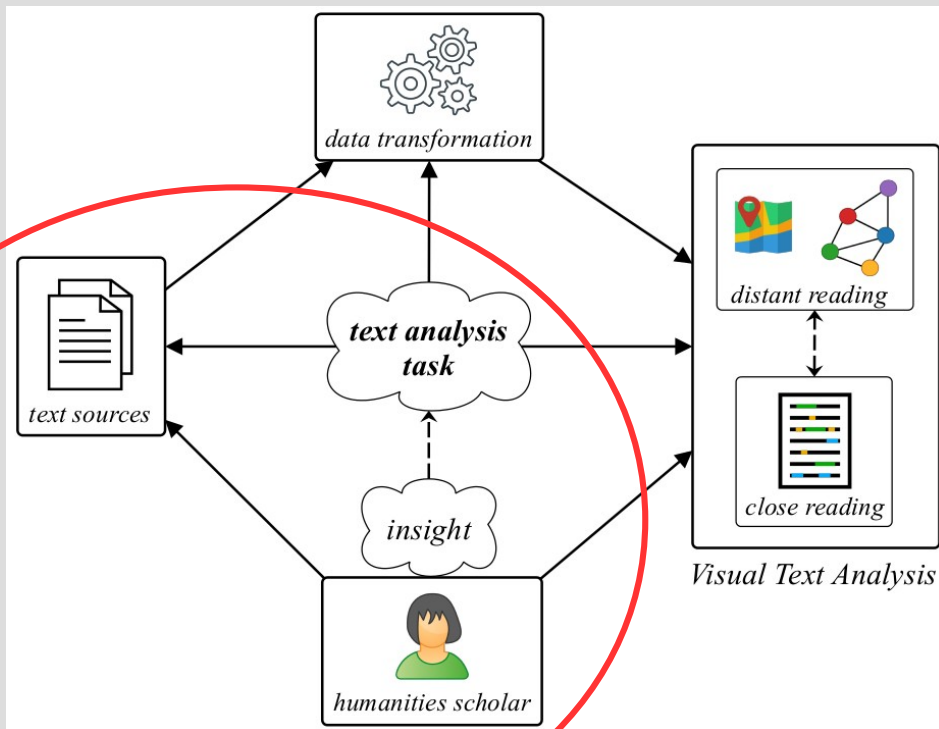
## Textquellen:

Einzeltexte

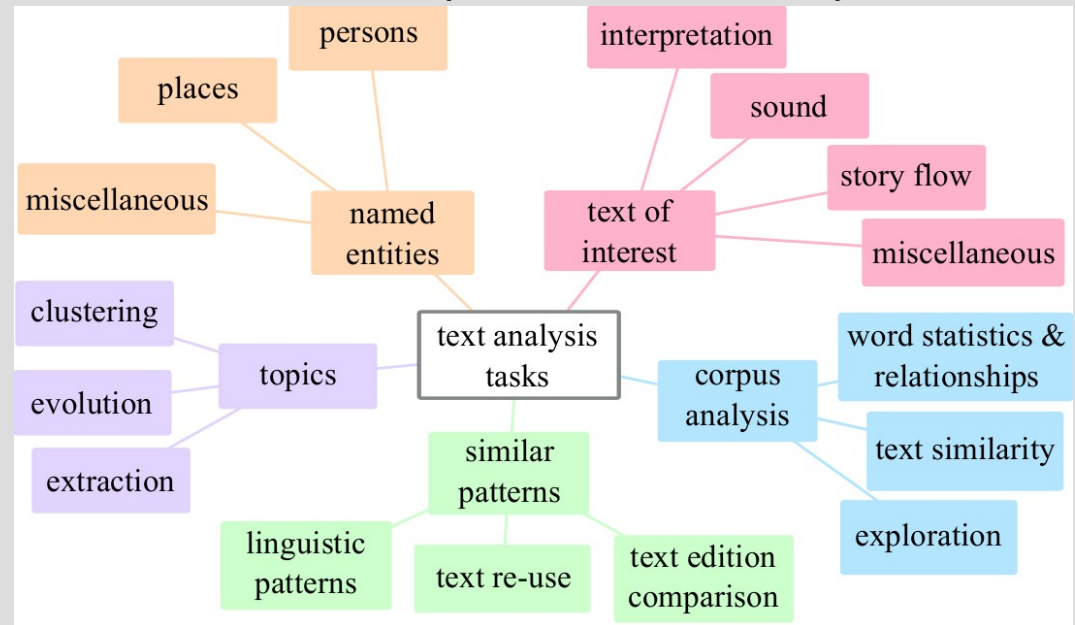
Editionen

Korpora

POI Collection

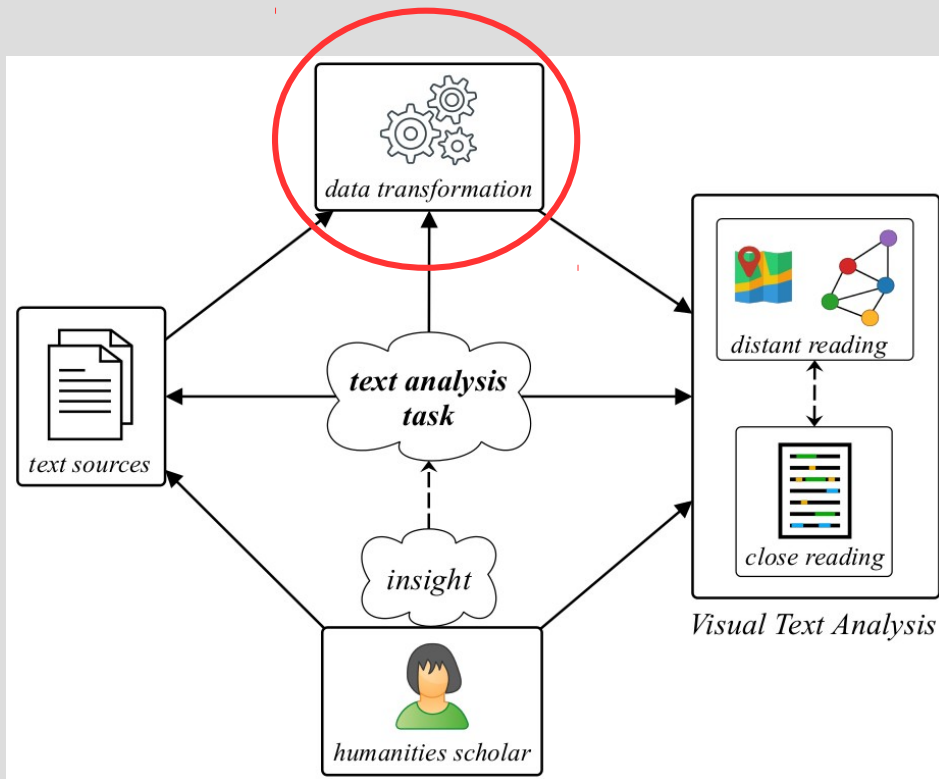


## Text Analysis Task Taxonomy:



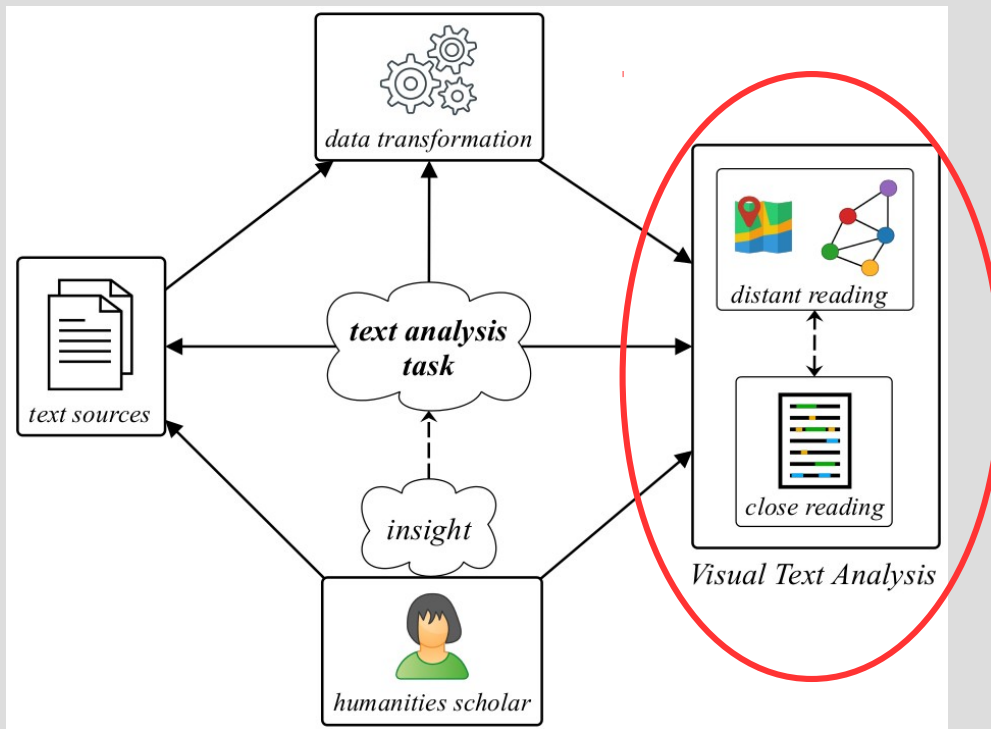


# Visual Text Analysis Process



**Datentransformationen:**  
Sequenzalignment  
Part-of-speech (POS) tagging  
Named Entity Recognition (NER)  
Topic Modeling  
Semi-automatisierte Ansätze  
...

# Visual Text Analysis Process



## Visuelle Textanalyse:

### *Close Reading:*

Farbe  
Schriftgröße  
Glyphen  
Verbindungen

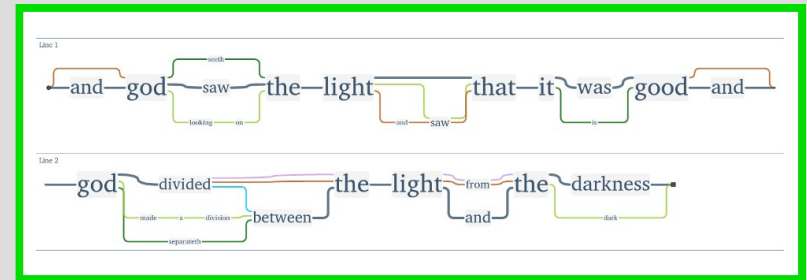
### *Distant Reading:*

Heat maps  
Tag clouds  
Karten  
Zeitleisten  
Graphen





# Visuelle Analyse von Editionstexten



S. Jänicke, M. Büchler, A. Geßner and G. Scheuermann (2014),  
5 Design Rules for Visualizing Text Variant Graphs, *Digital Humanities 2014*.

S. Jänicke, M. Büchler and G. Scheuermann (2014),  
Improving the Layout for Text Variant Graphs, *VisLR Workshop 2014*.

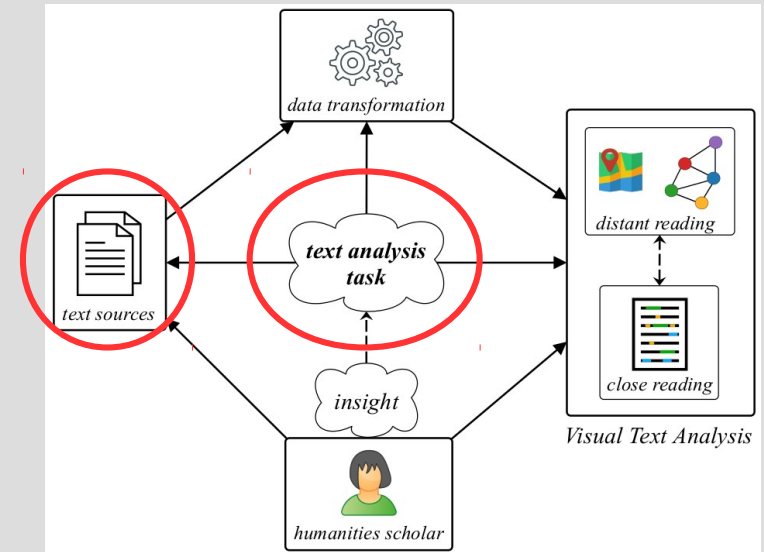
S. Jänicke, A. Geßner, G. Franzini, M. Terras, S. Mahony, and G. Scheuermann (2015),  
TRAViz: A Visualization for Variant Graphs, *Digital Scholarship in the Humanities (DSH)*.

S. Jänicke and A. Geßner (2015),  
A Distant Reading Visualization for Variant Graphs, *Digital Humanities 2015*.

# Visuelle Analyse von Editionstexten

## *Forschungsaufgabe:*

Analyse von Gemeinsamkeiten und Unterschieden zwischen Editionen eines Textes (Textkritik)



*Textkorpus* → *verschiedene Texteditionen*, z.B.:

24 englische Übersetzungen der Bibel

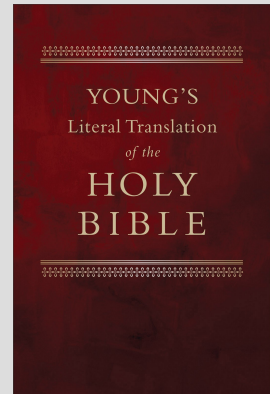
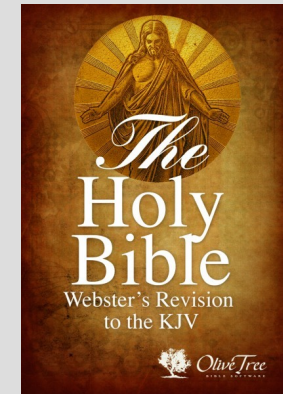
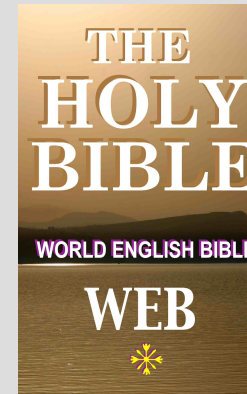
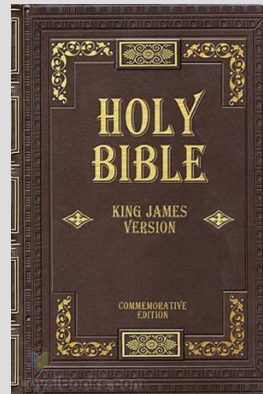
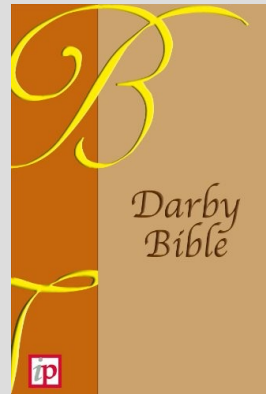
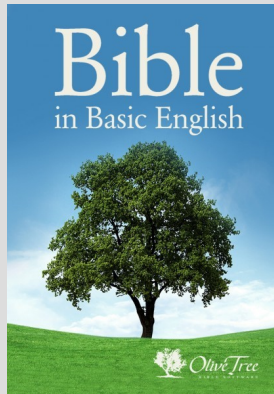
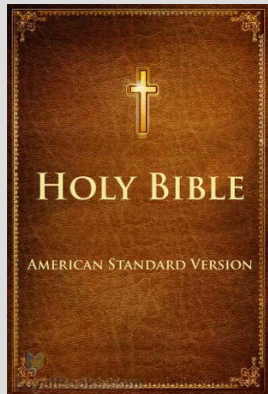
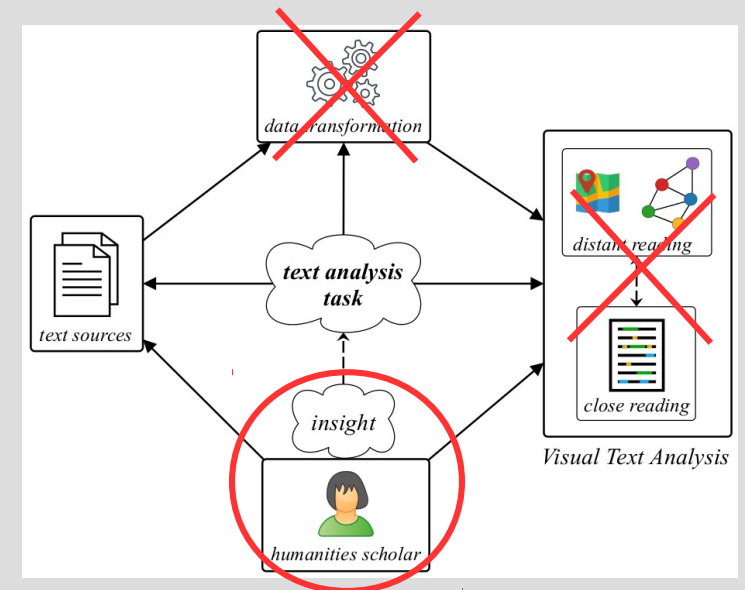
22 deutsche Übersetzungen von Shakespeare's *Othello*

5 lateinische Varianten von St. Augustine's *De Civitate Dei*

# Visuelle Analyse von Editionstexten

*Übliche Arbeitsweise (am Beispiel):*  
7 englische Bibelübersetzungen

American Standard Version
Bible in Basic English
Darby Bible
King James Version
World English Bible
Young's Literal Translation
Webster's Revision





# Visuelle Analyse von Editionstexten

## Genesis 1:4

And God saw the light, that it was good: and God divided the light from the darkness.

And God, looking on the light, saw that it was good:  
and God made a division between the light and the dark,

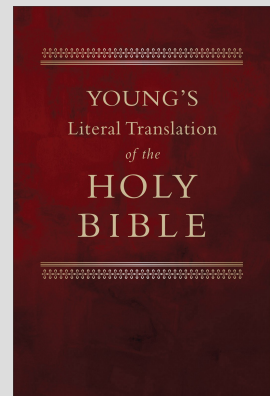
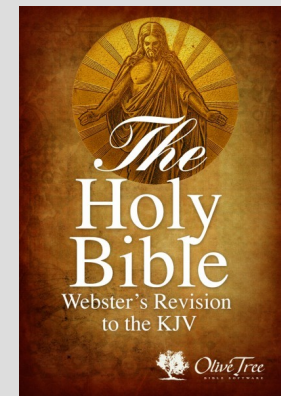
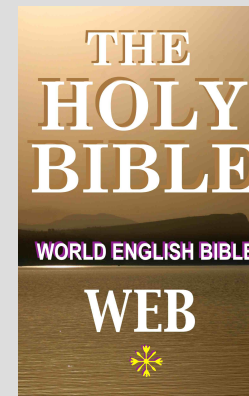
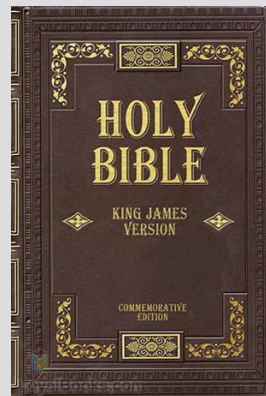
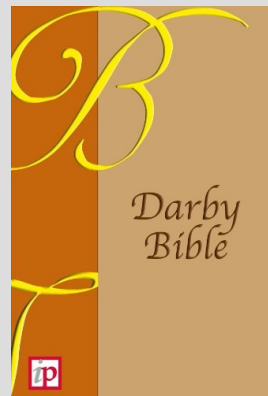
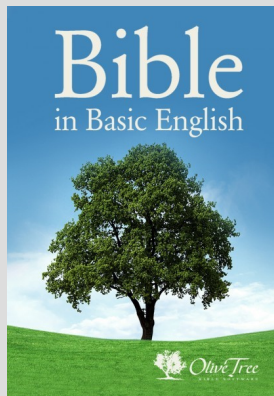
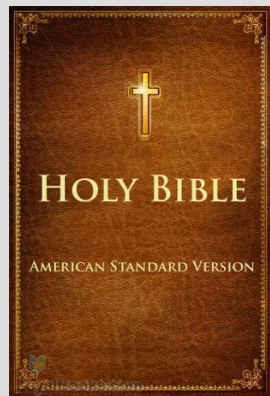
And God saw the light that it was good;  
and God divided between the light and the darkness.

And God saw the light, that it was good: and God divided the light from the darkness.

God saw the light, and saw that it was good. God divided the light from the darkness.

And God seeth the light that [it is] good,  
and God separateth between the light and the darkness,

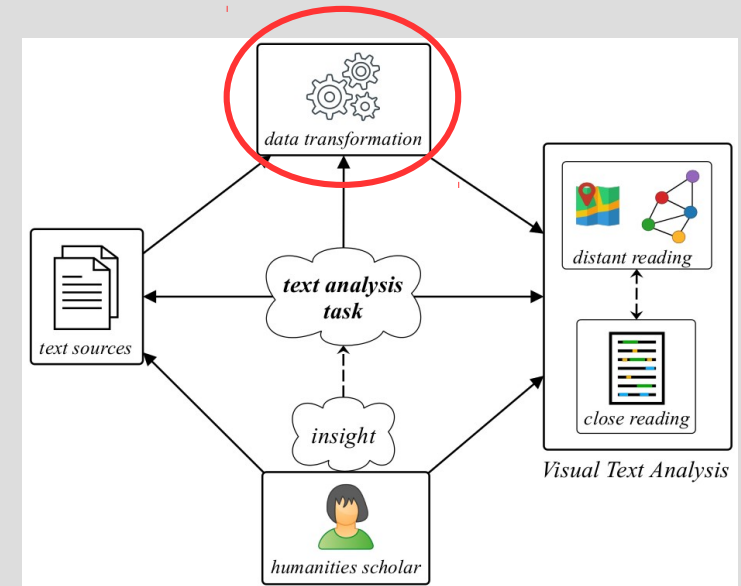
And God saw the light, that it was good: and God divided the light from the darkness.



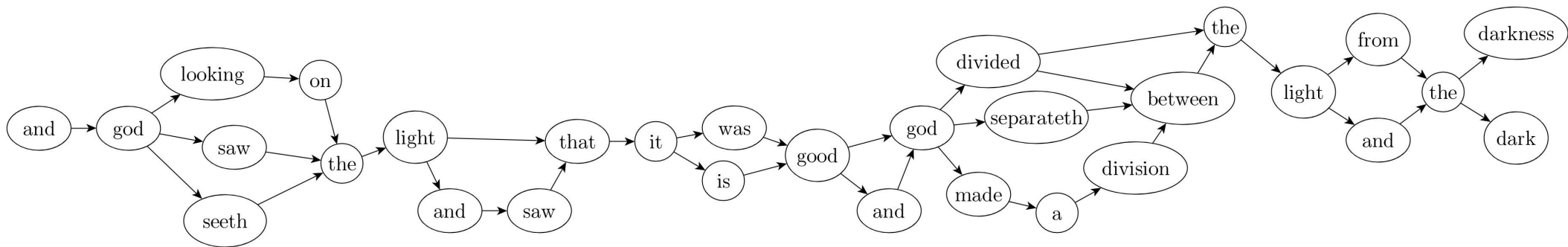
# Visuelle Analyse von Editionstexten

## *Datentransformation:*

- Editionen digital verfügbar
- Zuordnung gleicher Sätze trivial
- Alignierung auf Wortebene notwendig



# Visuelle Analyse von Editionstexten



## Variant Graph (Schmidt et al., 2009)

### *Genesis 1:4*

And God saw the light, that it was good: and God divided the light from the darkness.

And God, looking on the light, saw that it was good:  
and God made a division between the light and the dark,

And God saw the light that it was good;  
and God divided between the light and the darkness.

And God saw the light, that it was good: and God divided the light from the darkness.

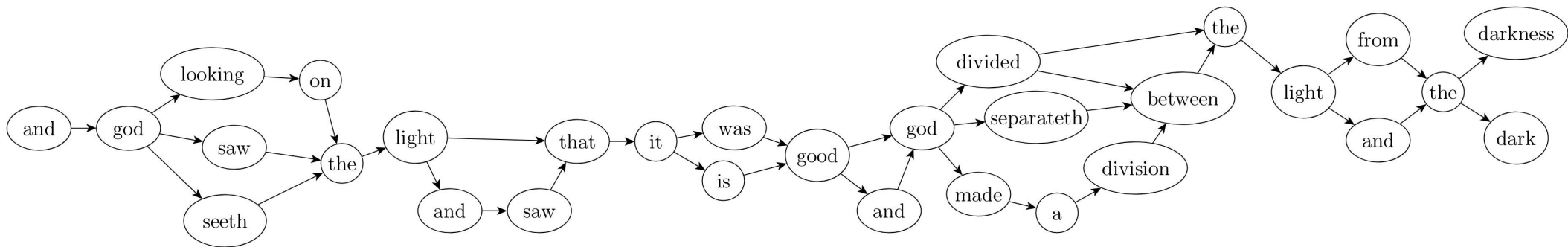
God saw the light, and saw that it was good. God divided the light from the darkness.

And God seeth the light that [it is] good,  
and God separateth between the light and the darkness,

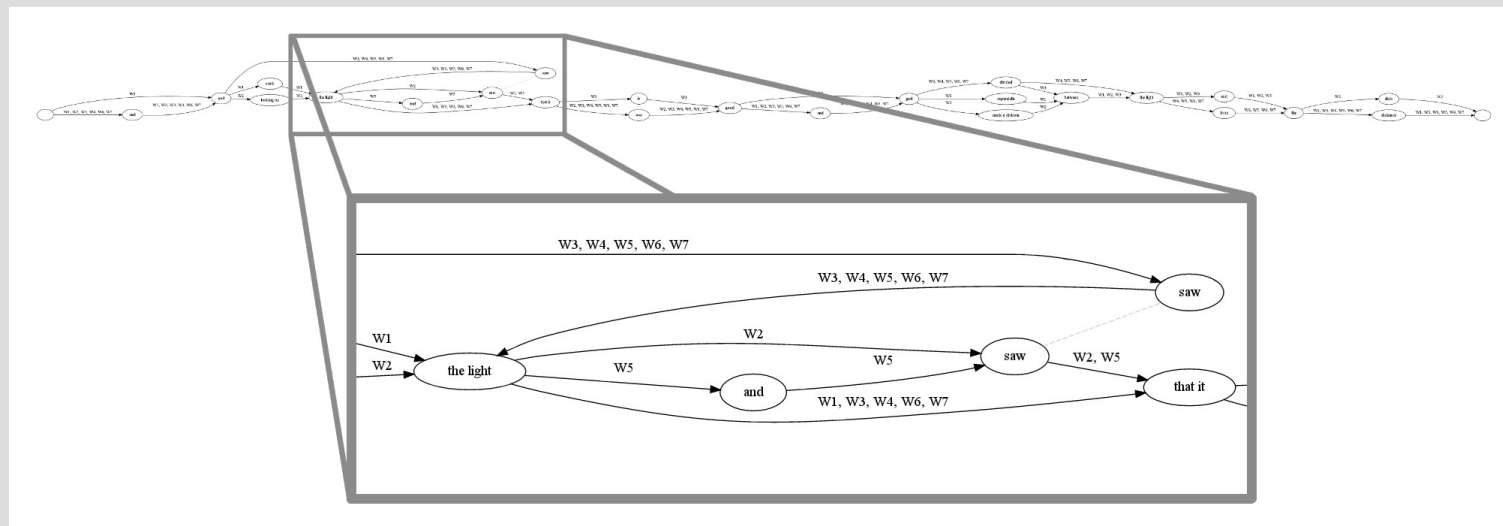
And God saw the light, that it was good: and God divided the light from the darkness.



# Visuelle Analyse von Editionstexten



Variant Graph (Schmidt et al., 2009)

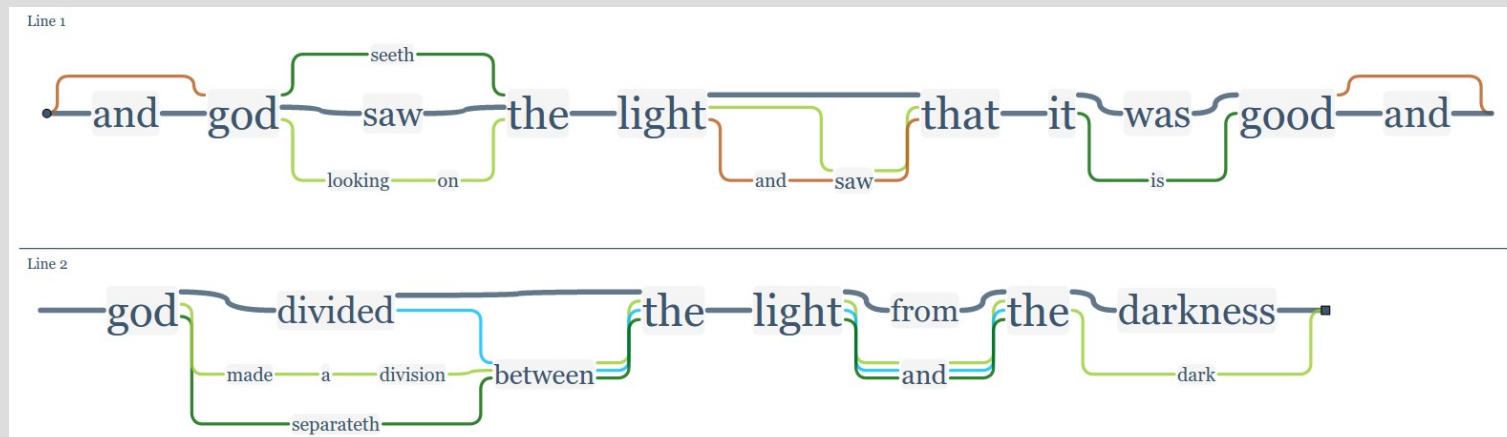
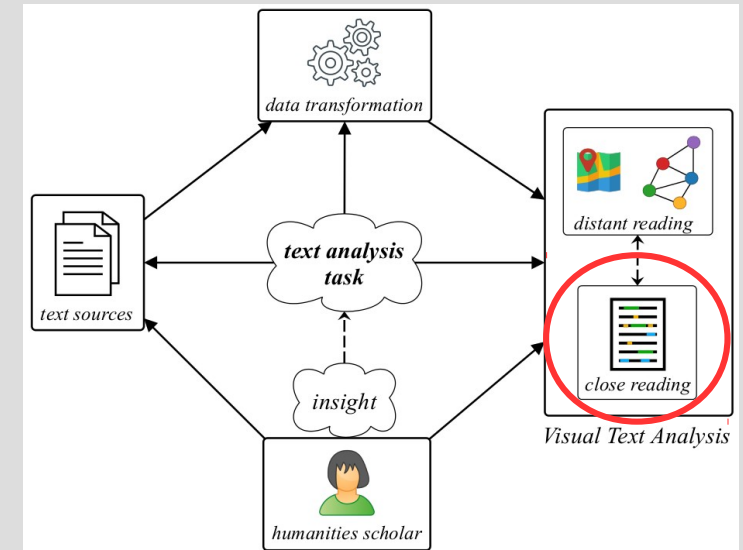


*CollateX*  
Variant Graph  
Visualisierung

# Visuelle Analyse von Editionstexten



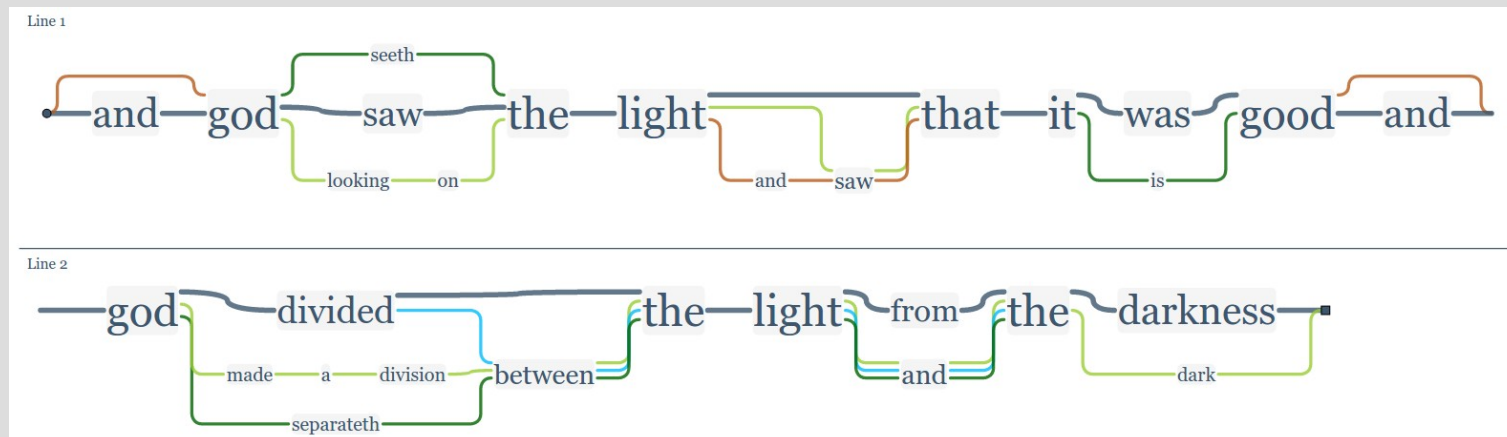
## Variant Graph Design & Variant Graph Layout Algorithmus



# Visuelle Analyse von Editionstexten

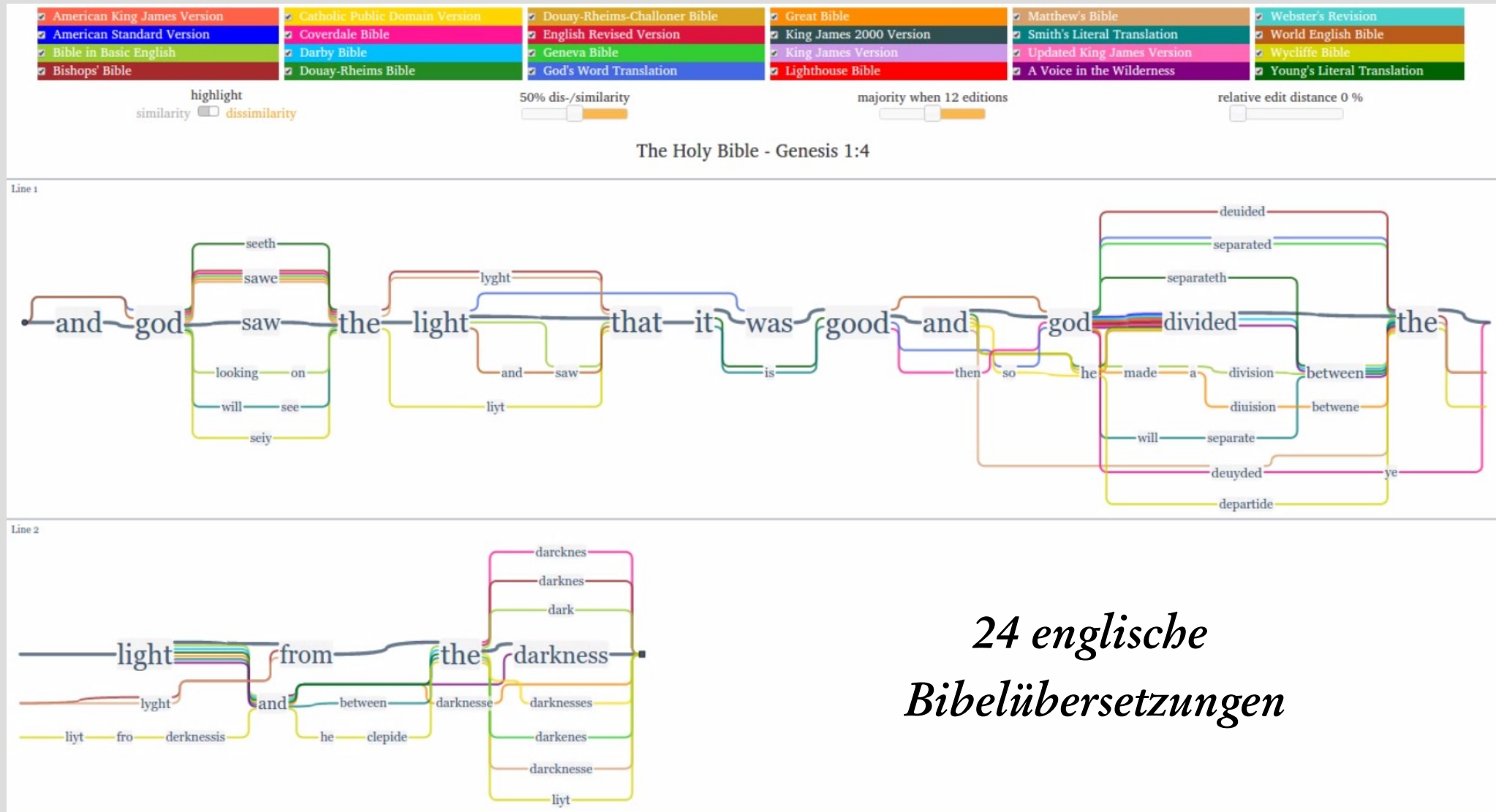
## Variant Graph Design

- 1) Textgröße für Häufigkeit einer Variante
- 2) ungerichtete Kanten verwenden
- 3) Farbige Kanten zur Unterscheidung zwischen Editionen
- 4) mehrfache Kanten bündeln
- 5) Zeilenumbrüche verwenden





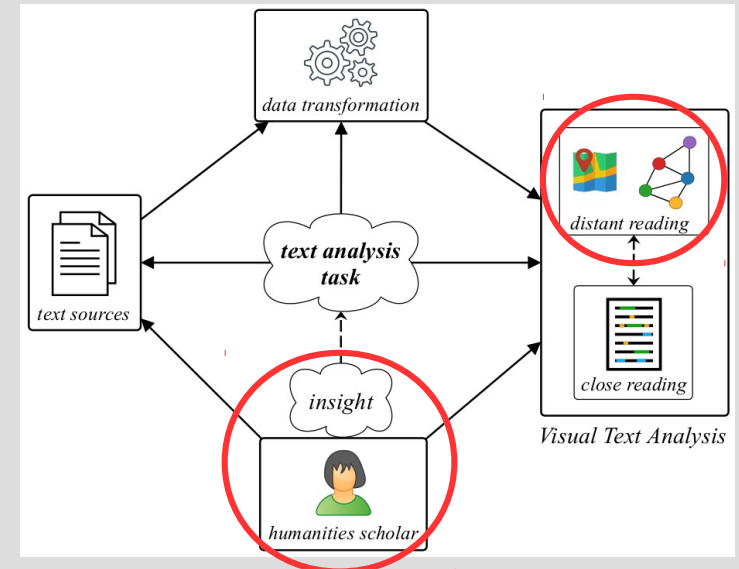
# Visuelle Analyse von Editionstexten



# Visuelle Analyse von Editionstexten

## *Ergebnisse:*

- viele Anwendungsfälle
- intuitives Design
- Visualisierung erleichtert die Arbeit mit Texteditionen auf Satzebene



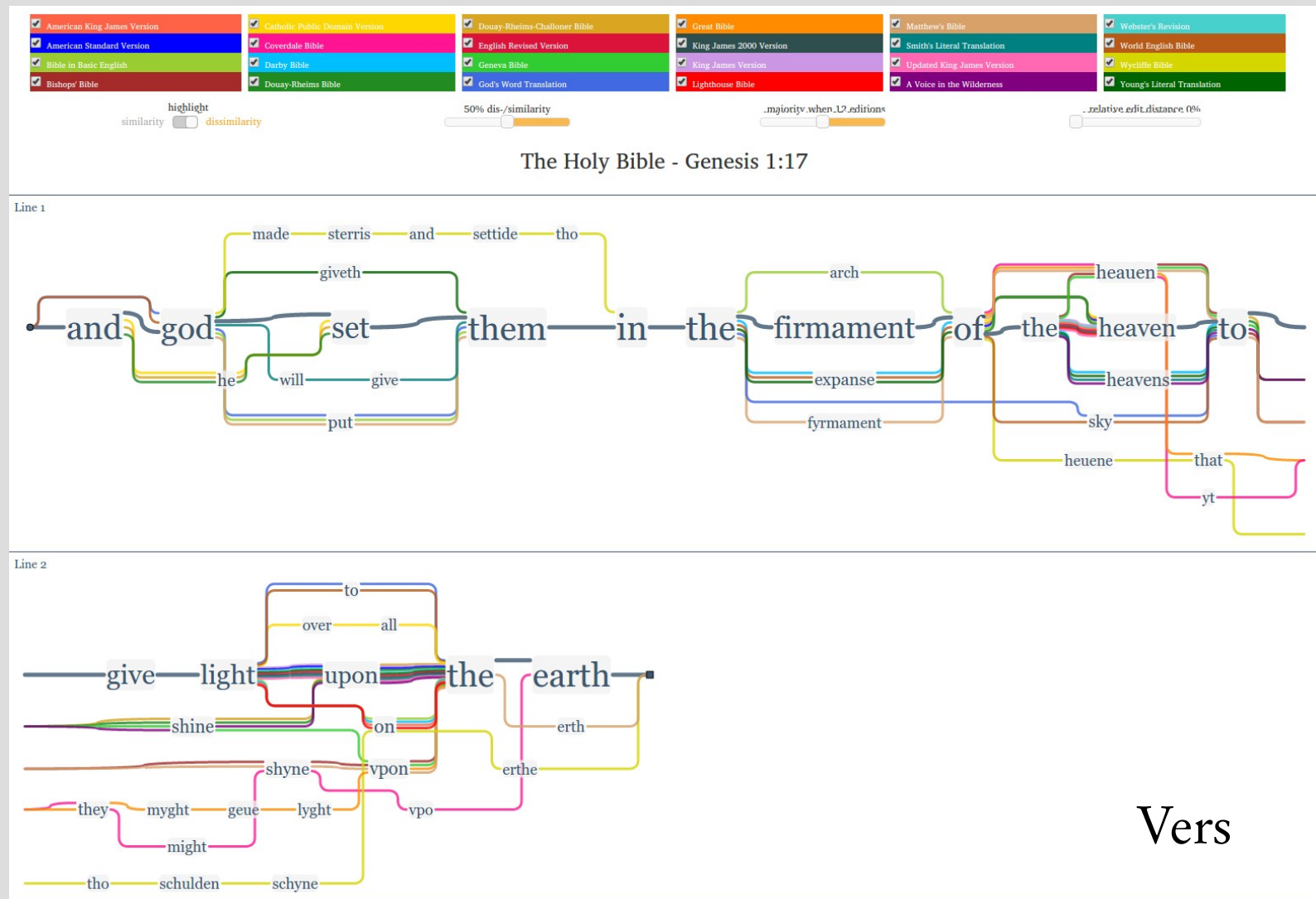
## *Distant Reading Visualisierung*

erlaubt Fragestellungen über Satzebene heraus, z.B.:

*Welche Bücher der Bibel sind über alle Editionen sehr ähnlich?*

*Welche Editionen unterscheiden sich signifikant an welchen Passagen (und warum)?*

# Visuelle Analyse von Editionstexten



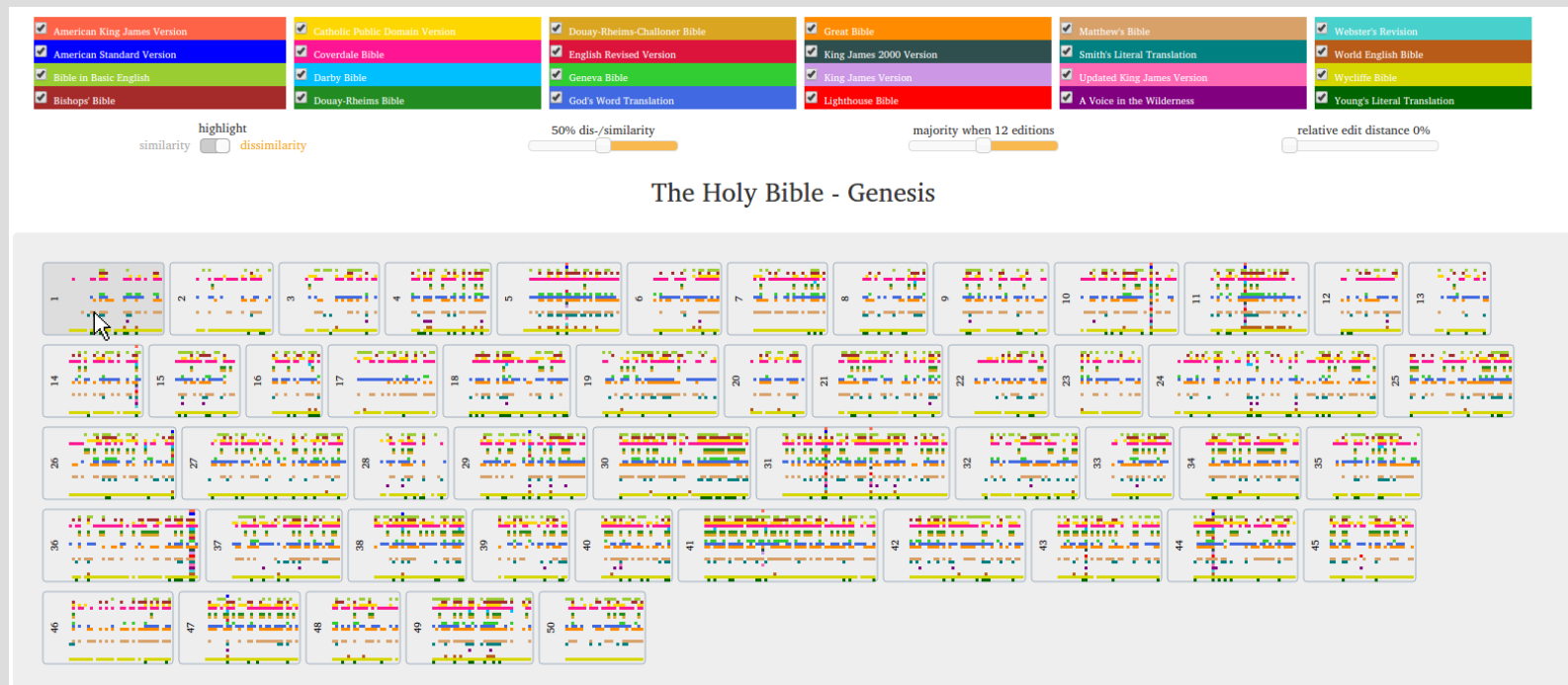


# Visuelle Analyse von Editionstexten



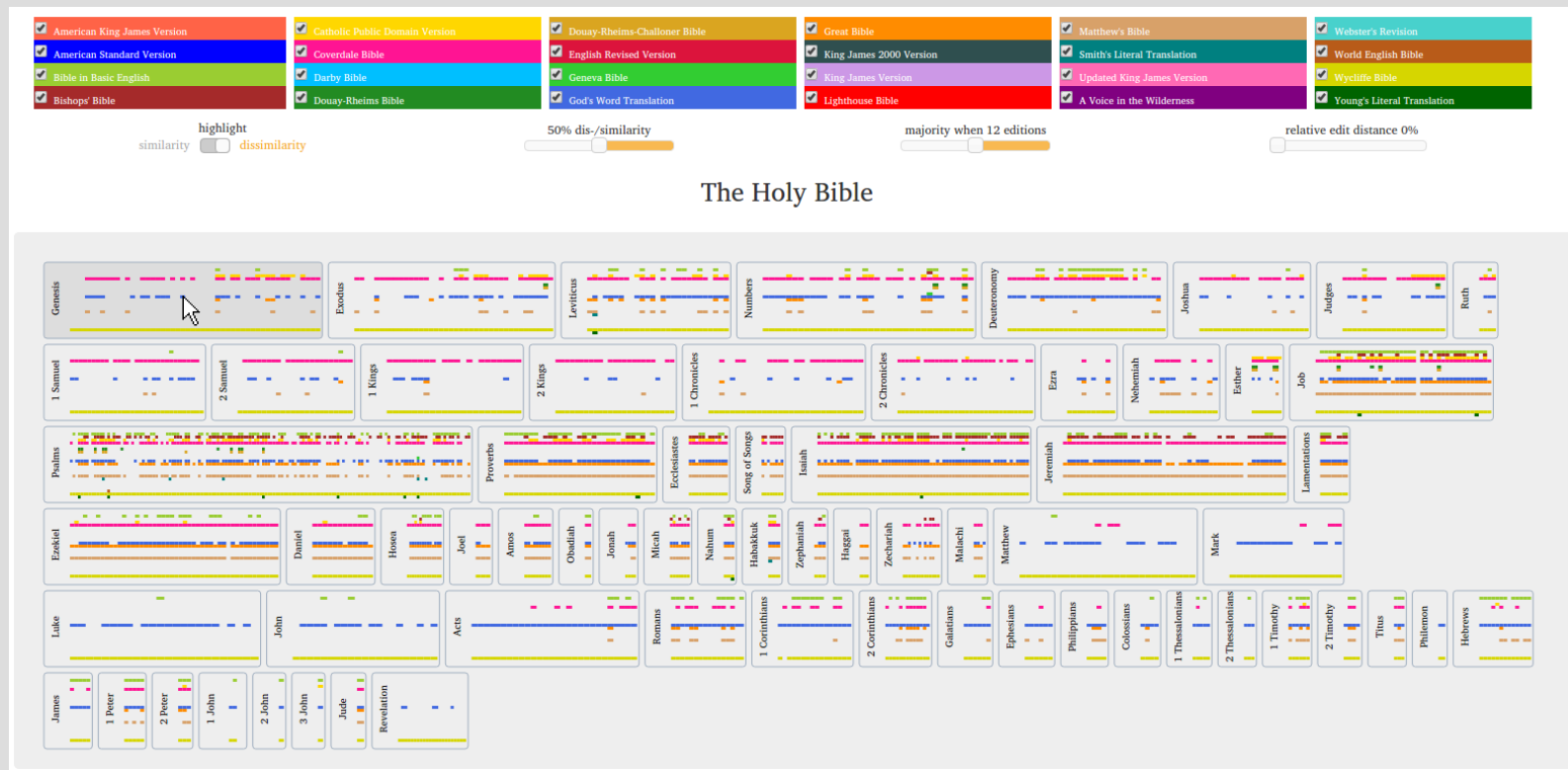
Kapitel

# Visuelle Analyse von Editionstexten



Buch

# Visuelle Analyse von Editionstexten

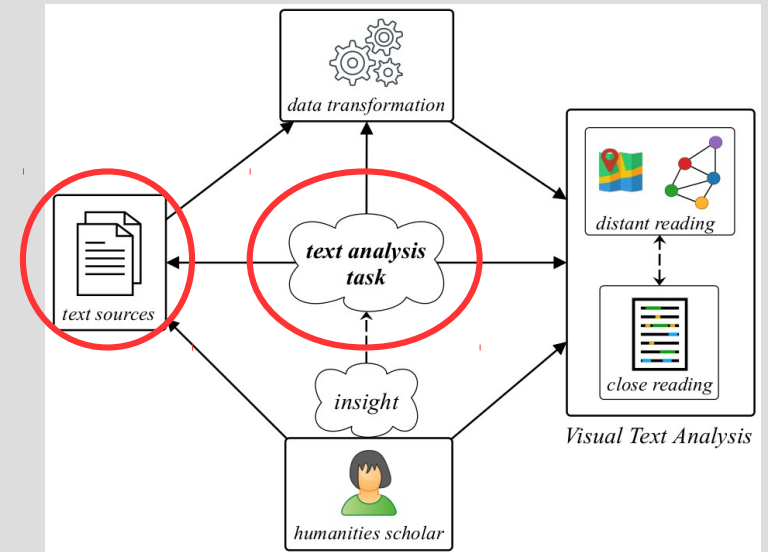


Bibel



# Visuelle Analyse von Editionstexten

*Forschungsaufgabe:*  
Alignment mittelalterlicher  
Texteditionen und  
Visualisierung der Ergebnisse



*Textkorpus:*

7 Editionen des *Chanson de Roland*

(Venise 4, Chateauroux 1, Venice 7, Paris 860, Lyon BM 743,  
Lavergne BnF 14658, Camb. Trinity R.3.32)

# Visuelle Analyse von Editionstexten

*Oxford  
Manuskript*

Charlle li rois a la barbe grifaïne  
Sit anz toz plenz a esté en Espaigne;  
Conquis la terre jusqe la mer alteïne.  
En meint estor fu veüe s'enseïne.  
  
Ne trove bore ne castel q'il nen plaigne,  
Ne mur tant aut q'a la terre nen fraigne;  
Fors Saragoze au chef d'une montaigne.  
La est Marsille qi la loi Deo nen daigne;  
Mahomet sert, mot fait folle gaaigne. io  
Ne poit durer qe Charles ne le taïne,  
Car il n'a home de lui servir se feigne,  
Fors Gainelon qi l treit por engaigne.  
Jamais n'est jor qe li rois ne s'en plegne.

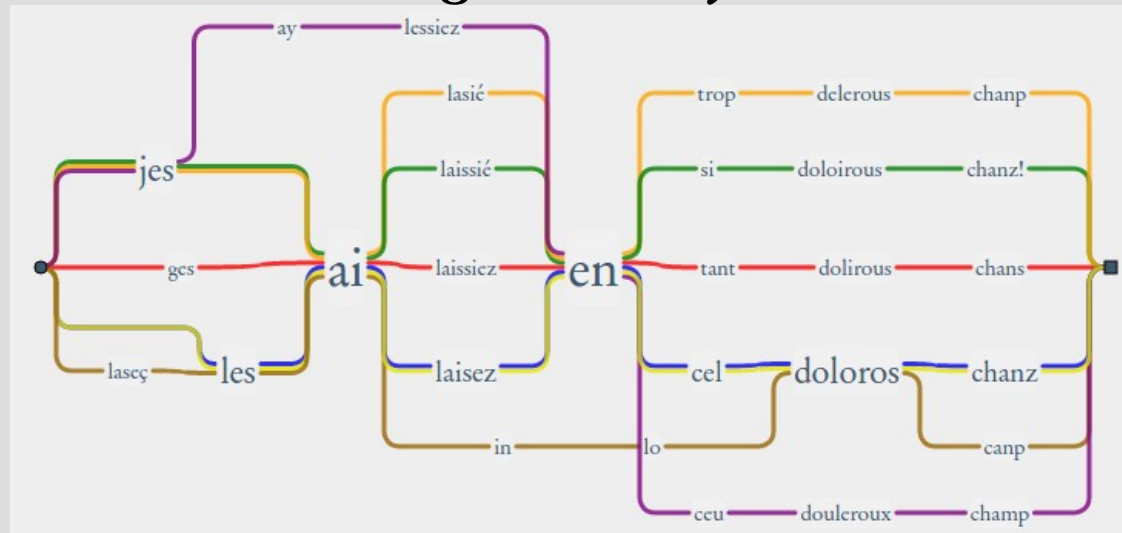
*Venice 7  
Manuskript*

Carles li reis, nostre emper[er]e magnés  
Set anz tuz pleins ad estet en Espaigne:  
Tresqu'en la mer cunquist la tere altaïne.  
N'i ad castel ki devant lui remaigne;  
  
Mur ne citet n'i est remes a fraindre,  
Fors Sarraguce, ki est en une muntaïne.  
Li reis Marsilie la tient, ki Deu nen aimet;  
Mahumet sert e Apollin reclimet:  
Nes poet garder que mals ne l'i ateignet.  
aoi.

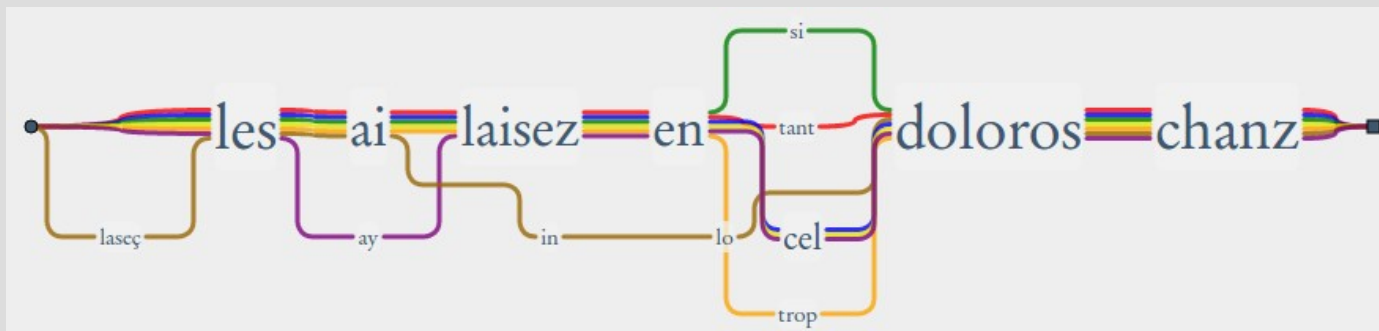
*Ist ein (semi-)automatisches  
Alignment überhaupt möglich?*

# Visuelle Analyse von Editionstexten

*String Similarity = 1*



*String Similarity = 0.6*





# Visuelle Analyse von Editionstexten

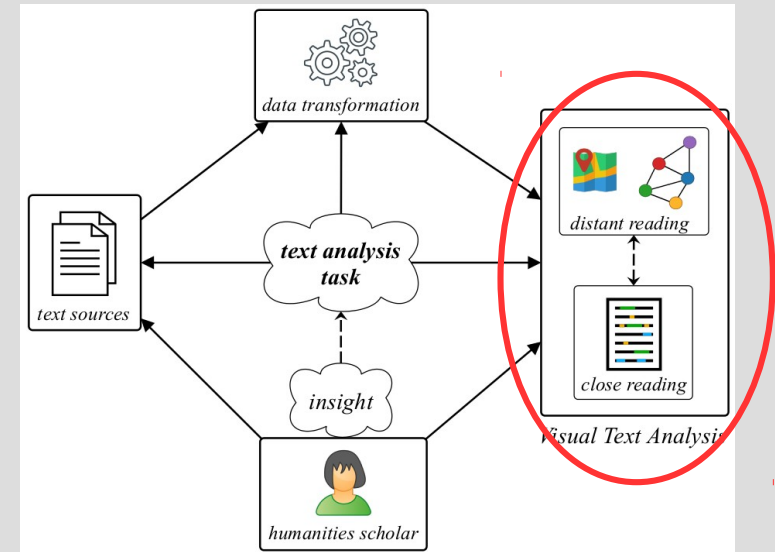
## *Experimentelle Ergebnisse:*

### 1) Oxford Manuskript

4,002 Zeilen, ~30,000 Wortformen

### 2) Venice 7 Manuskript

6,002 Zeilen, ~55,000 Wortformen



$4,002 \cdot 6,002 = 24,020,004$  Alignment Berechnungen

→ 1,759 automatisch ermittelte Alignments

→ *Visuelle Analyse*

# Song of Roland

## Oxford manuscript

## Venice 7 manuscript

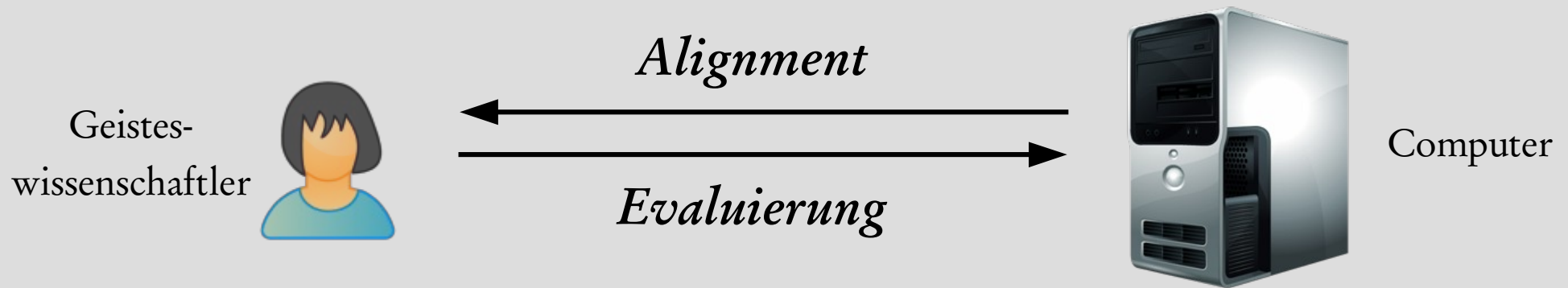
Oxford

Venice 7



# Visuelle Analyse von Editionstexten

## *Erweiterung des Ansatzes um Visual Analytics Feedback Loop*



- Markieren von positiven und negativen Resultaten
- Eigenschaften re-konfigurieren Parameter des nächsten Durchlaufs

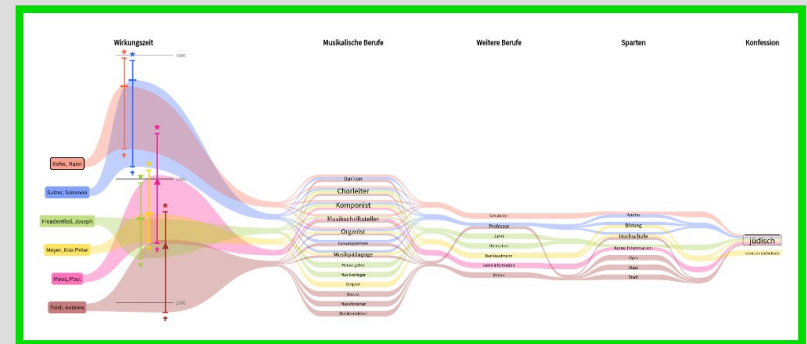


# Musikerprofiling

S. Jänicke, J. Focht and G. Scheuermann (2016),  
Interactive Visual Profiling of Musicians,  
*IEEE Transactions on Visualization and Computer Graphics*.

R. Khulusi and S. Jänicke (2016),  
On the Distant Reading of Musicians' Biographies, *Digital Humanities 2016*.

S. Jänicke and J. Focht (2017),  
Untangling the Social Network of Musicians,  
Submitted to *Digital Humanities 2017*.



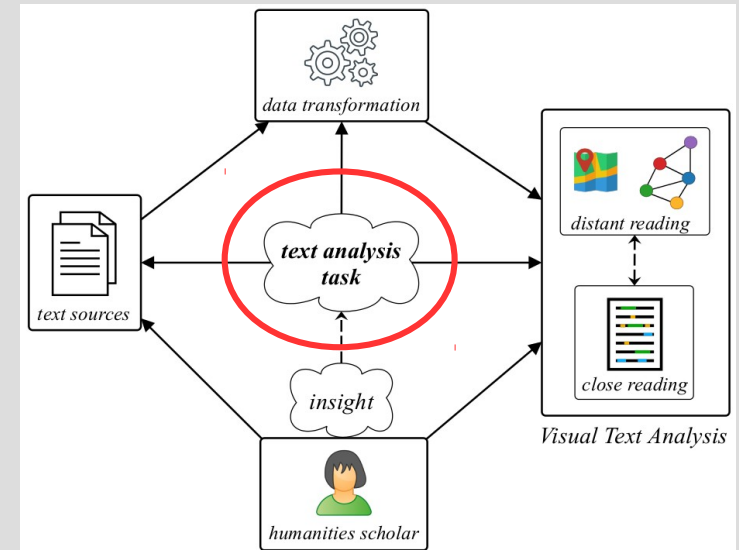
# Musikerprofiling

## *Forschungsfrage:*

Welche Musiker X,Y,Z sind  
am ähnlichsten zu Musiker A?  
(Rasterfahndung, Profiling)

## *Textkorpus:*

musikwissenschaftliche Literatur  
(Lexika, Periodika, Reihen etc.)

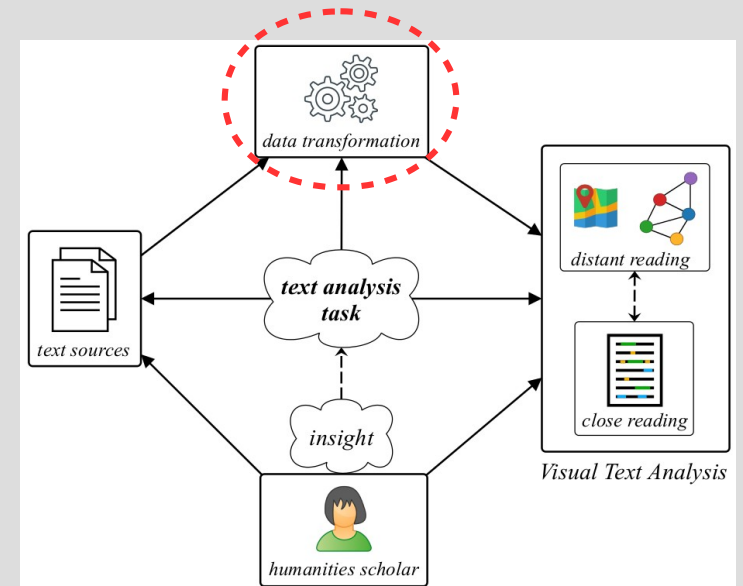


# Musikerprofiling

## *Datentransformation:*

manuell durch Musikwissenschaftler im Rahmen des Projektes „Bayerisches Musiker Lexikon Online“ (BMLO)

<http://www.bmlo.de/>



→ Datenbank mit biografischen Informationen zu ca. 28,000 Musikern  
(Komponisten, Instrumentenbauer, Kapellmeister,  
Sänger, Instrumentalisten, Spielgrafen, ...)

# Musikerprofiling

## *Beispiel:*

**Mozart, Wolfgang Amadeus** (Johann Chrysostom Wolfgang Amadeus, Joannes Chrysostomus Wolfgangus Theophilus, Johannes Chrysostomus Wolfgangus Theophilus, Wolfgang Amadé, Wolfgango Amadeo, Johannes Chrysostomus Wolfgang Gottlieb)

\* 27. Januar 1756 Salzburg, † 5. Dezember 1791 Wien

**Geschlecht** männlich

**Konfession** römisch-katholisch

### ▼ **Beziehungen**

- ▶ Eltern
- ▶ Geschwister
- ▶ Kinder
- ▶ Partner
- ▶ Schwager und Schwägerinnen
- ▶ Lehrer
- ▶ Schüler
- ▶ Vorgänger
- ▶ Netzwerk

**Musikalische Berufe** Komponist, Kapellmeister, Konzertmeister, Pianist, Organist, Geiger, Sänger

**Zeitgenössische Angaben** *Componist, Kapellmeister, Konzertmeister, Ritter des goldenen Sporns, cavaliere*

**Träger/Sparte** Hof, Stadt

**Wirkungsorte** **Salzburg, Wien**, Amsterdam, Berlin, Bologna, Frankfurt/Main, London, Mailand, Mannheim, München, Paris, Potsdam, Prag, Wallerstein

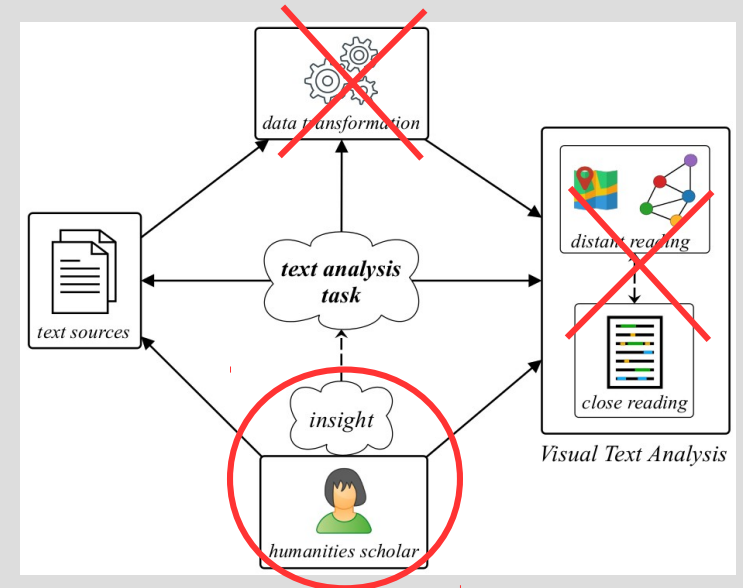




# Musikerprofiling

## *Übliche Arbeitsweise:*

Erschließung von Ähnlichkeiten mittels  
Literaturrecherche (Printmedien, Internet)



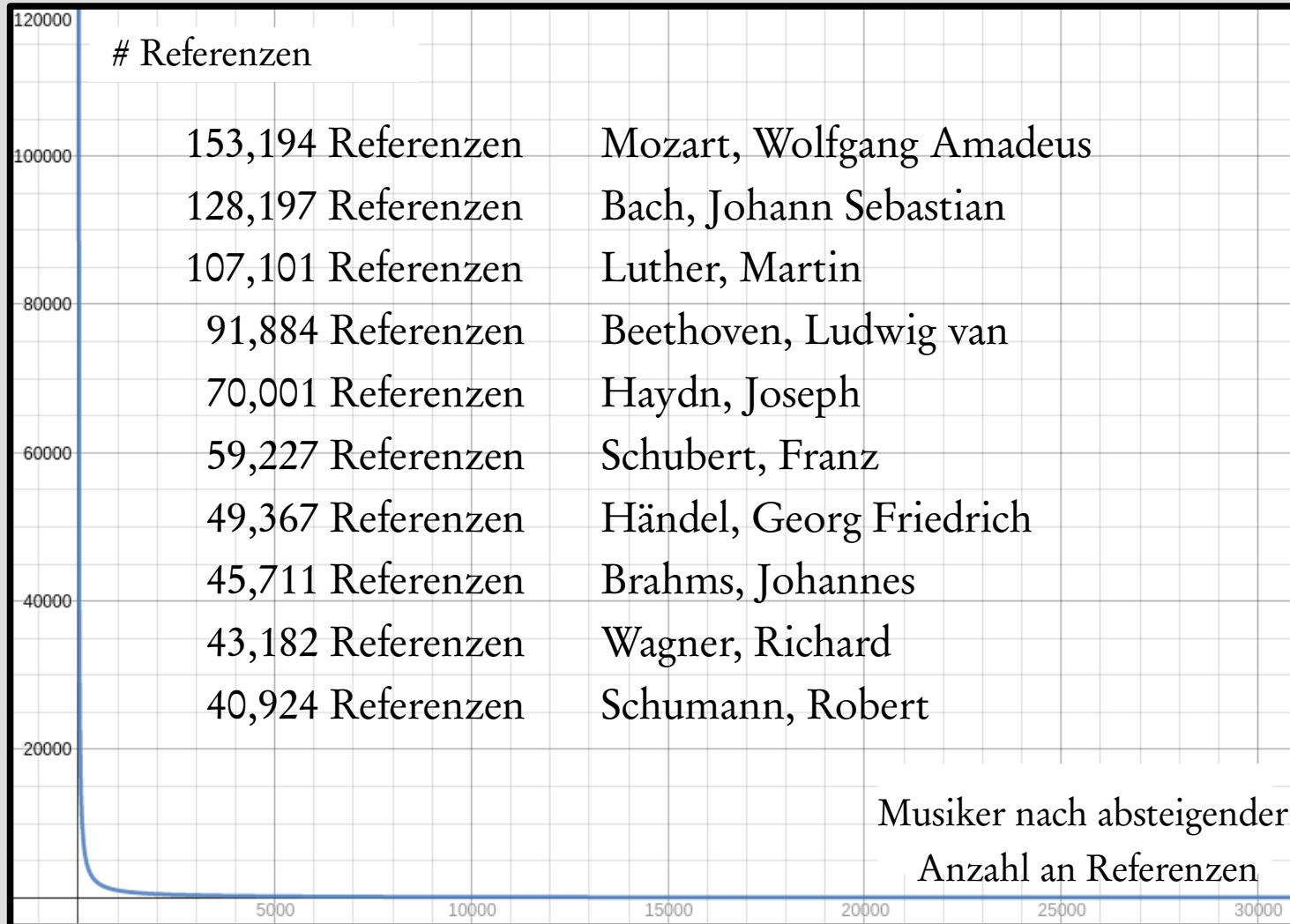
## *Problem:*

inhomogener Forschungsstand

→ musikwissenschaftliche Forschung konzentriert sich  
vorwiegend auf 50 populäre Musiker (Komponisten)

# Musikerprofilung

Antiproportionales Verhältnis zwischen Anzahl an Referenzen und Popularitätsgrad

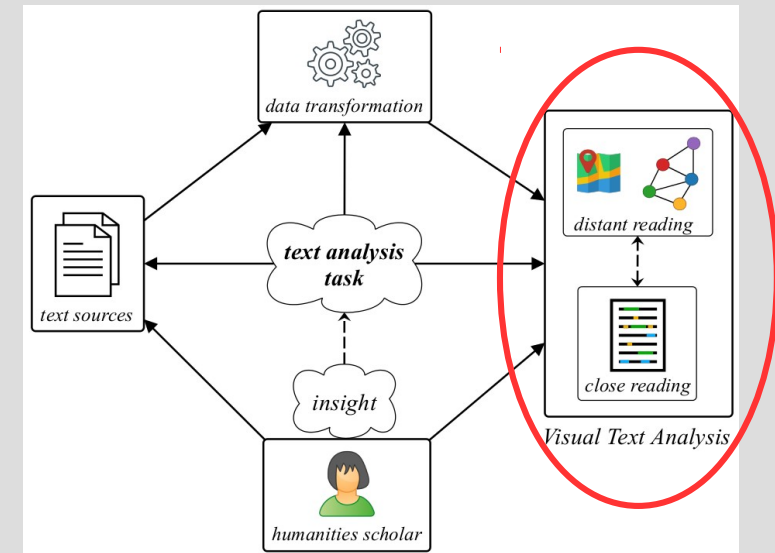


0,3% der Musiker  
erzeugen die Hälfte  
aller Referenzen

# Musikerprofiling

## *Musiker Profiling System:*

- Bezug auf alle 28.000 Musiker der BMLO
- minimiert Inhomogenität der Daten

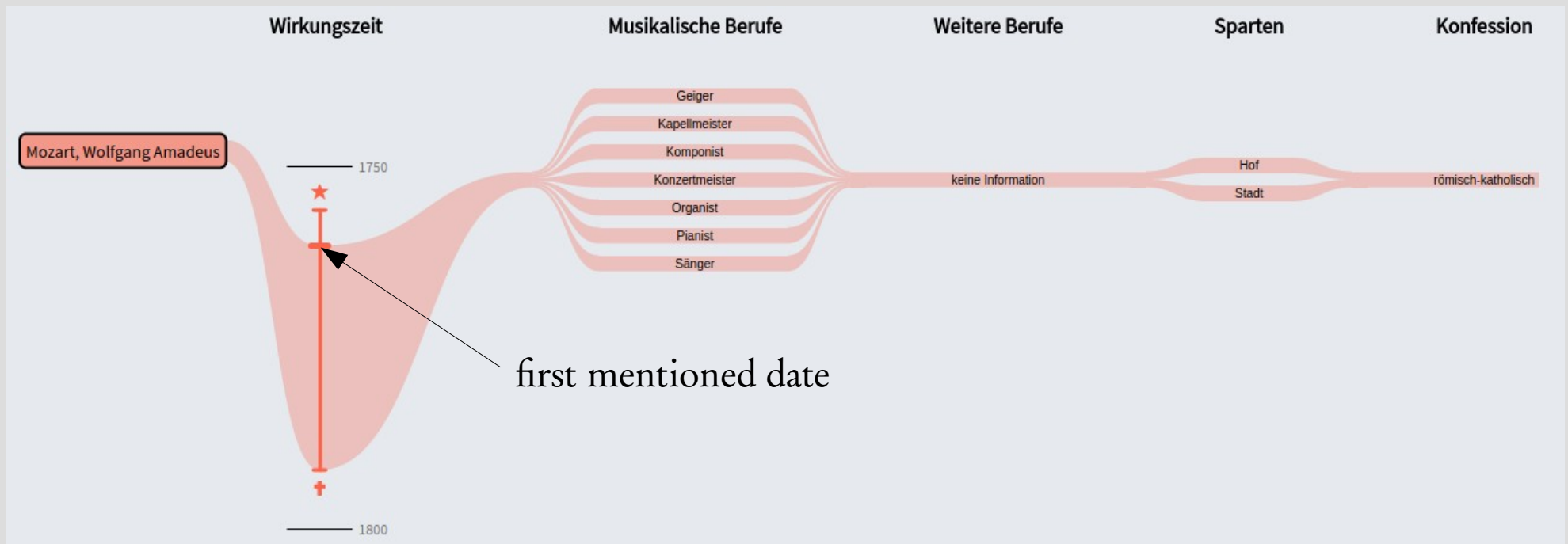


## *Visual Analytics Paradigma:*

*Nutzer kann Profiling durch Wichtung  
von Ähnlichkeitsmaßen entsprechend  
der Forschungsfrage steuern*

# Musikerprofilung

## *Profilvisualisierung: Column Explorer*



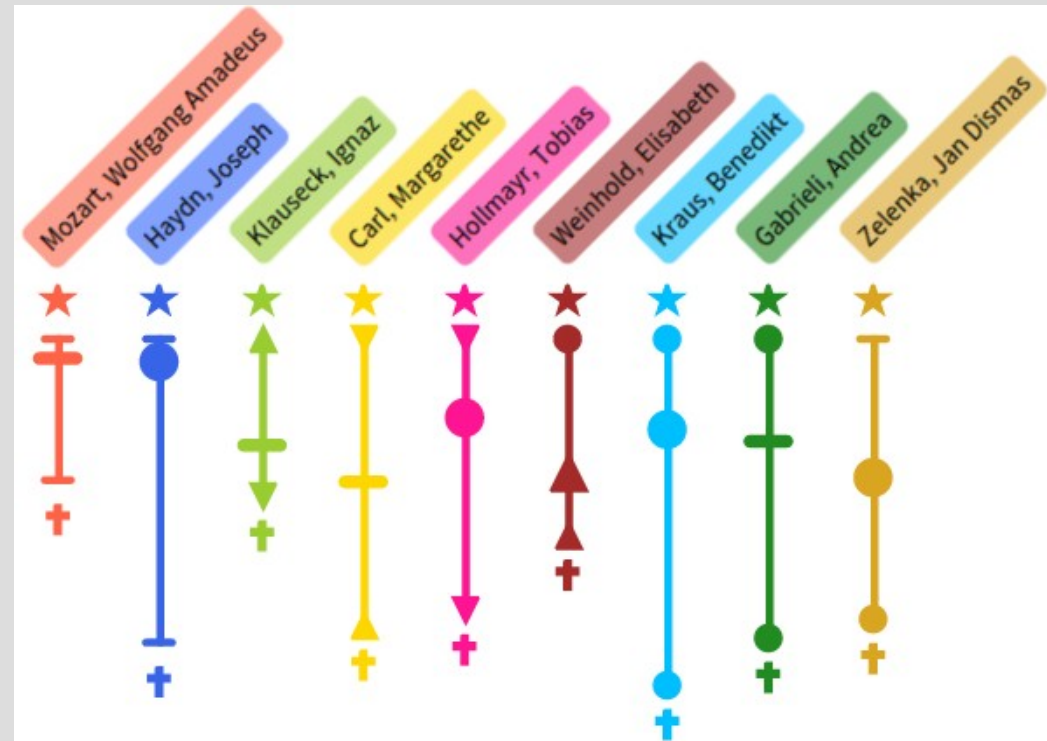


# Musikerprofilung

## *Profilvisualisierung: Column Explorer*

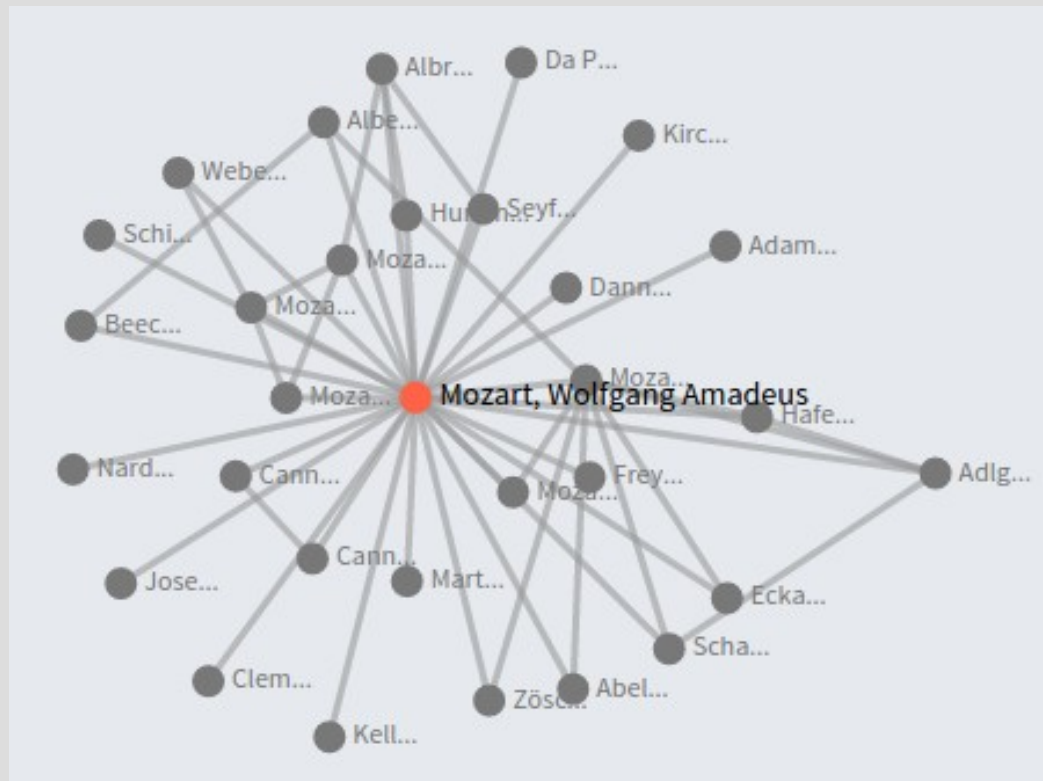
### Unsichere Zeitangaben

uncertainty	dating year	difference
before/after	$\leq 1700$	- / + 30 years
	1701 – 1800	- / + 25 years
	1801 – 1900	- / + 10 years
	> 1900	- / + 5 years
around	$\leq 1500$	$\pm 20$ years
	1501 – 1600	$\pm 15$ years
	1601 – 1700	$\pm 8$ years
	1701 – 1800	$\pm 5$ years
	1801 – 1900	$\pm 3$ years
	> 1900	$\pm 2$ years



# Musikerprofiling

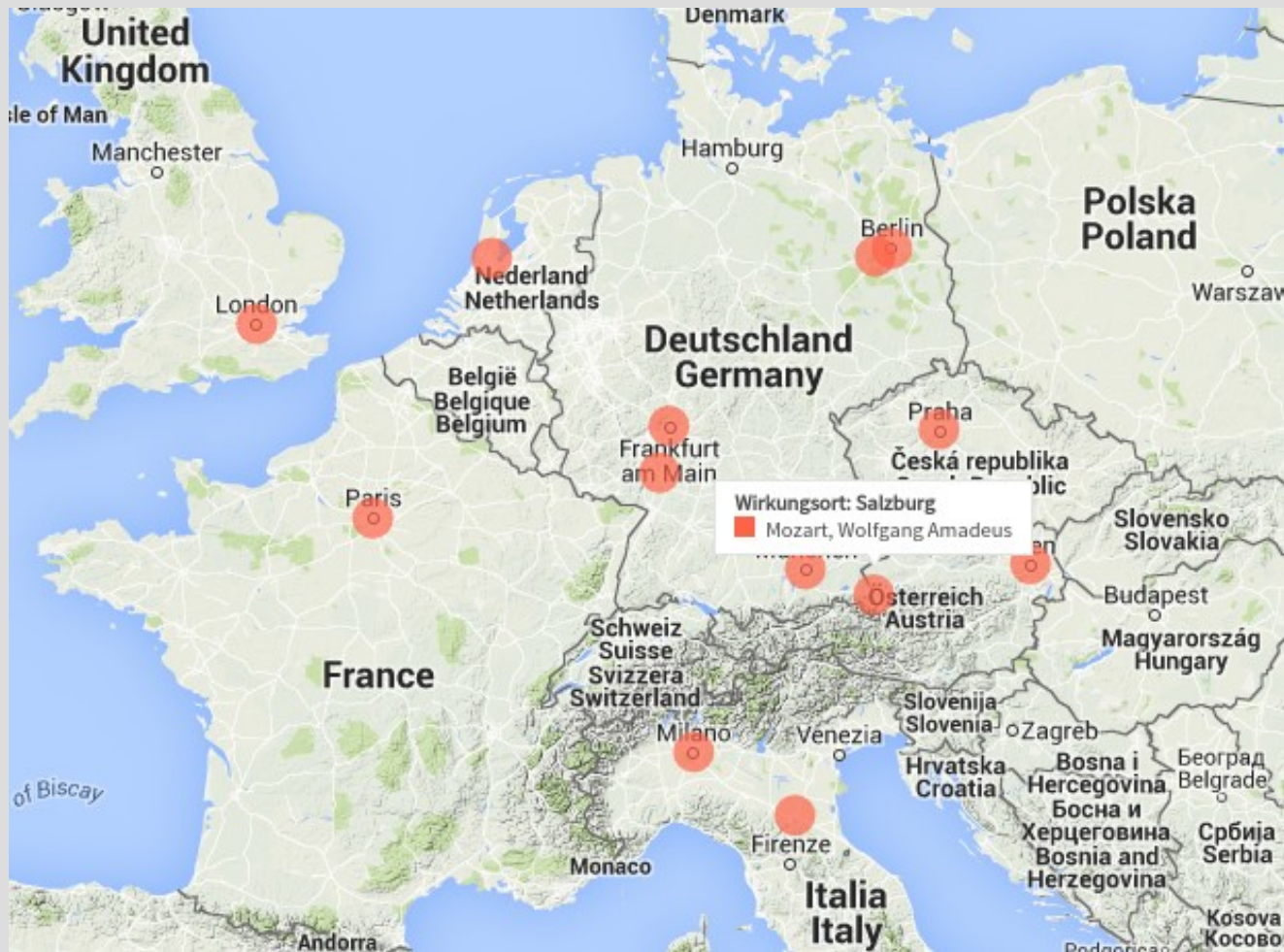
## *Profilvisualisierung: Soziales Netzwerk*



category	relationship	$s_{rel}$
family of origin	parents, children, siblings	1
	grandparents, grandchildren	
partnership	partners	1
education	fellow students, teachers, students	0.8
relatives	cousins, nephews, nieces, uncles, aunts, great uncles, great aunts, grandnephews, grandnieces	0.6
godparenthood	godparents, godchildren	0.6
affinity	parents in law, children in law	0.4
	brothers/sisters in law	
personal relationships	network, patrons, protégés	0.4
working environment	colleagues, predecessors,	0.2
	successors	
dedication	dedication donors & recipients	0.2

# Musikerprofiling

## *Profilvisualisierung: Karte*



# Musikerprofiling

## *Musiker Profiling System: Ähnlichkeitsmaße*

1. Geschlecht

2. Wirkungszeit

3. Wirkungsraum

4. Musikalische Berufe

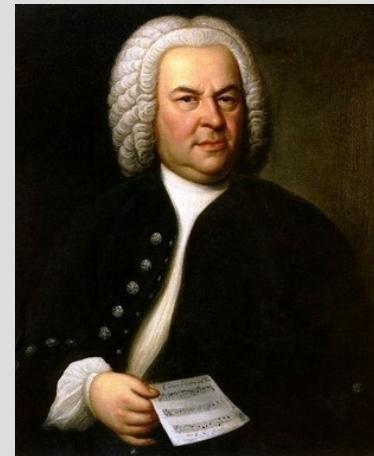
5. Weitere Berufe

6. Beziehungen

7. Sparten

8. Konfession

$$S_1^{sex}(m_i, m_j) = \begin{cases} 1, & \text{if sexes are equal} \\ 0, & \text{otherwise} \end{cases}$$



$$S_1^{sex} = 1$$



# Musikerprofiling

## *Musiker Profiling System: Ähnlichkeitsmaße*

1. Geschlecht

2. Wirkungszeit

3. Wirkungsraum

4. Musikalische Berufe

5. Weitere Berufe

6. Beziehungen

7. Sparten

8. Konfession

$$S_1^{sex}(m_i, m_j) = \begin{cases} 1, & \text{if sexes are equal} \\ 0, & \text{otherwise} \end{cases}$$



$$S_1^{sex} = 0$$

# Musikerprofilung



## *Musiker Profiling System: Ähnlichkeitsmaße*

1. Geschlecht

2. Wirkungszeit

3. Wirkungsraum

4. Musikalische Berufe

5. Weitere Berufe

6. Beziehungen

7. Sparten

8. Konfession

$$S_i(m_i, m_j) = J\left(f(m_i), f(m_j)\right) = \frac{|f(m_i) \cap f(m_j)|}{|f(m_i) \cup f(m_j)|}$$

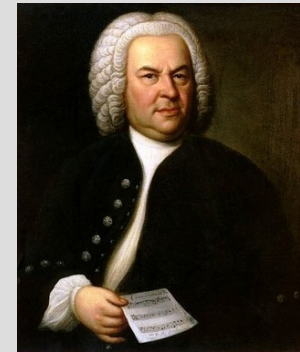
# Musikerprofiling

## *Musiker Profiling System: Ähnlichkeitsmaße*

1. Geschlecht
2. Wirkungszeit
3. Wirkungsraum
4. Musikalische Berufe
5. Weitere Berufe
6. Beziehungen
7. Sparten
8. Konfession



Komponist, Kapellmeister,  
Organist, Geiger, Sänger,  
Konzertmeister, Pianist



Komponist, Kapellmeister,  
Organist, Dirigent,  
Kompositionslehrer, Klavierlehrer,  
Cembalist, Chorleiter,  
Musikpädagoge

$$S_4^{mus}(m_i, m_j) = \frac{|mus(m_i) \cap mus(m_j)|}{|mus(m_i) \cup mus(m_j)|} = \frac{3}{13} = 0.23$$

# Musikerprofiling



## *Musiker Profiling System: Ähnlichkeitsmaße*

1. Geschlecht

2. Wirkungszeit

3. Wirkungsraum

4. Musikalische Berufe

5. Weitere Berufe

6. Beziehungen

7. Sparten

8. Konfession

*geografische Distanz*

*politische Distanz*

München/Nürnberg?

München/Berlin?

Wien/Salzburg?

Wien/Bratislava?



# Musikerprofiling

## *Musiker Profiling System: Ähnlichkeitsmaße*

1. Geschlecht
2. Wirkungszeit
3. Wirkungsraum
4. Musikalische Berufe
5. Weitere Berufe
6. Beziehungen
7. Sparten
8. Konfession

### Beziehungsstärken $s_{rel}$

category	relationship	$s_{rel}$
family of origin	parents, children, siblings grandparents, grandchildren	1
partnership	partners	1
education	fellow students, teachers, students	0.8
relatives	cousins, nephews, nieces, uncles, aunts, great uncles, great aunts, grandnephews, grandnieces	0.6
godparenthood	godparents, godchildren	0.6
affinity	parents in law, children in law brothers/sisters in law	0.4
personal relationships	network, patrons, protégés	0.4
working environment	colleagues, predecessors, successors	0.2
dedication	dedication donors & recipients	0.2

# Musikerprofiling

## *Musiker Profiling System: Ähnlichkeitsmaße*

1. Geschlecht
2. Wirkungszeit
3. Wirkungsraum
4. Musikalische Berufe
5. Weitere Berufe
6. Beziehungen
7. Sparten
8. Konfession

$$S_6^{rel} = 1$$

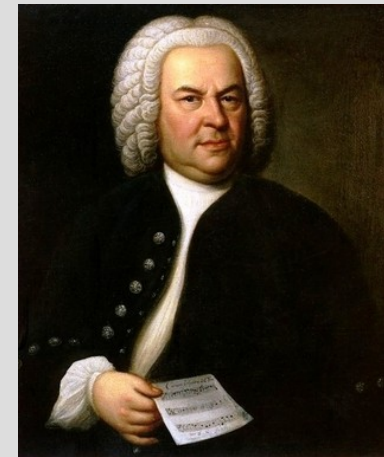


# Musikerprofiling

## *Musiker Profiling System: Ähnlichkeitsmaße*

1. Geschlecht
2. Wirkungszeit
3. Wirkungsraum
4. Musikalische Berufe
5. Weitere Berufe
6. Beziehungen
7. Sparten
8. Konfession

$$S_6^{rel} = 0.1$$



# Musikerprofiling



*Musiker Profiling System: Ähnlichkeit zwischen 2 Musikern*

$$S(m_i, m_j) = \sum_{k=1}^8 w_k \cdot S_k$$

1. Geschlecht
2. Wirkungszeit
3. Wirkungsraum
4. Musikalische Berufe
5. Weitere Berufe
6. Beziehungen
7. Sparten
8. Konfession



# Musikerprofiling

## *Musiker Profiling System: Ähnlichkeit zwischen 2 Musikern*

1. Geschlecht
2. Wirkungszeit
3. Wirkungsraum
4. Musikalische Berufe
5. Weitere Berufe
6. Beziehungen
7. Sparten
8. Konfession

$$S(m_i, m_j) = \sum_{k=1}^8 w_k S_k$$

*Musiker  $m \rightarrow$  Gewicht  $w_4$  ?*

*$mus(m) = \{ \text{Komponist} \}$*

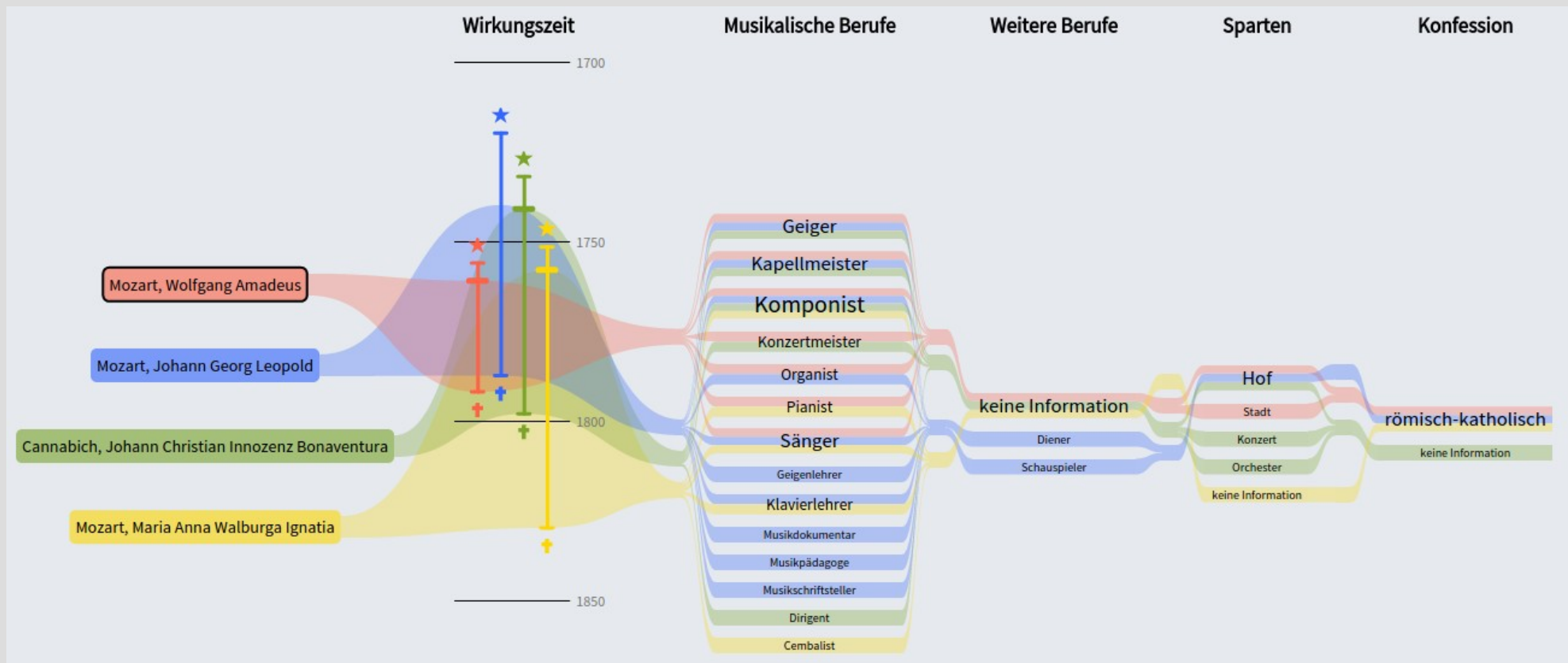
*4858 Komponisten  $\rightarrow w_4$  klein*

*$mus(m) = \{ \text{Spielgraf} \}$*

*15 Spielgrafen  $\rightarrow w_4$  groß*

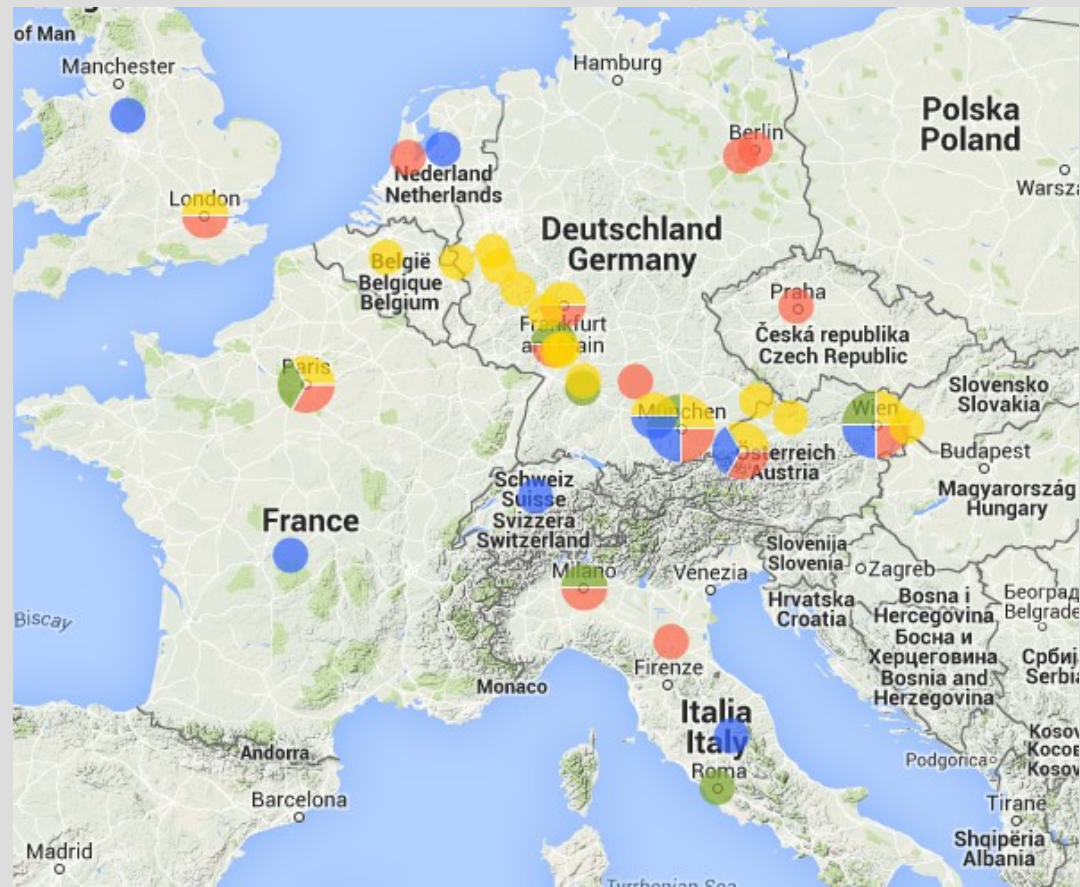
# Musikerprofilung

## Ähnliche Musiker: Column Explorer



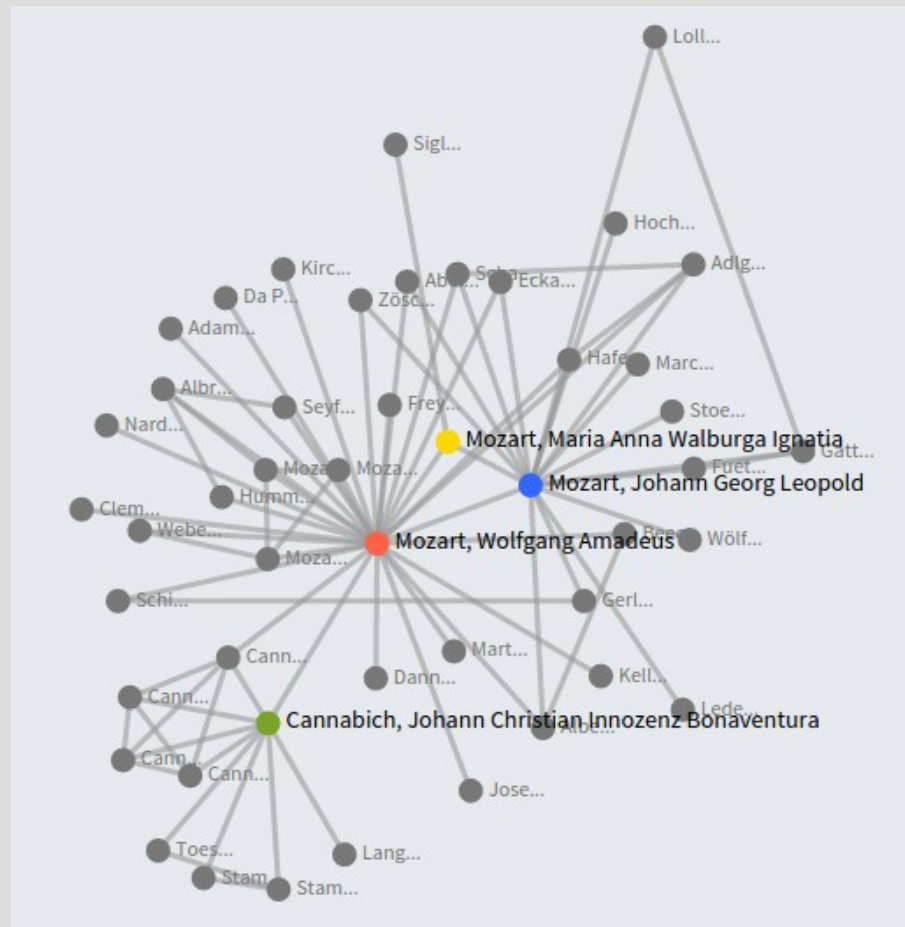
# Musikerprofilung

## *Ähnliche Musiker: Karte*



# Musikerprofilung

## *Ähnliche Musiker: Soziales Netzwerk*

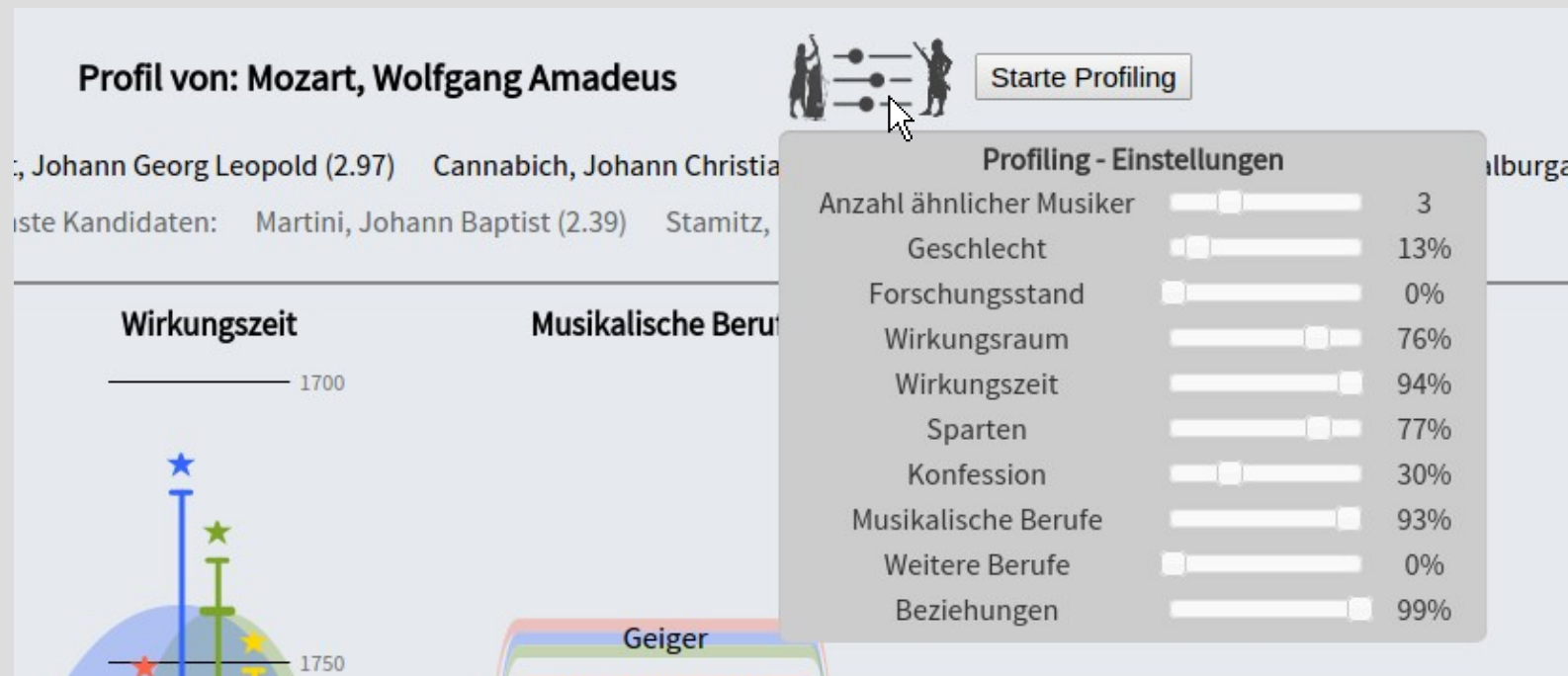




# Musikerprofiling

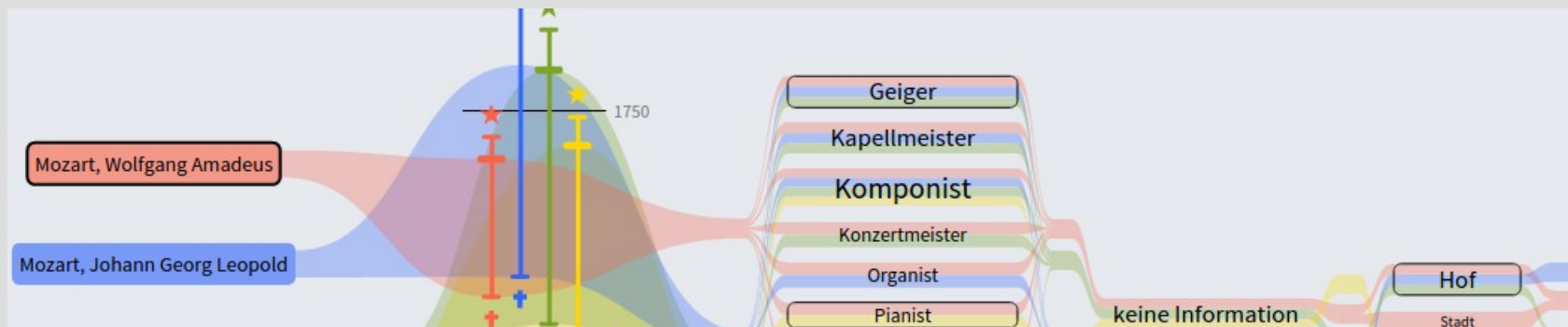
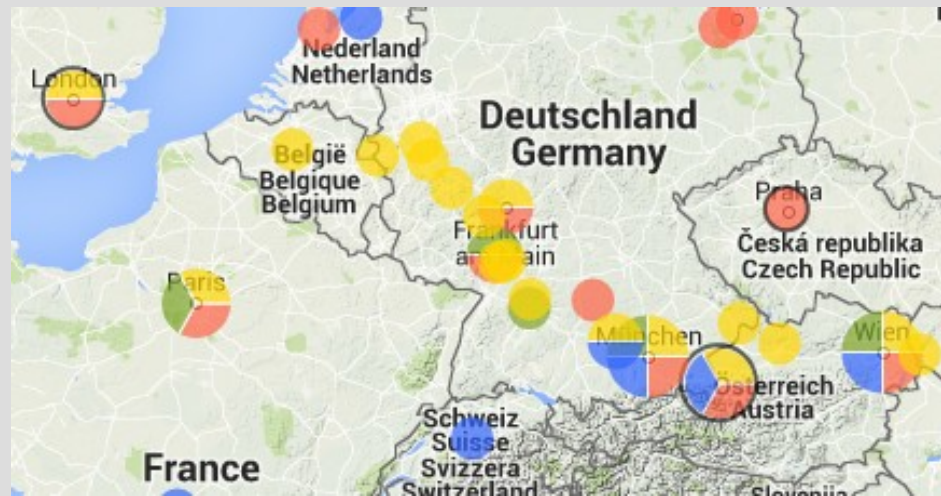
## *Visual Analytics Ansatz*

$$S(m_i, m_j) = \sum_{k=1}^8 w_k \cdot S_k$$



# Musikerprofilung

## *Vordefinierte Attribute*



# Musikerprofiling

*Nutzerstatistiken (seit 15.8.2015):*

4,240 Ähnlichkeitsberechnungen

1,084 Profilaufrufe

> 2,500 verschiedene Musiker

<http://profiling-musicians.vizcovery.org>



## *10+ Musiker*

Mozart, Wolfgang Amadeus (83)

Bach, Johann Sebastian (50)

Uffenbach, Johann Friedrich Armand (37)

Reger, Max (23)

Ferrandini, Giovanni Battista (22)

Wagner, Richard (20)

Mahler, Gustav (19)

Beethoven, Ludwig van (16)

Marsop, Paul (16)

Wich, Günther (12)

Damas, Paul (12)

Woehl, Waldemar (11)

Eppelsheim, Jürgen (11)

Rüdinger, Gottfried (10)

Delvard, Marya (10)

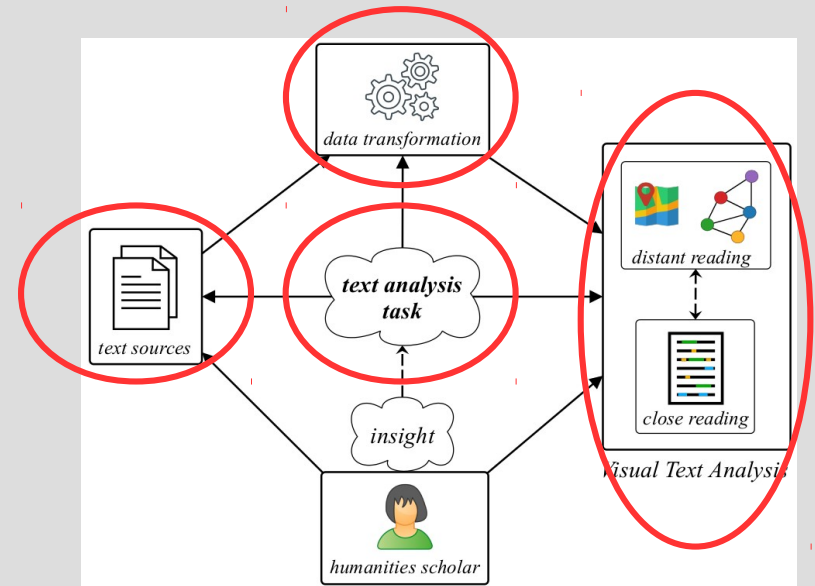
# Lehrernetzwerk

## *Forschungsfrage:*

Wie wurde musikalisches Wissen transferiert?

## *Daten:*

Beziehungsnetzwerk der BMLO

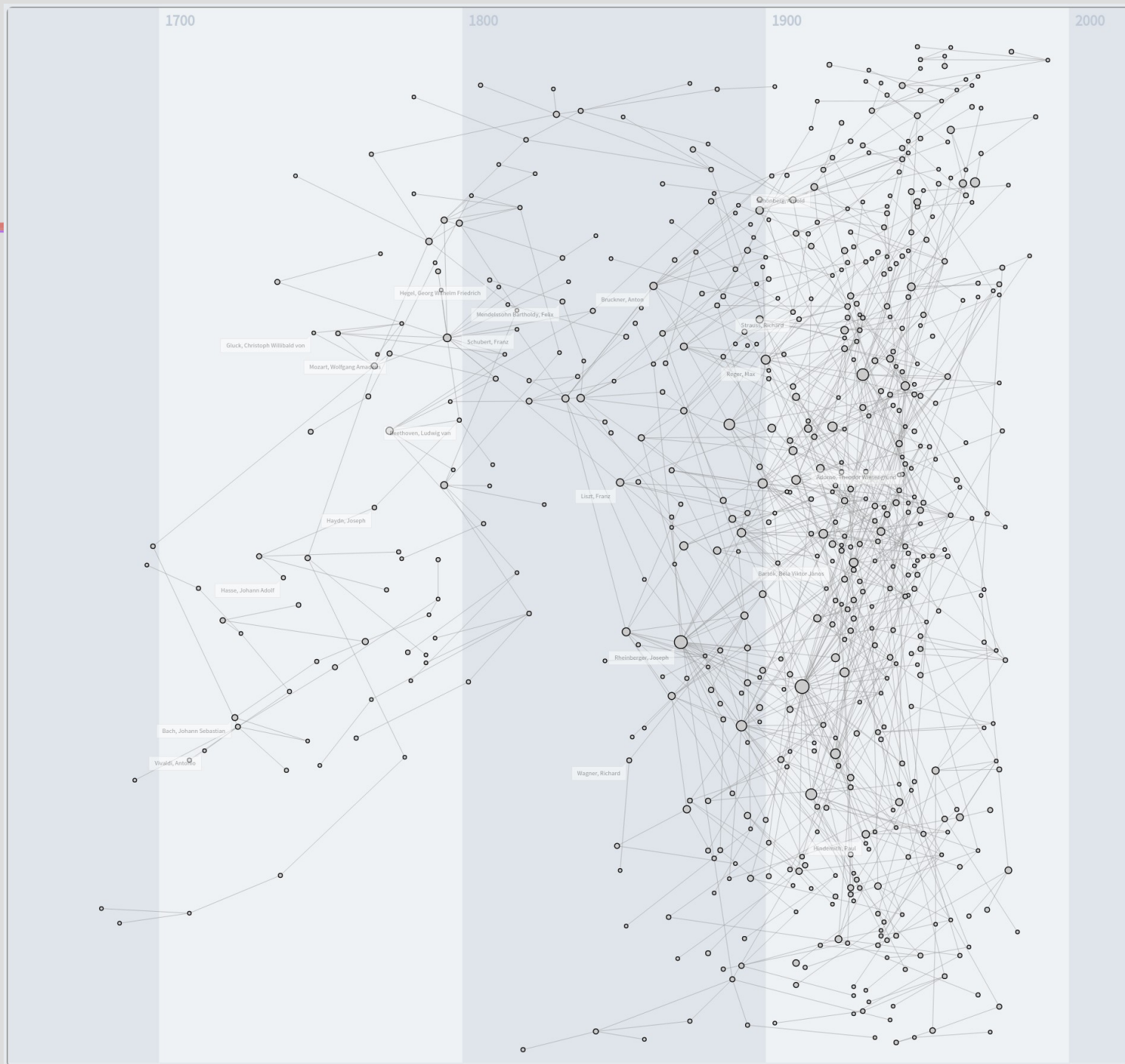


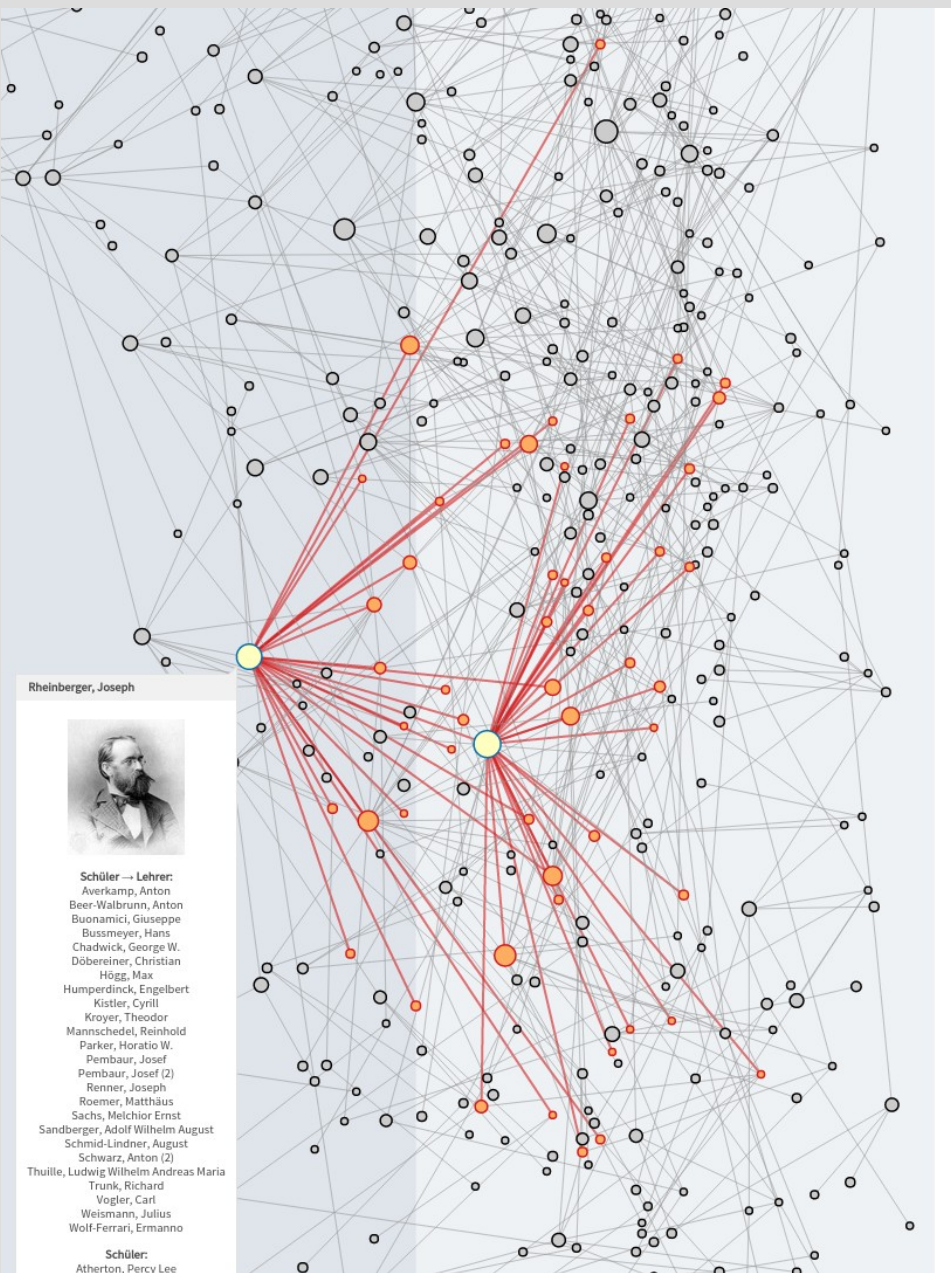
## *Visualisierung:*

Lehrer-Schüler Netzwerk

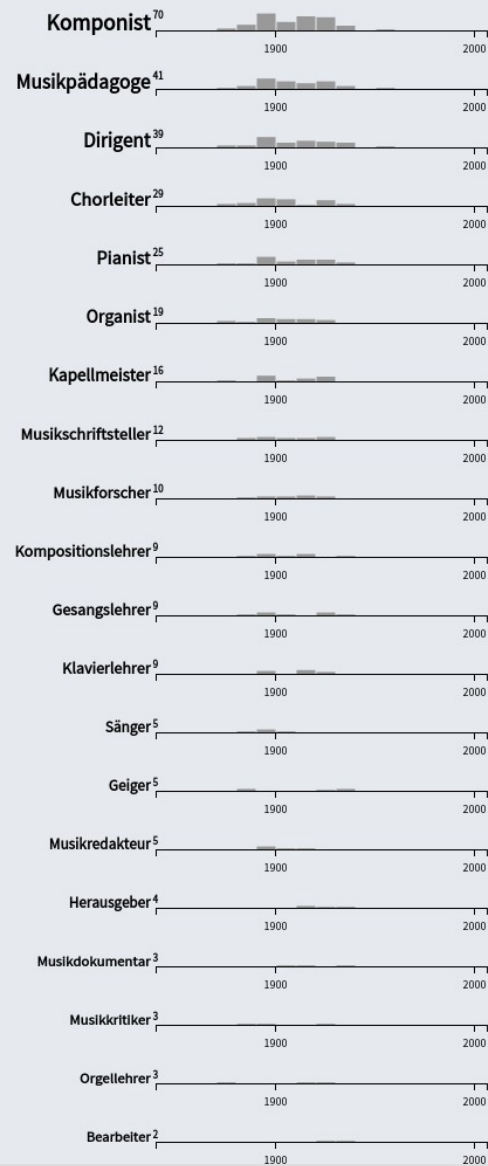
(ca. 5,000 Musiker, ca. 500 Jahre)



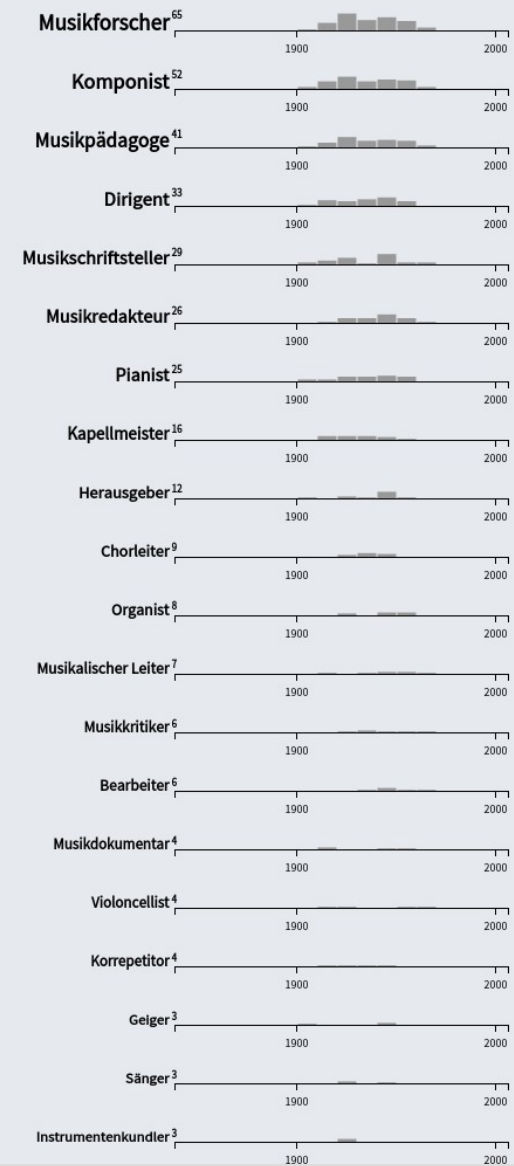




### Rheinberger, Joseph<sup>87</sup>

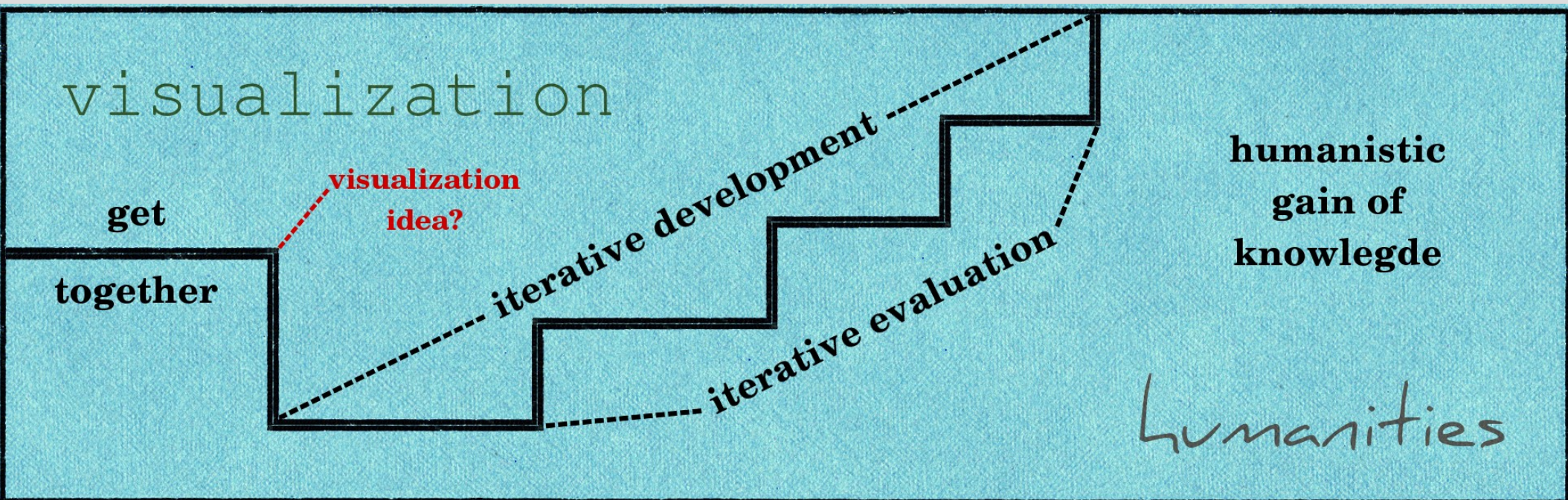


### Sandberger, Adolf Wilhelm August<sup>97</sup>





# Interdisziplinäre Zusammenarbeit in Digital Humanities Projekten



## *Visualisierung für die Geisteswissenschaften:*

- erleichtern Zugang zu großen Datenmengen
- erzeugen neue Perspektiven auf bekannte Daten
- stoßen Denkprozesse an

# Visualisierung

im Bereich Digital Humanities

*Vielen Dank für ihre Aufmerksamkeit!*  
*Gibt es Fragen?*

Stefan Jänicke  
[@vizcovery](#)



UNIVERSITÄT LEIPZIG

**vizcovery.org**