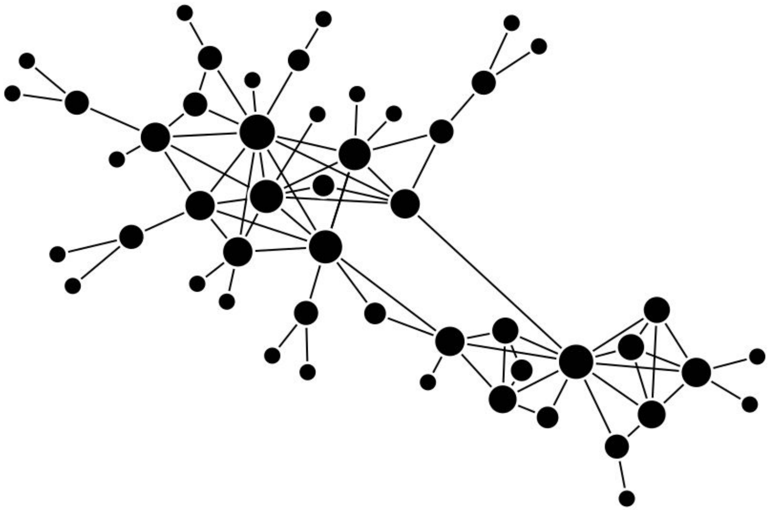
Translating Networks

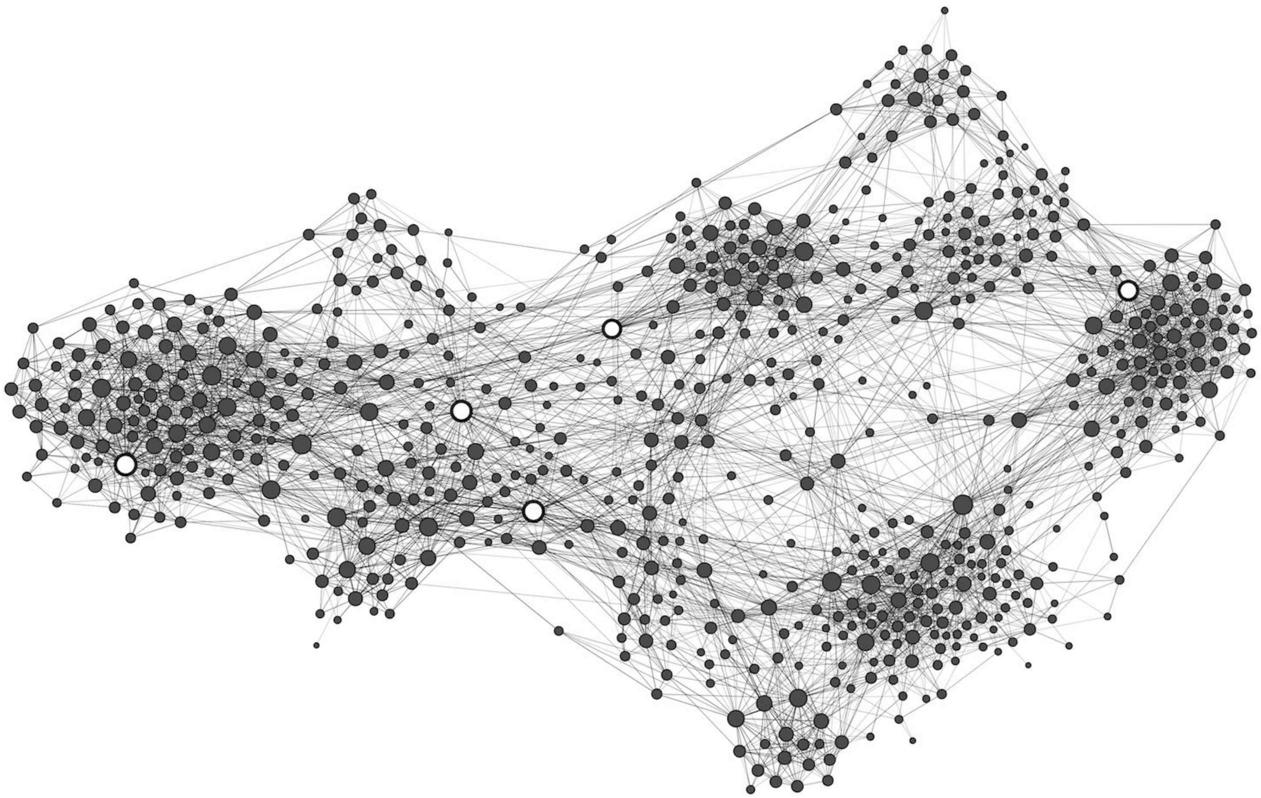
Assessing correspondence between network visualisation and analytics



Martin GRANDJEAN, University of Lausanne (Switzerland)
Mathieu JACOMY, Aalborg University (Denmark)

Aim

How do we "read" networks and how do we "translate" them into the language of humanities research?



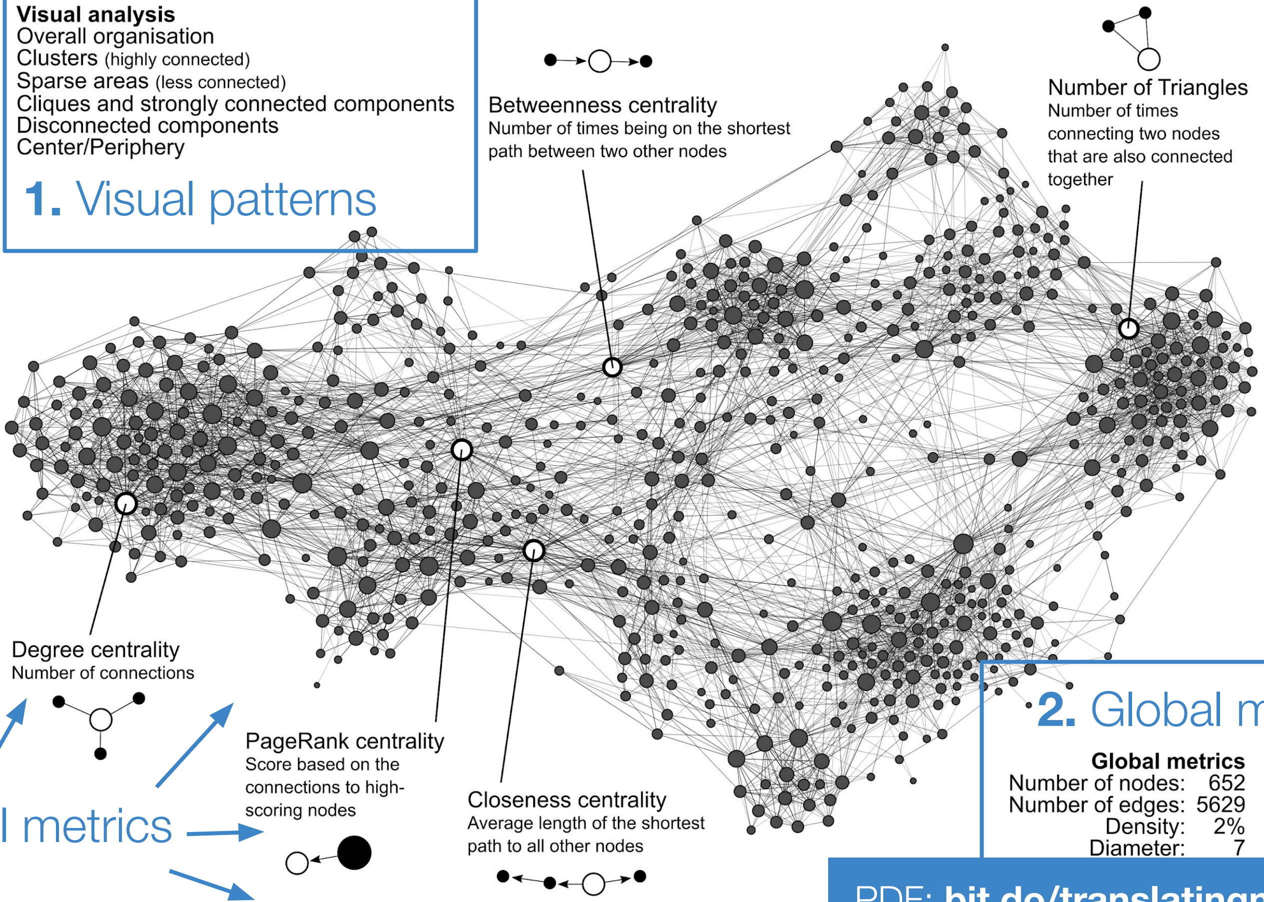
TRANSLATING NETWORKS

Aim

How do we “read” networks and how do we “translate” them into the language of humanities research?

Visual analysis
Overall organisation
Clusters (highly connected)
Sparse areas (less connected)
Cliques and strongly connected components
Disconnected components
Center/Periphery

1. Visual patterns



2. Global metrics

Global metrics

Number of nodes:	652
Number of edges:	5629
Density:	2%
Diameter:	7

3. Local metrics

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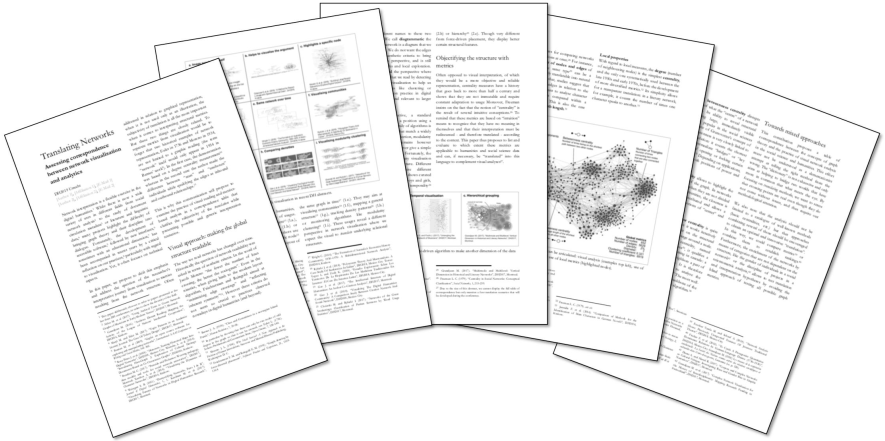
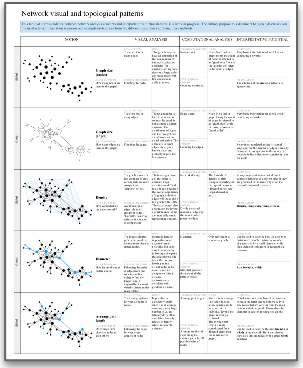
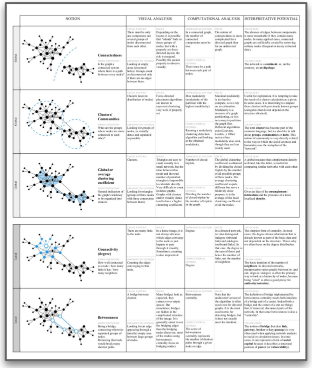
Aim

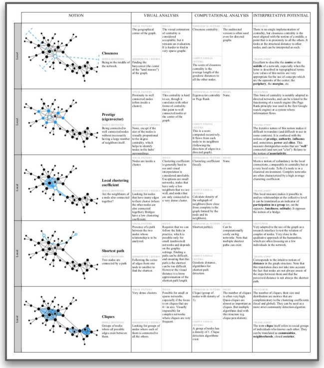
How do we "read" networks and how do we "translate" them into the language of humanities research?

➪ Building a correspondence **table** that clarifies the subjectivity of the translation while presenting possible and generic interpretation scenarios based on a wide literature review.









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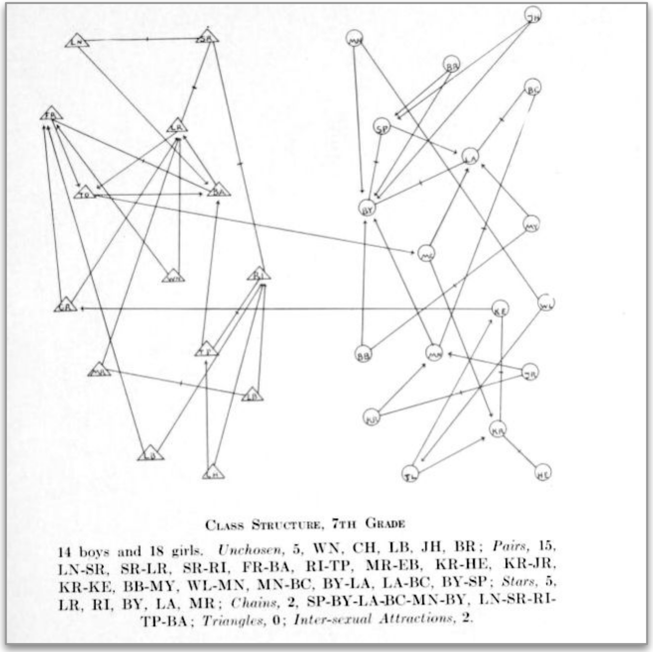
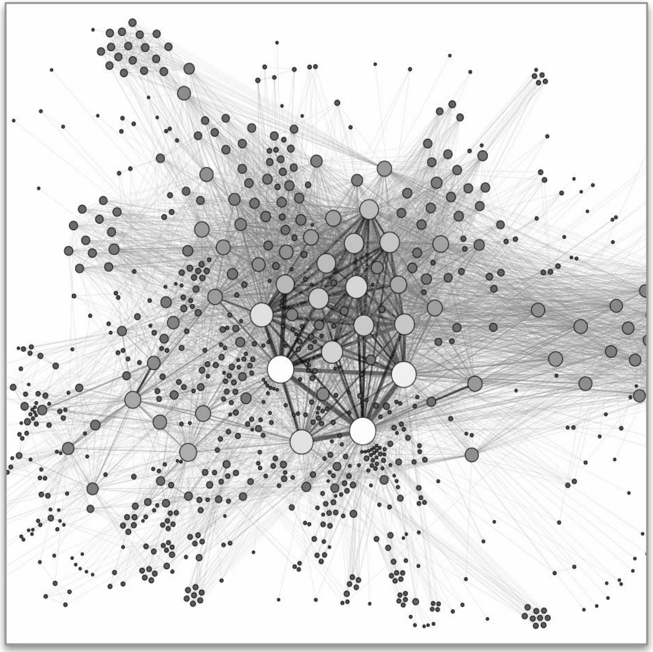
Visual approach

Diagrammatic



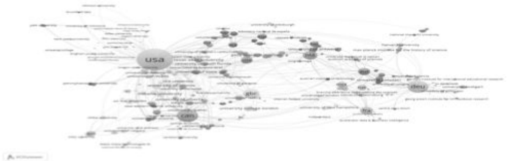
Topological



Visual approach

Examples from recent DH conferences

a. Image speaks for itself



"El resultado es una imagen real de lo que son hoy en día las Humanidades Digitales a nivel global"

Pino-Díaz J. and Fiormonte D. (2018). "La Geopólitica De Las Humanidades Digitales: Un Caso De Estudio De DH2017 Montreal", DH2018, Mexico City.

b. Helps to visualise the argument

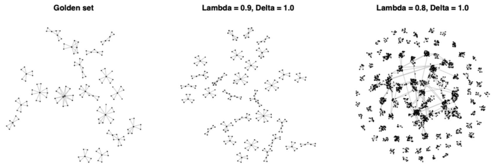


Figure 4. Largest components of social networks from *golden* set (left-most) and from disambiguated datasets (center and right-most).

Colavizza G. et al. (2016). "A Method for Record Linkage with Sparse Historical Data", DH2016, Krakow.

c. Highlights a specific node

Moretti G. et al. (2016). "Building Large Persons' Networks to Explore Digital Corpora", DH2016, Krakow.

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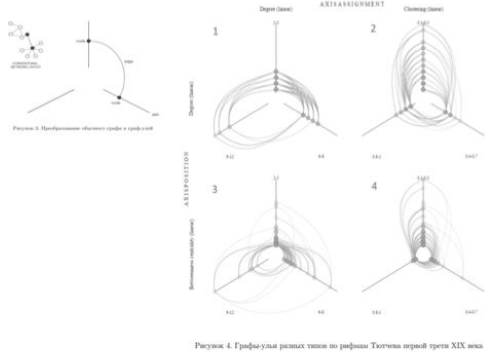
Visual approach

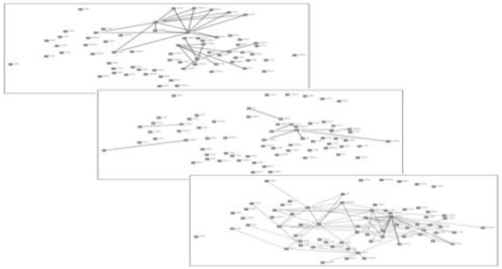
Examples from recent DH conferences

d. Comparing layouts



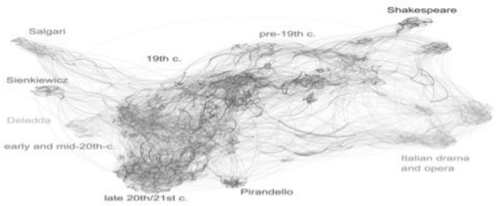
Sozinova O. (2016). "Complex Networks-Based Approach to Russian Rhyme History Description: Linguostatistics and Database", DH2016, Krakow.

e. Same network over time



Wright C. (2016). "The Formation of Australia's Economic History Community, 1950–1970: A Multi-dimensional Network Analysis", DH2016, Krakow.

f. Visualising communities



Rybicki J. et al. (2018). "Polysystem Theory And Macroanalysis. A Case Study Of Sienkiewicz In Italian", DH2018, Mexico City.

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Visual approach

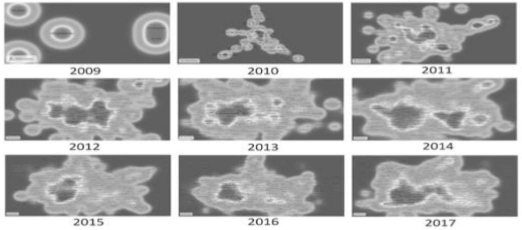
Examples from recent DH conferences

g. Image presented as a map

Figure 2. The provisional ACA network map in DH, data from journals *CHum*, *LLC/DSH*, and *DHQ*, 1966-2016, created using VOSviewer

Gao J. et al. (2017). "The Intellectual Structure of Digital Humanities: An Author Co-Citation Analysis", DH2017, Montreal.

h. Comparing densities



Gao J. et al. (2018). "Visualising The Digital Humanities Community: A Comparison Study Between Citation Network And Social Network", DH2018, Mexico.

i. Visualising modularity clustering

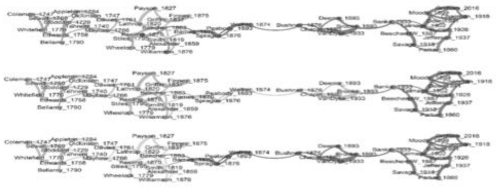


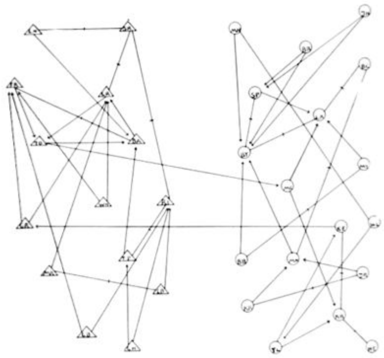
Figure 1. The four Great Awakenings in traditional classification (top); divided by modularity into 3 (center) and 4 (bottom) groups.

Choinski M. and Rybicki I. (2017). "Networks of the Great Awakenings: Classification of Puritan Sermons by Word Usage Statistics", DH2017, Montreal.

Visual approach

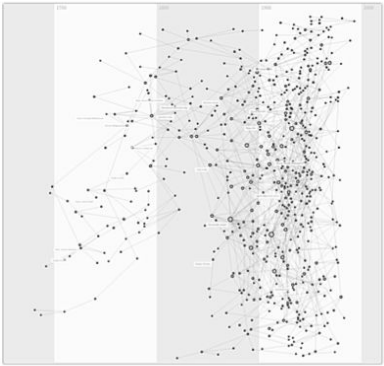
Making non-relational dimensions visually explicit

a. Grouping by category



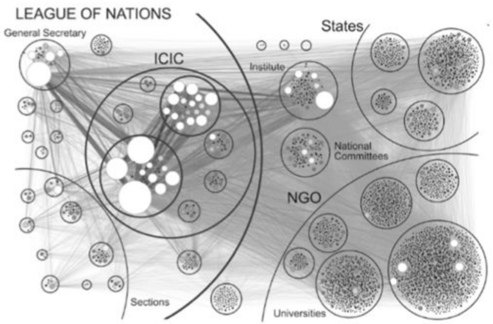
Moreno J. L. (1934). *Who Shall Survive? A New Approach to the Problem of Human Interrelations*, Nervous and Mental Disease Publishing, Washington D.C.

b. Temporal visualisation



Jänicke S. and Focht J. (2017). "Untangling the Social Network of Musicians", DH2017, Montreal.

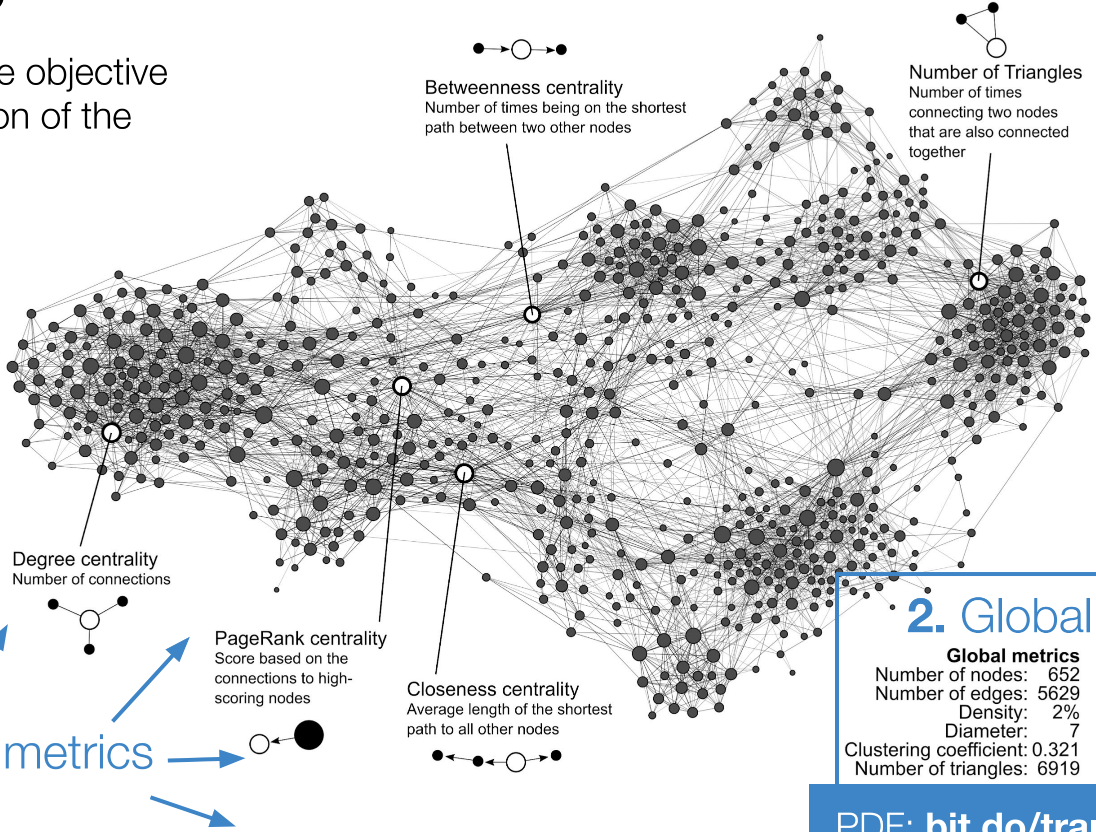
c. Hierarchical grouping



Grandjean M. (2017). "Multimode and Multilevel: Vertical Dimension in Historical and Literary Networks", DH2017, Montreal.

Objectifying the structure with metrics

Are graph metrics a more objective and reliable representation of the structure?



3. Local metrics

2. Global metrics

Global metrics

Number of nodes:	652
Number of edges:	5629
Density:	2%
Diameter:	7
Clustering coefficient:	0.321
Number of triangles:	6919

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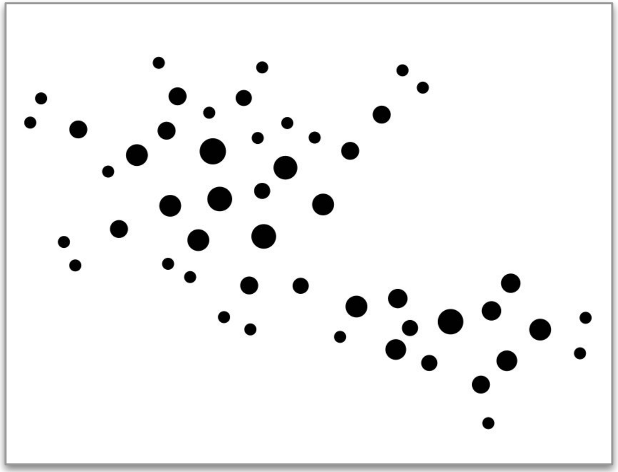
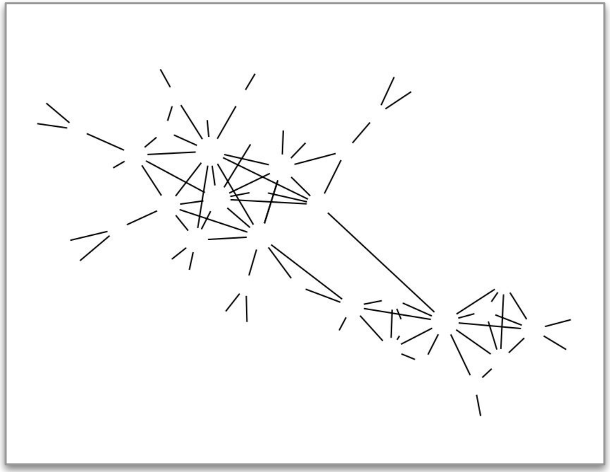
Global properties

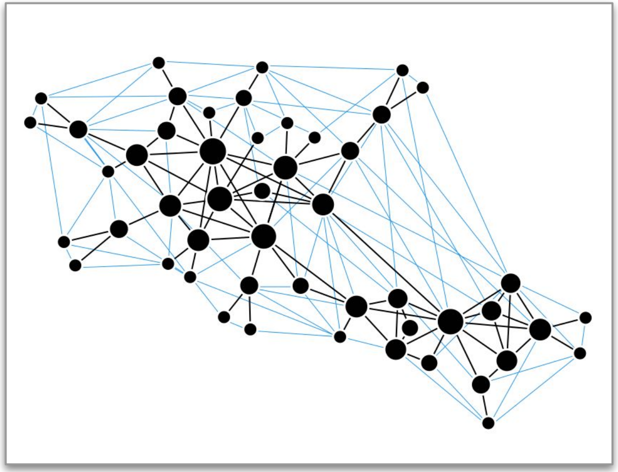
Analyze the **size** of the graph



NODES
Main "translation" equivalents:
Size



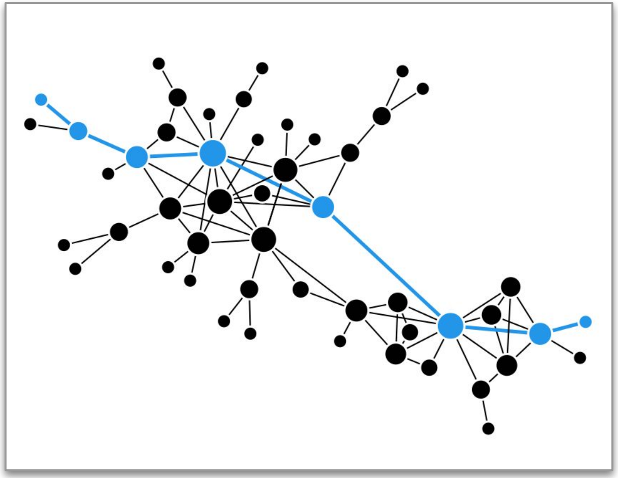
EDGES
Main "translation" equivalents:
Size



DENSITY
Main "translation" equivalents:
Complexity | Completeness

Global properties

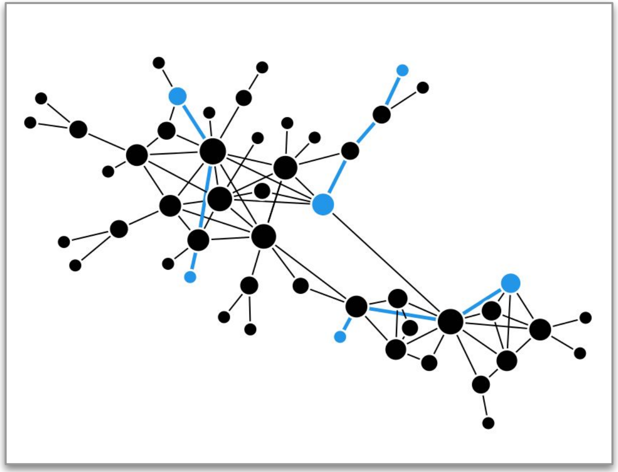
Analyze the **width** of the graph



DIAMETER

Main "translation" equivalents:

Size | **Breadth** | **Width**



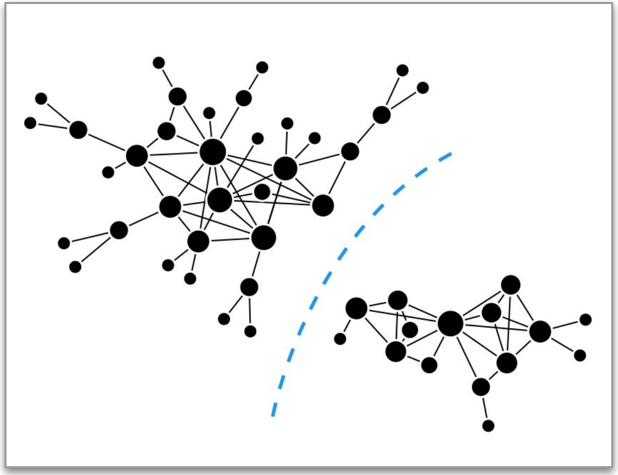
AVERAGE PATH LENGTH

Main "translation" equivalents:

Size | **Width** | **Small world**

Global properties

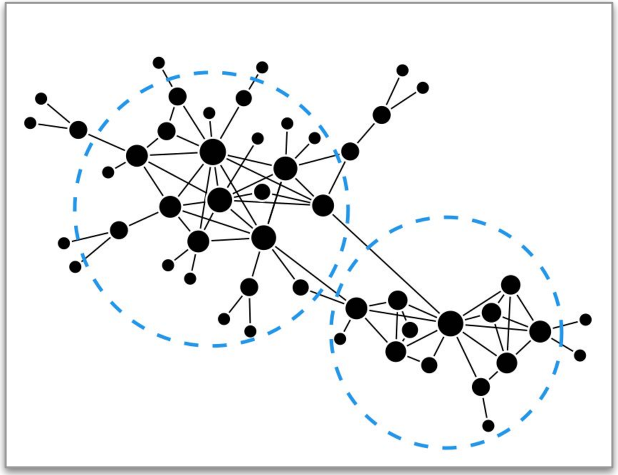
Analyze how the graph is **globally structured**



CONNECTEDNESS

Main “translation” equivalents:

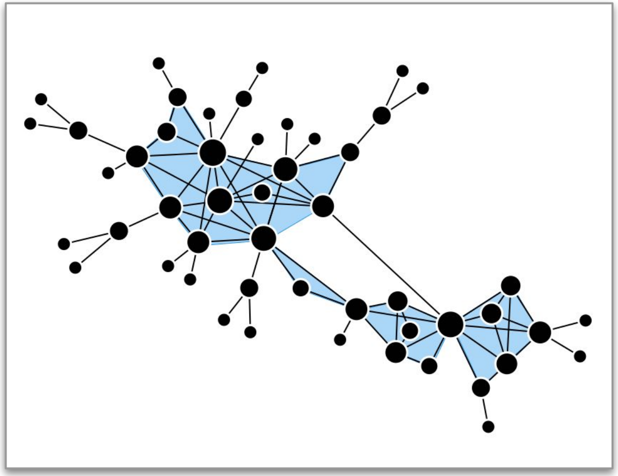
Continents | Archipelagos



CLUSTERS

Main “translation” equivalents:

Groups | Communities | Hubs



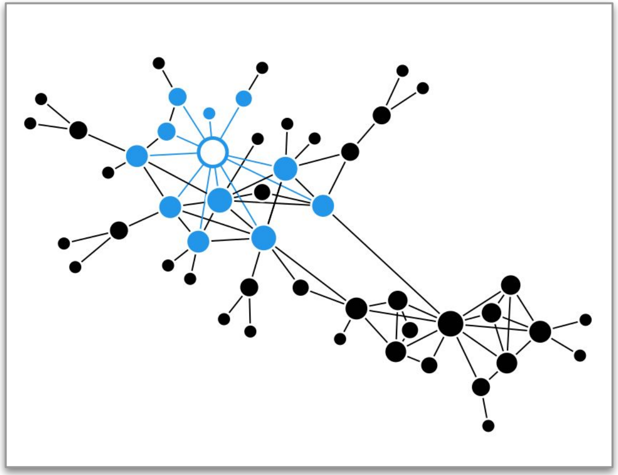
(GLOBAL) CLUSTERING COEF.

Main “translation” equivalents:

Entanglement | Intrication

Local properties

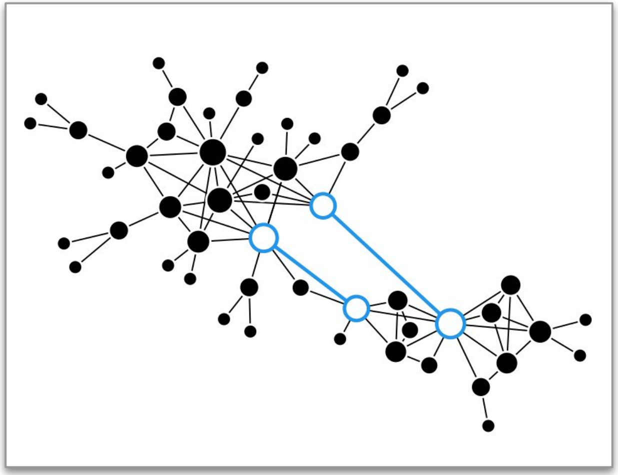
Analyze the **relation of a single node** to the rest of the graph.



DEGREE

Main "translation" equivalents:

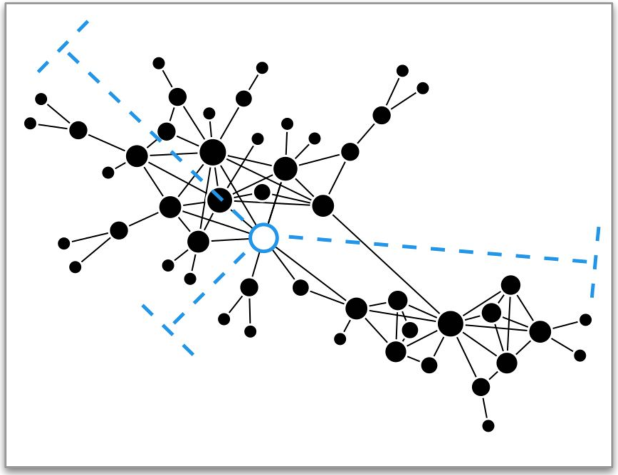
Connectivity | Neighbors



BETWEENNESS

Main "translation" equivalents:

Bridge | Gateway | Broker | Power | Vulnerability



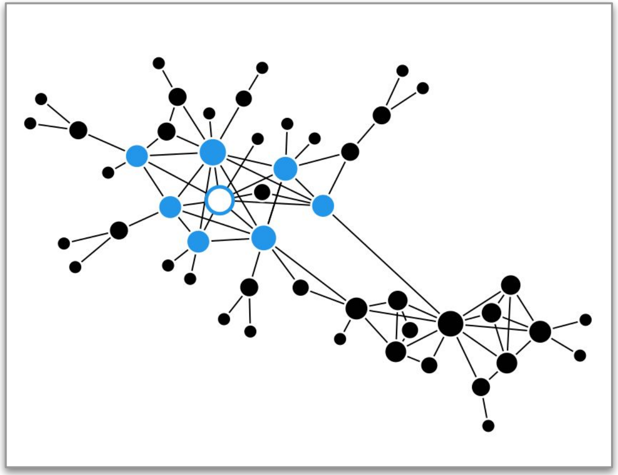
CLOSENESS

Main "translation" equivalents:

Center | Middle

Local properties

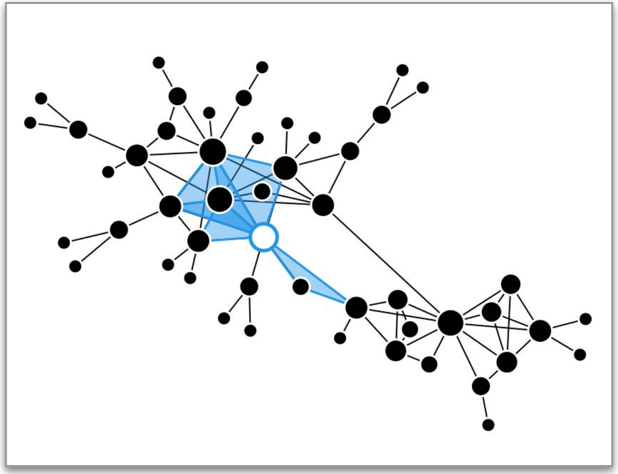
Analyze the **environment of a single node**.



EIGENVECTOR

Main "translation" equivalents:

Prestige | Authority | Influence



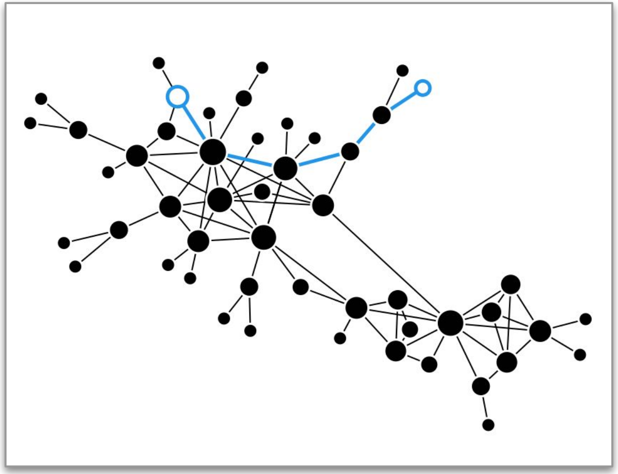
LOCAL CLUSTERING COEF.

Main "translation" equivalents:

Participation in a group

Local properties

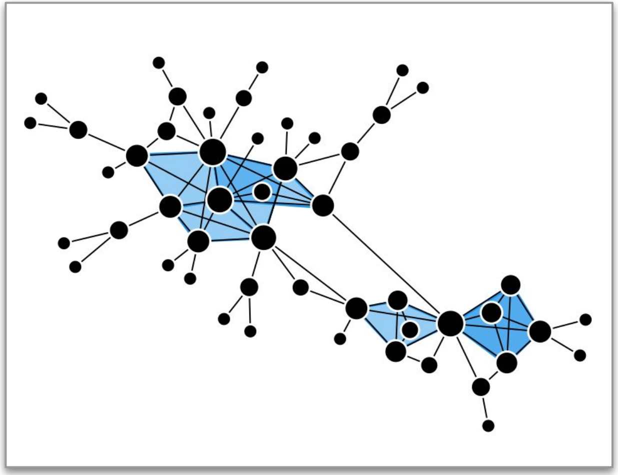
Search for a **specific feature**.



SHORTEST PATH

Main “translation” equivalents:

Distance



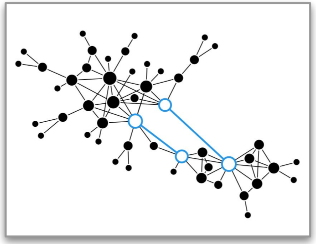
CLIQUES

Main “translation” equivalents:

Communities | Neighborhoods

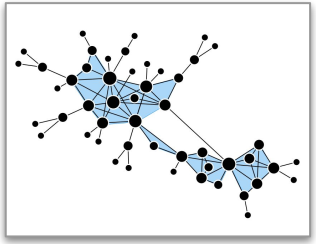
Toward mixed and enriched approaches

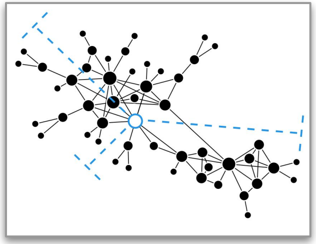
The previous table lists only the simplest concepts. But the analysis should not be limited to a catalogue of well-known methods (basic centralities, etc.) but that approaches combining several of those should be encouraged to obtain an optimal and innovative “translation”.



+

Hierarchical information



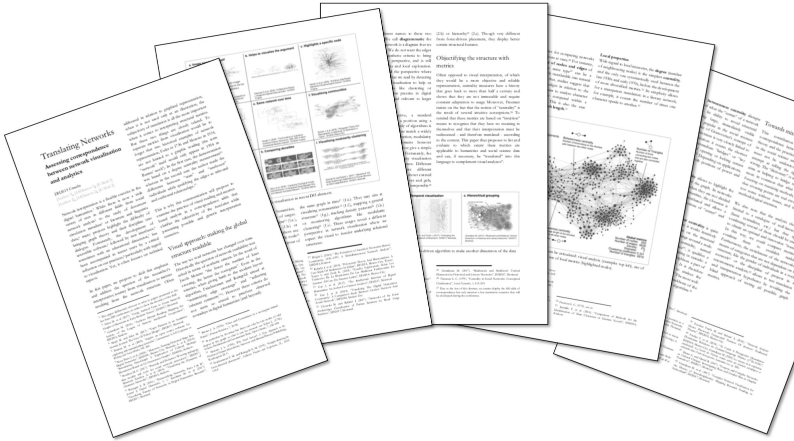


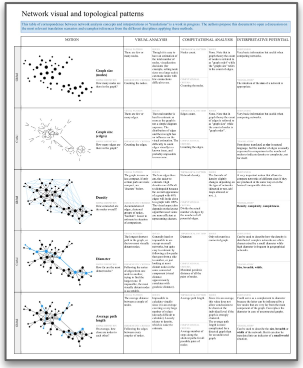
Non-structural categories

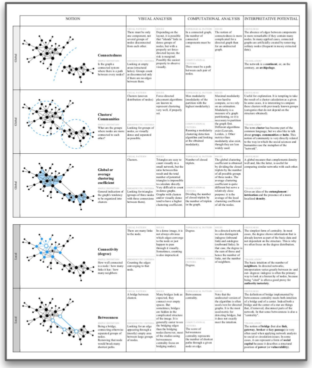
Next steps

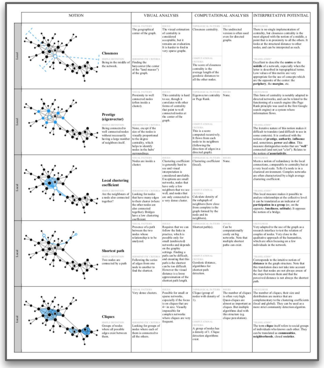
How do we “read” networks and how do we “translate” them into the language of humanities research?

➪ Discuss our practices in order to produce a catalogue that clarifies and fosters creativity.









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