

Network science meets Digital humanities: many challenges and some success stories

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Friday, August 25th 2023



Universitat Oberta
de Catalunya

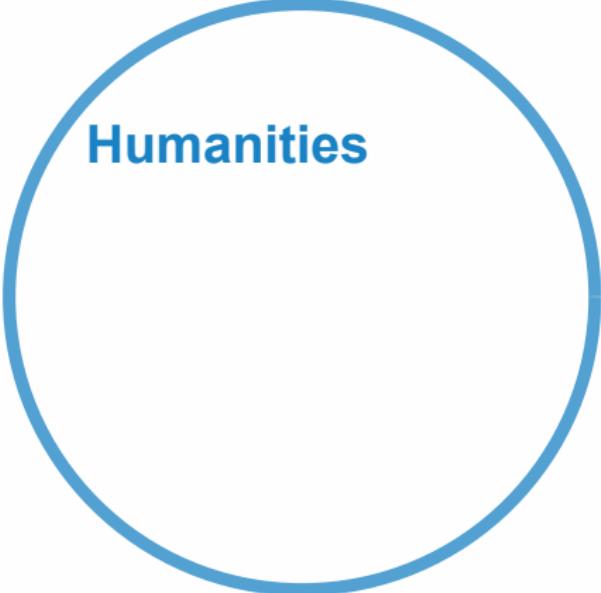




I
to be best in
point of view.

Translation

another language;
language foreign to
written communica
ight

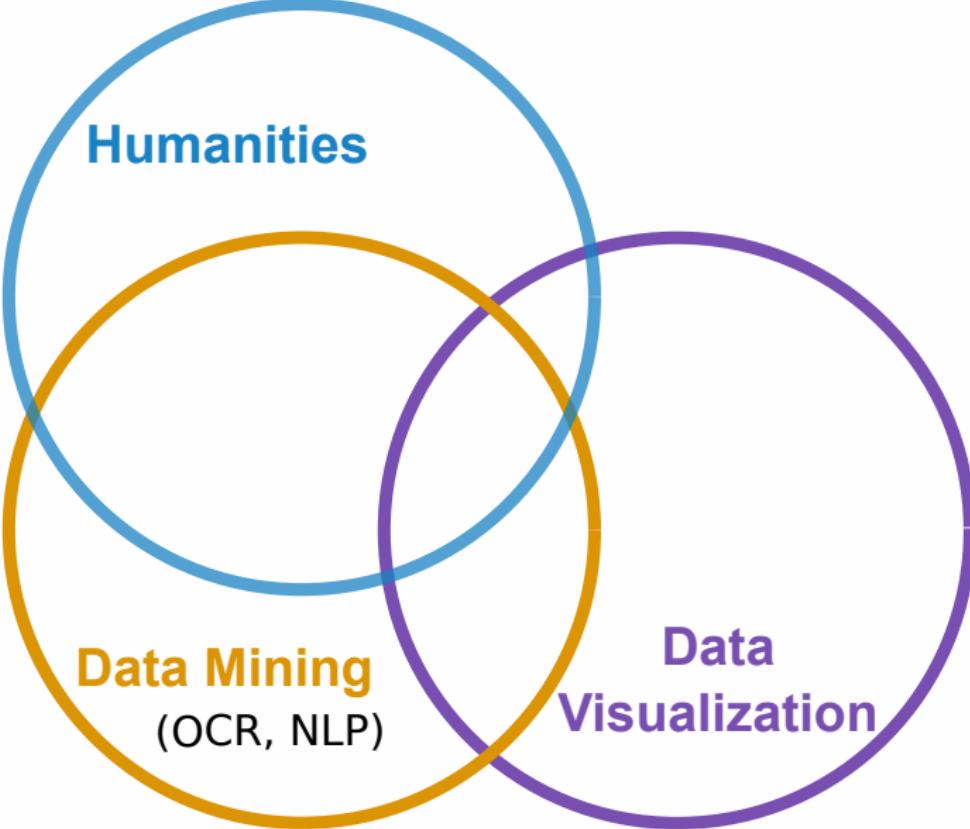


Humanities

A Venn diagram consisting of two overlapping circles. The left circle is blue and labeled "Humanities". The right circle is orange and labeled "Data Mining (OCR, NLP)". The two circles overlap in the center.

Humanities

Data Mining
(OCR, NLP)

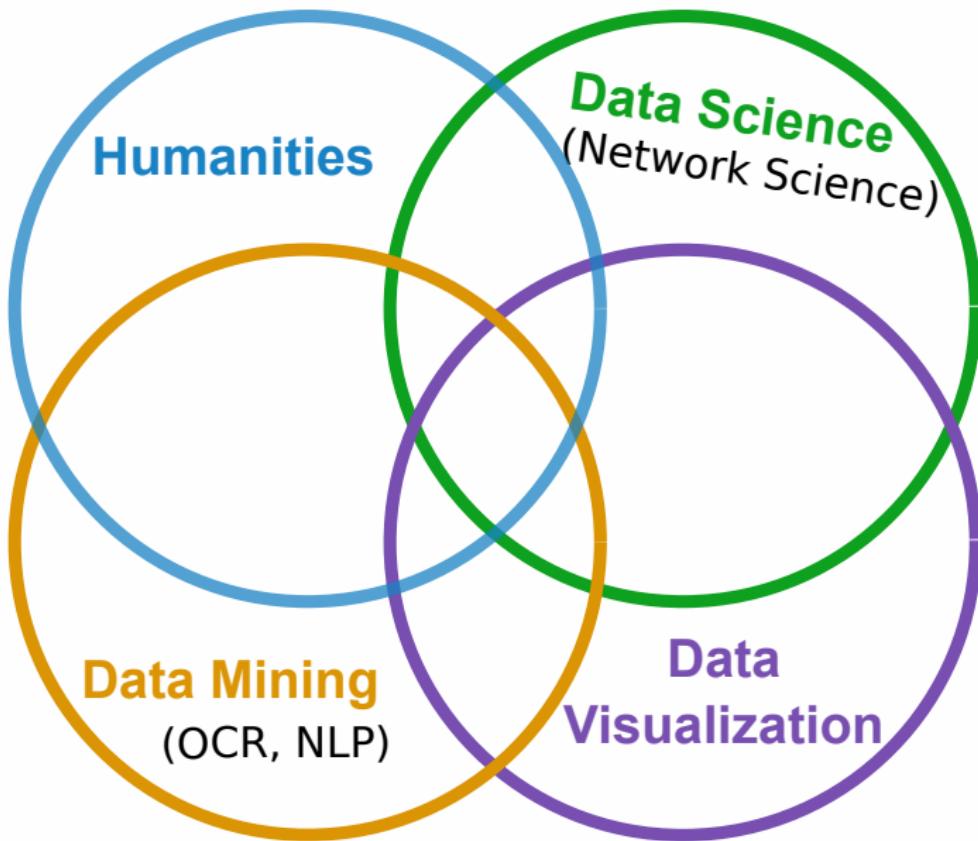


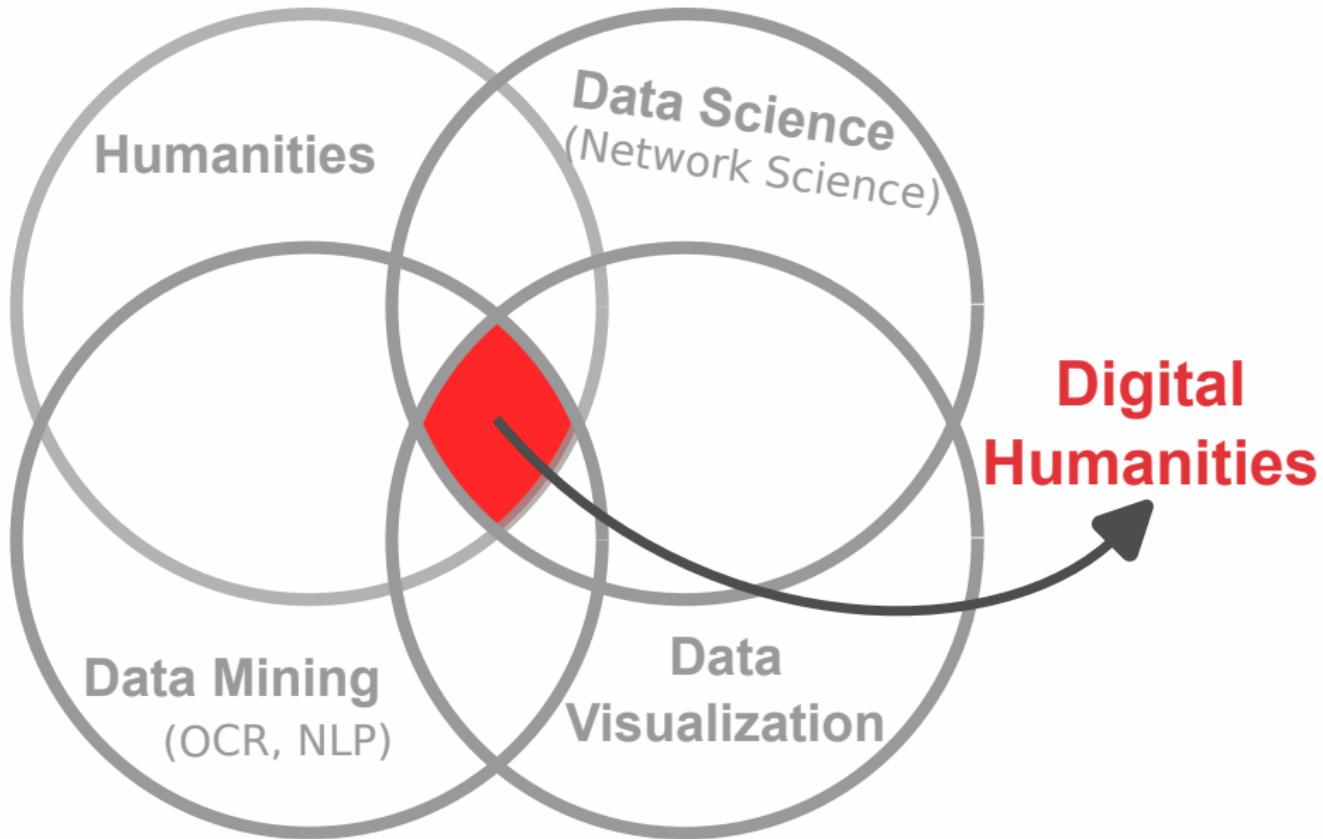
A Venn diagram consisting of three overlapping circles. The top-left circle is blue and labeled "Humanities". The bottom-left circle is orange and labeled "Data Mining (OCR, NLP)". The bottom-right circle is purple and labeled "Data Visualization". The intersection of all three circles is empty.

Humanities

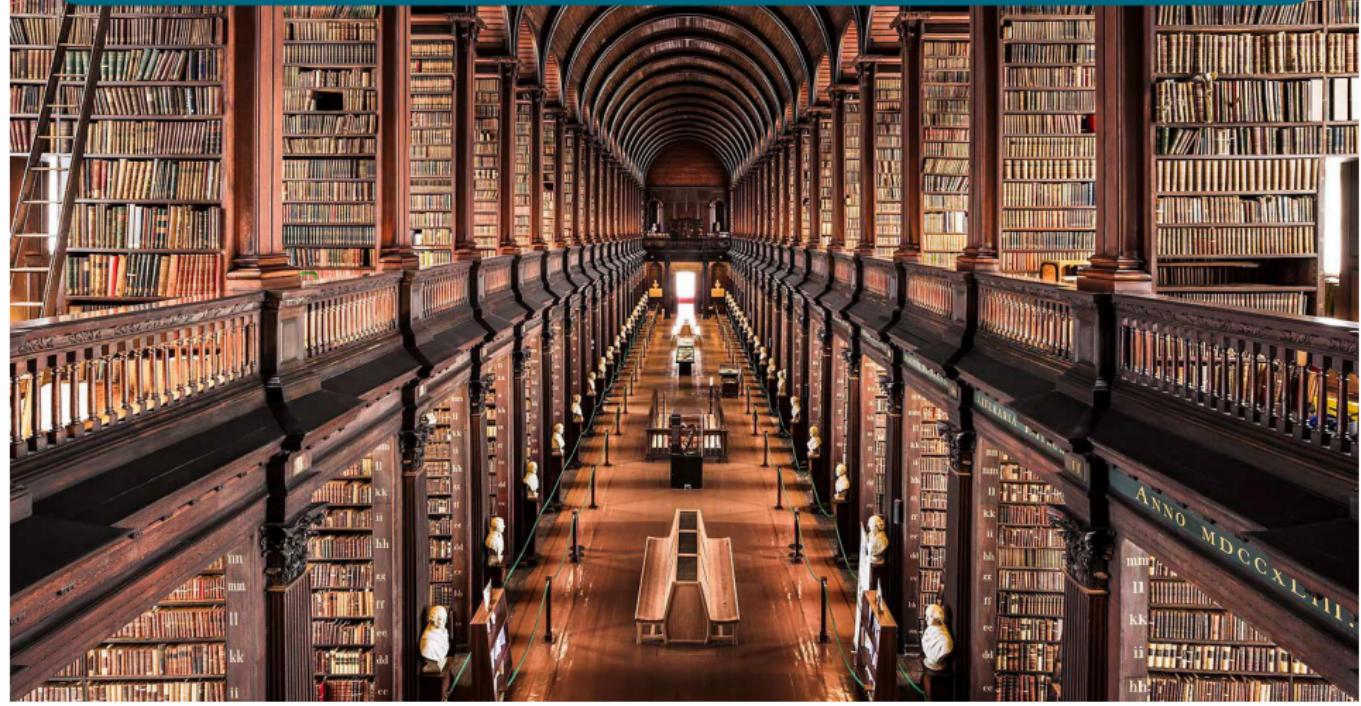
Data Mining
(OCR, NLP)

**Data
Visualization**





How networks can help us in addressing research questions *relevant for the humanities?*



- Translation flows in Ibero-American periodicals.

- Translation flows in Ibero-American periodicals.
- Women marginalization in Ibero-American film culture.

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- Women marginalization in Ibero-American film culture.
- Geography of intellectual cooperation during the interwar period.

to be best in any point of view.

Translation

Translation flows in Ibero-American periodicals

Data

Dataset

- A collection of \approx 31,500 contributions (records) published in 42 modernist periodicals during the first half of the XXth century.

- E. Hanno – DOI: 10.20375/0000-000d-1cff-6

BOLETIN TITIKAKA

PUNO - PERU - 1982 CIRCULACION CONTINENTAL ISSN 03-1080

Al rededor de José Carlos Mariátegui Universalidad Ideológica de Mariátegui
Por Vicente Mendoza Díaz

José Carlos Mariátegui, fallecido en Lima el 16 de Abril de 1930.

El "Boletín Titicaca" nació en Marañón a uno año de la muerte de Mariátegui. La idea surgió de un grupo de amigos que querían homenajearlo y recordar su legado. El nombre del boletín es una reminiscencia a la memoria de su autor, quien en sus escritos mencionó la laguna Titicaca como un símbolo de la cultura andina. La publicación se ha convertido en un espacio para la difusión de ideas y análisis sobre la historia, cultura y política del Perú, así como sobre las demás naciones sudamericanas. Se han publicado artículos de diversos autores, tanto nacionales como internacionales, que abordan temas como la filosofía, la literatura, la historia, la economía, la política y la cultura. El boletín también incluye secciones de opiniones y debates, así como reseñas de libros y artículos de otros medios. Su objetivo es contribuir a la comprensión y el desarrollo de la cultura y la sociedad andina, así como a la promoción de la investigación histórica y filosófica en el Perú y en el mundo. El boletín es una publicación independiente, sin fines de lucro, que busca mantener vivo el legado de Mariátegui y promover la reflexión crítica sobre la historia y la cultura andina.

En su primera edición, el boletín titulado "Boletín Titicaca" apareció en 1982, con un número de 10 páginas. A lo largo de los años, el número de páginas ha aumentado y la calidad de impresión se ha mejorado. Actualmente, el boletín tiene una extensión de 20 páginas y se publica trimestralmente. Los artículos están escritos en español y se publican tanto en formato digital como en formato impreso. El boletín es distribuido a través de correo electrónico y se puede acceder a su contenido a través de su sitio web: www.boletintiticaca.com.

El "Boletín Titicaca" es una publicación que busca contribuir a la comprensión y el desarrollo de la cultura y la sociedad andina, así como a la promoción de la investigación histórica y filosófica en el Perú y en el mundo. El boletín es una publicación independiente, sin fines de lucro, que busca mantener vivo el legado de Mariátegui y promover la reflexión crítica sobre la historia y la cultura andina.

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- We group periodicals into regions (Iberian peninsula, Andes, Rio de la Plata, etc.)



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- We group periodicals into regions (Iberian peninsula, Andes, Rio de la Plata, etc.)
- We select only **translated contributions** (*i.e.*, 981 records).

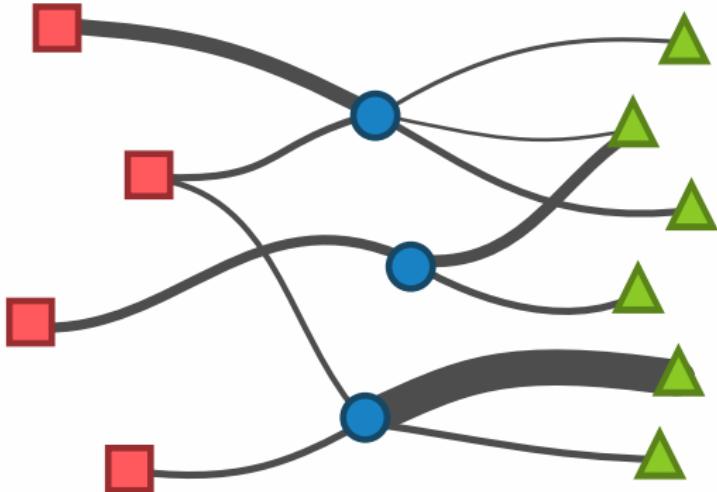
Data

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- We select only **translated contributions** (*i.e.*, 981 records).
- For each record, we consider its **publication's region, original language**, and the **author's country of origin**.

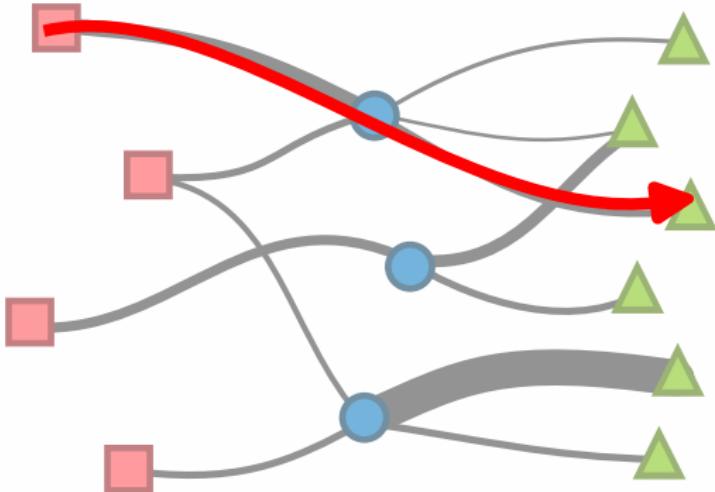
Methods

- We build a tri-partite *weighted* network whose nodes are:
 - countries of origin,
 - languages,
 - regions.

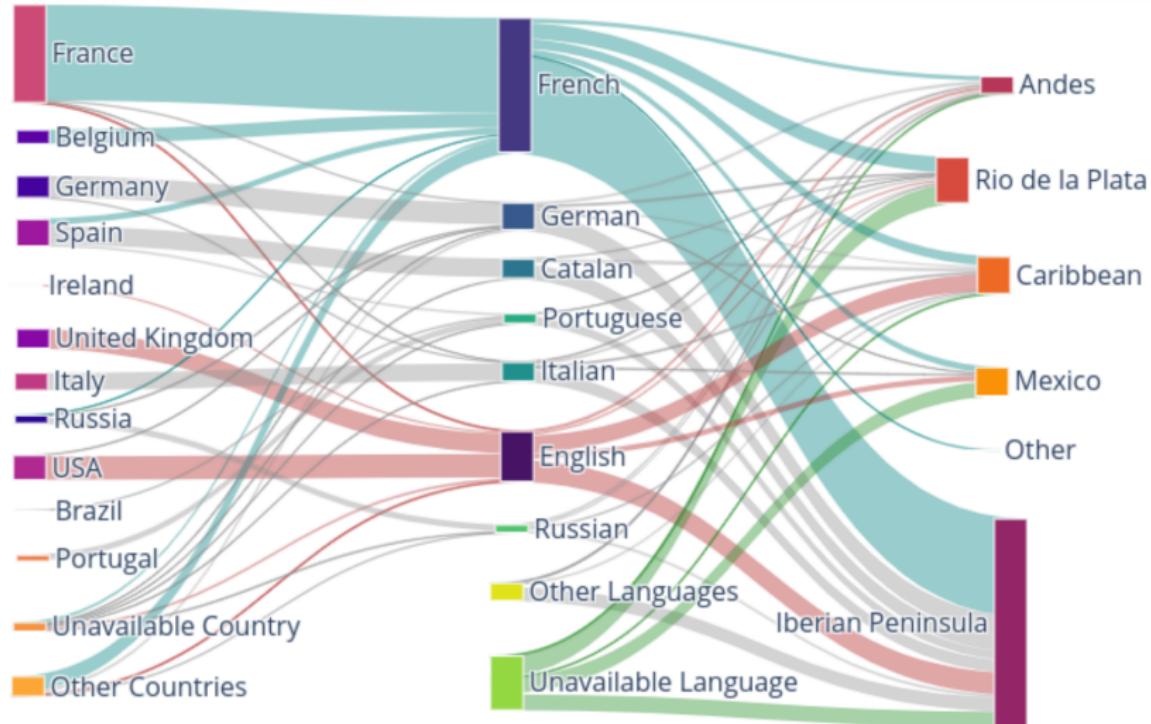


Methods

- We build a tri-partite *weighted* network whose nodes are:
 - countries of origin,
 - languages,
 - regions.
- We analyze the network to study the**flows of translation**
(i.e., who is translating what).

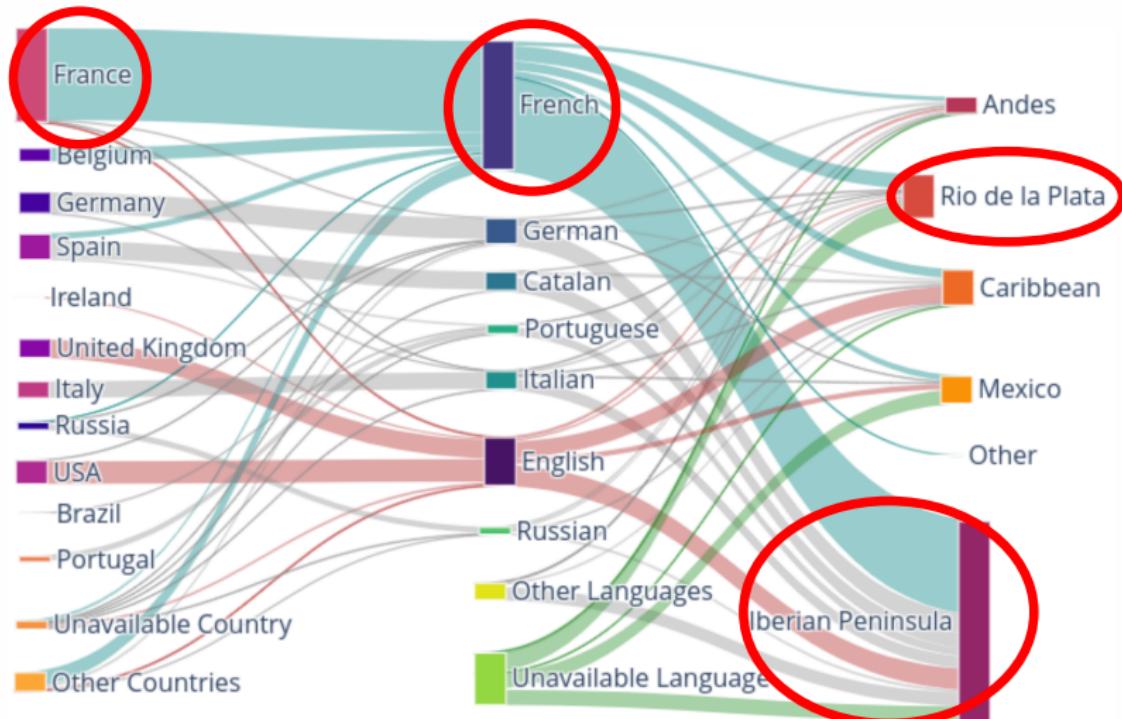


Results



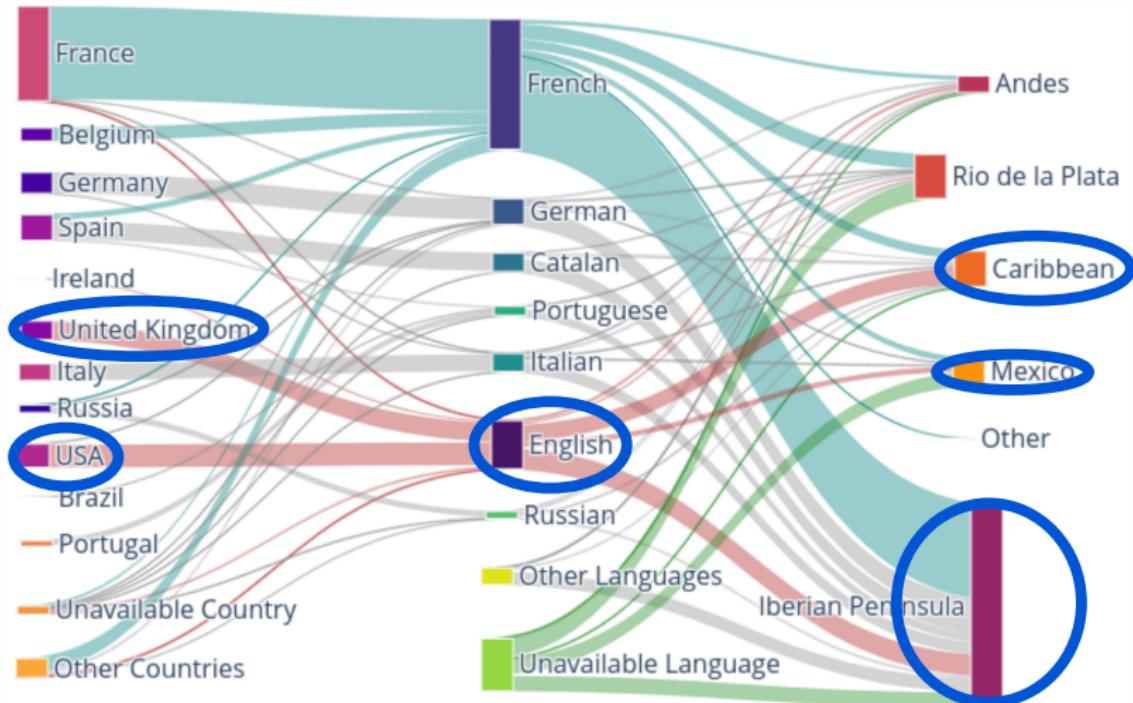
- D. Roig-Sanz et al. "Global Translation Flows in Ibero-American Periodicals: A Network Science Perspective." Accepted for publication (2023).

Results



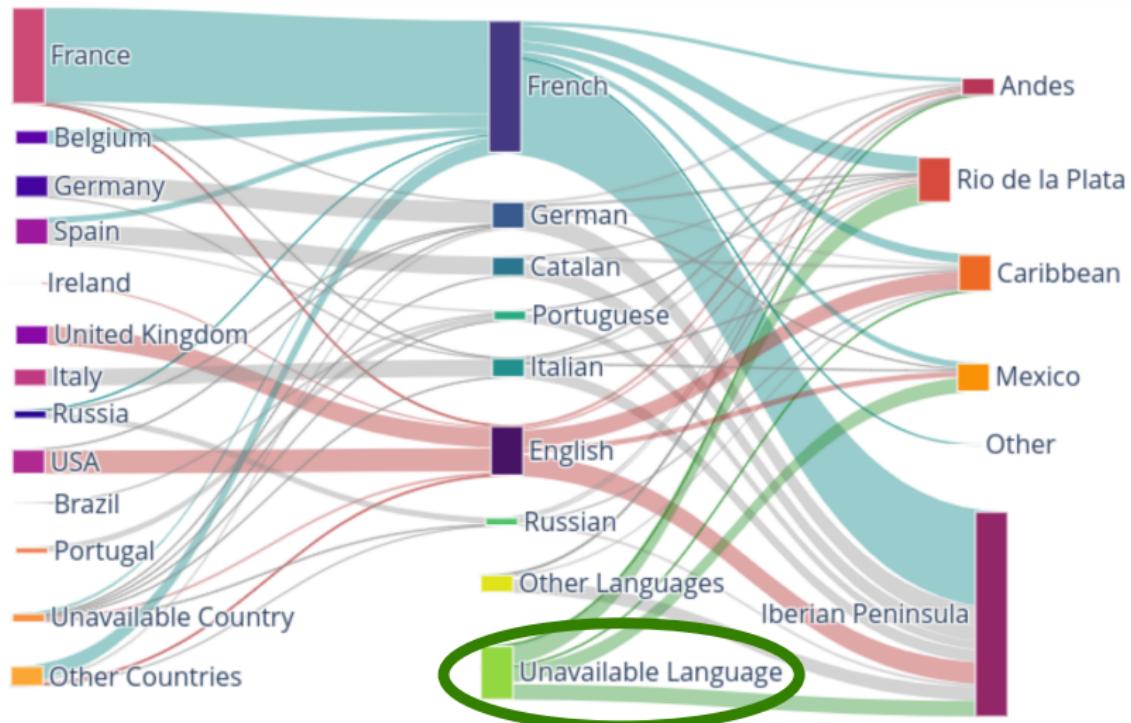
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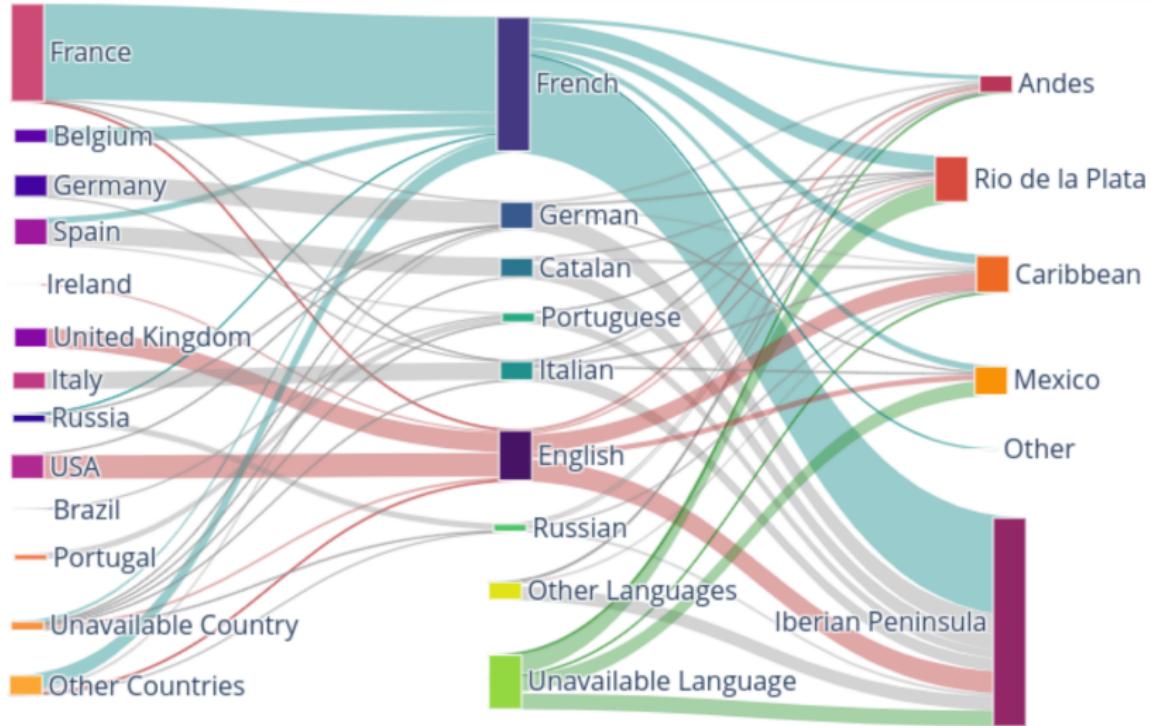
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Women marginalization in Ibero-American film culture

Data

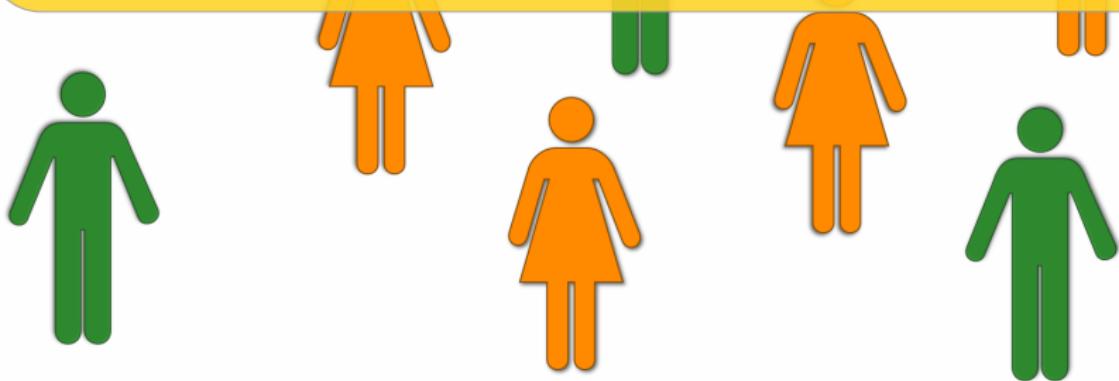
Manually collected (*follow the actor*) relationships between people **associated with film culture** during the first half of XXth century based on:

- participation to events (e.g., projections),
- involvement in collective bodies (e.g., a cineclub),
- editorial relationships (e.g., publication in a specialized periodical),
- personal relationships (e.g., friendship),
- epistolary correspondence.

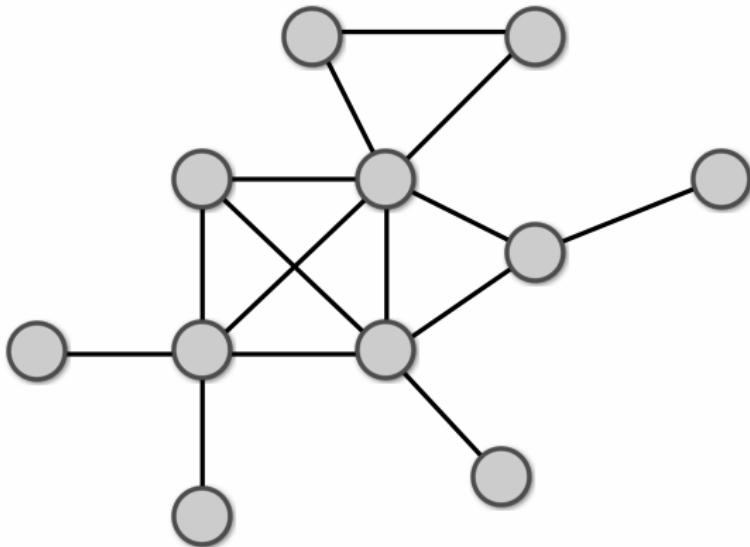
Translating into an unweighted network with $N = 1367$ nodes (women and men).



How **central** (especially in a *diffusion context*)
were women in the field of film culture?



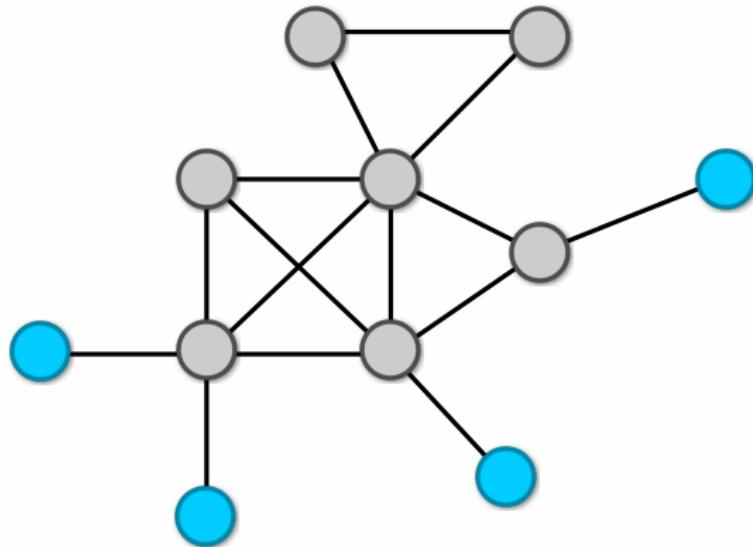
Methods



- S. B. Seidman, Social Networks, **5**, 269–287, (1983). DOI: [10.1016/0378-8733\(83\)90028-X](https://doi.org/10.1016/0378-8733(83)90028-X)
- M. Kitsak *et al.*, Nature Physics, **6**, 888–893, (2010). DOI: [10.1038/nphys1746](https://doi.org/10.1038/nphys1746)

Methods

k-shell 1 ($k_s = 1$)

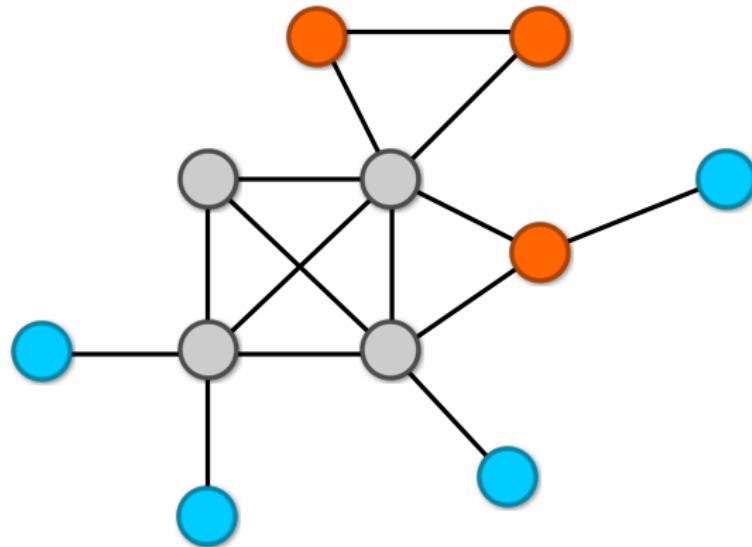


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Methods

■ k -shell 1 ($k_s = 1$)

■ k -shell 2 ($k_s = 2$)



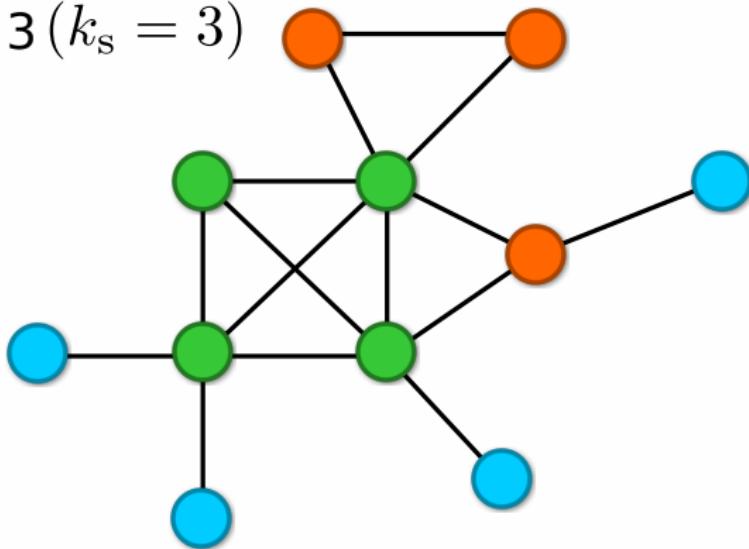
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Methods

■ k -shell 1 ($k_s = 1$)

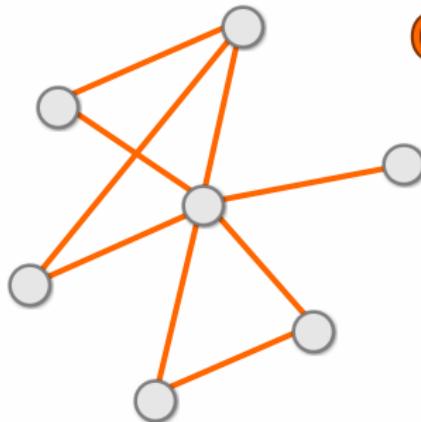
■ k -shell 2 ($k_s = 2$)

■ k -shell 3 ($k_s = 3$)



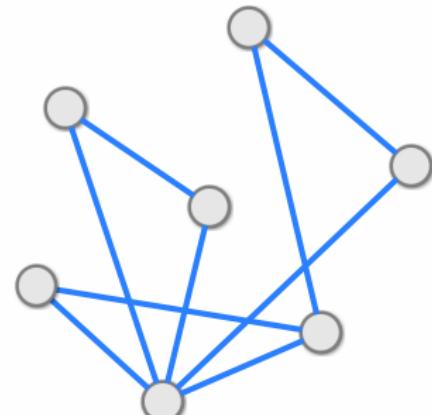
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Methods



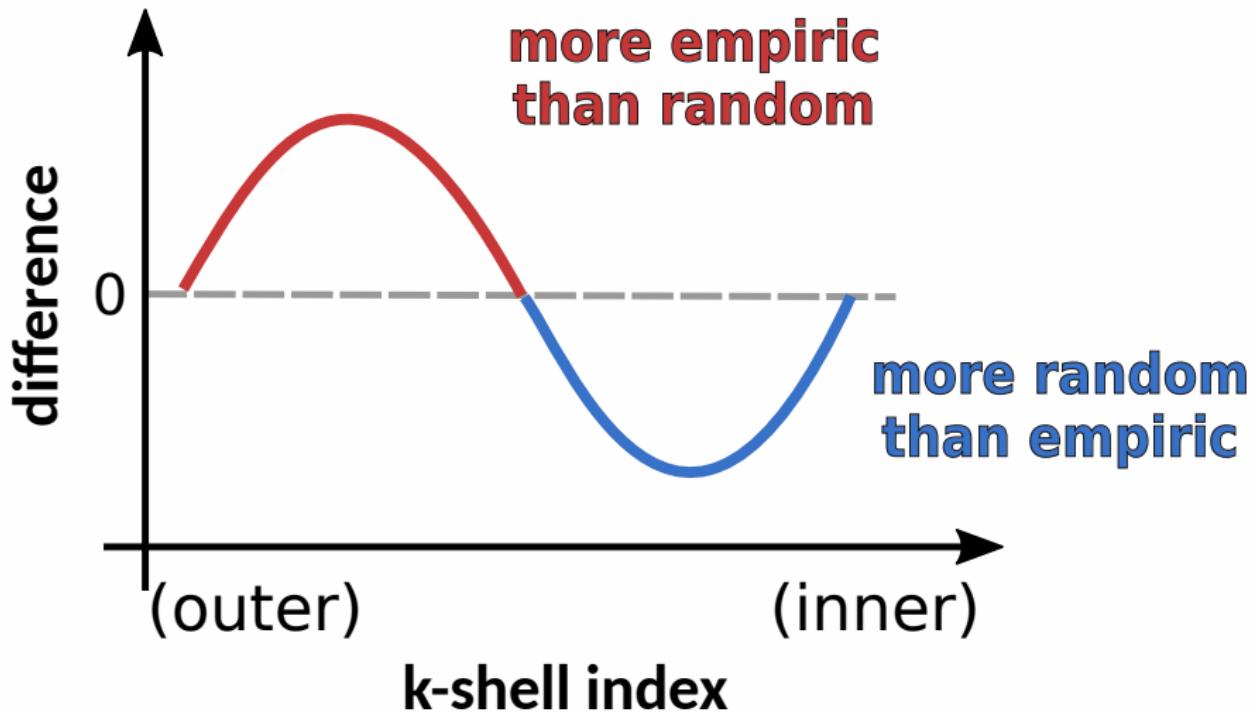
Original
network

Randomized
(shuffled)
counterpart

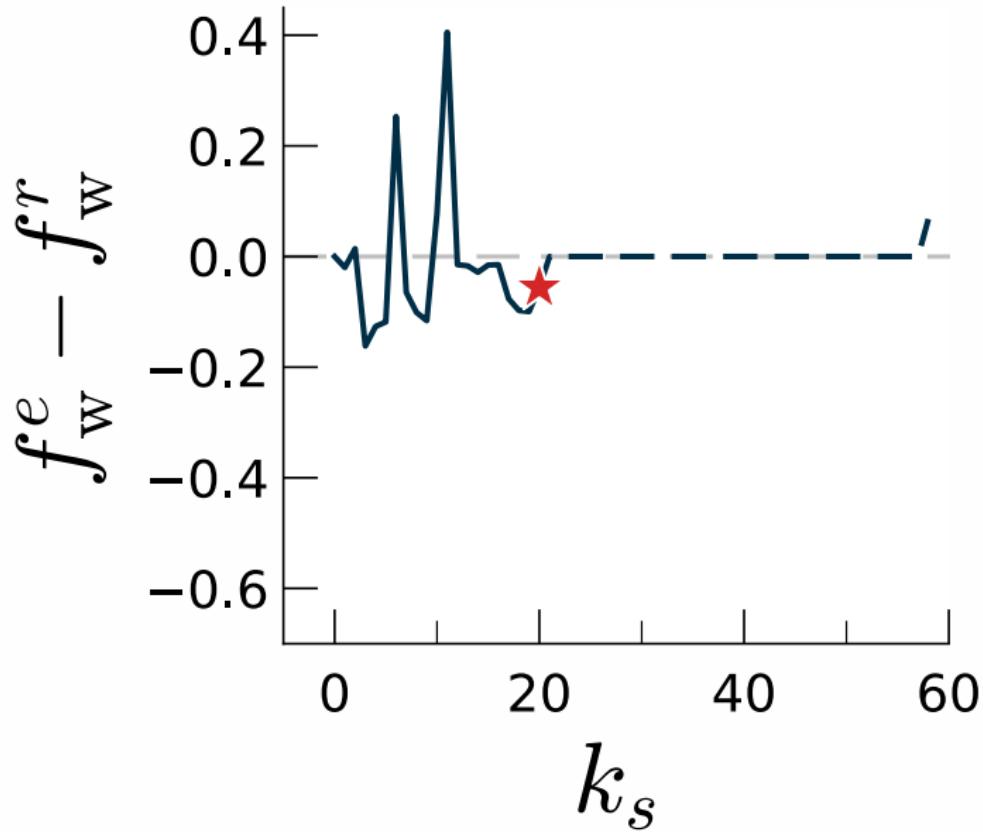


- B. K. Fosdick, et al., SIAM Review, **60**, 315–355, (2018). DOI: [10.1137/16M1087175](https://doi.org/10.1137/16M1087175)

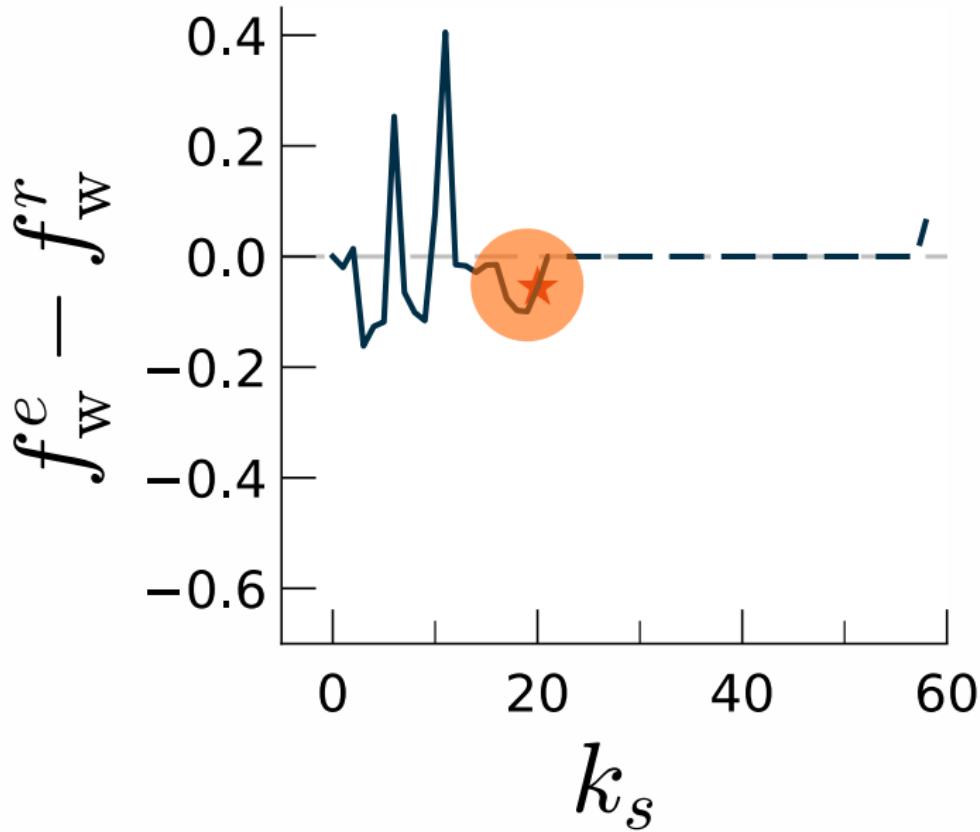
Results



Results

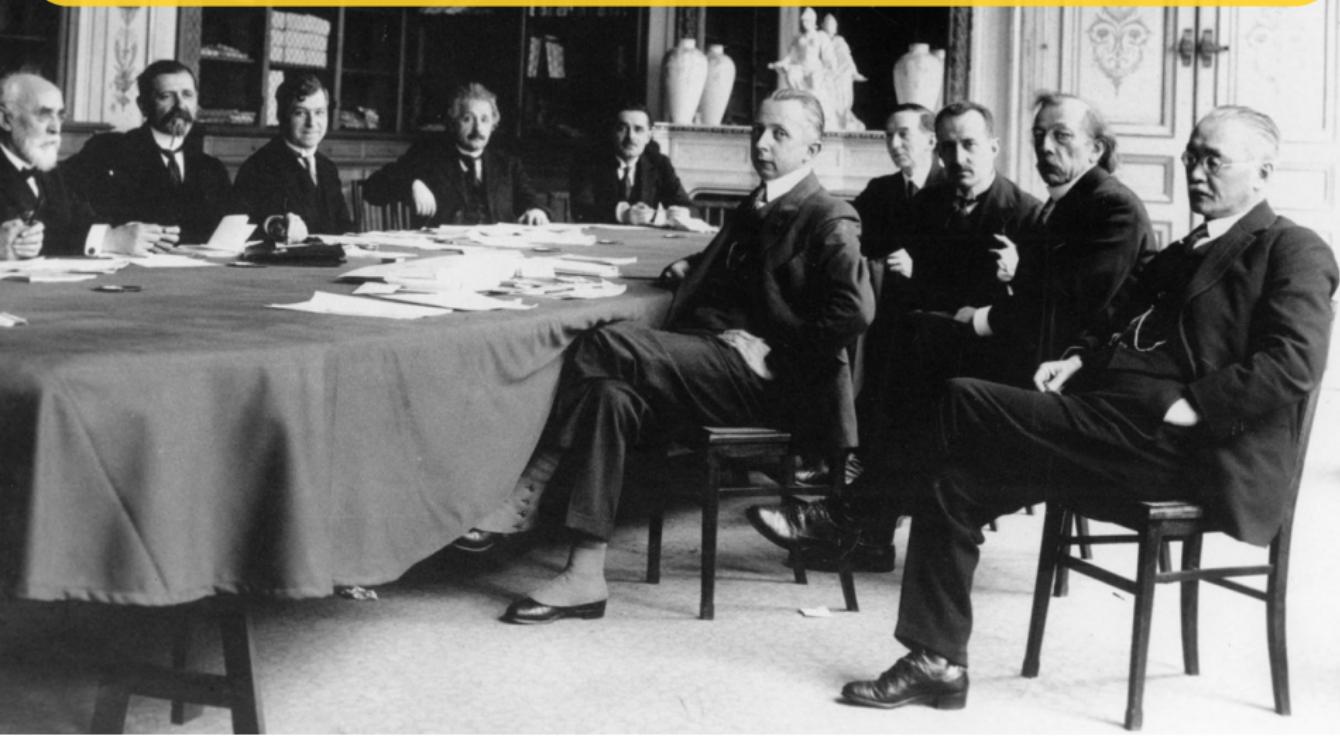


Results



- A. Clariana-Rodagut and A. Cardillo arXiv:2307.13137 (2023). DOI: 10.48550/arXiv.2307.13137

Geography of intellectual cooperation during the interwar period





*Directed by LEWIS MILESTONE • a CARL LAEMMLE Jr Production • Story by ERICH MARIA REMARQUE
Adaptation and Dialogue by MAXWELL ANDERSON and GEORGE ABBOTT*

A UNIVERSAL PICTURE



*Directed by LEWIS MILESTONE • a CARL LAEMMLE Jr. Production • Story
Adaptation and Dialogue by MAXWELL ANDERSON and GE*

A UNIVERSAL PICTURE

THE NEW YORK TIMES, WEDNESDAY, DECEMBER 25, 1918.



Victory Democracy Peace

Make them secure by a

LEAGUE OF NATIONS

Christians this year dawn on a world groping from war toward peace. The world hopes and prays that peace may be established on justice and safeguarded against future wars. ¶ The army of occupation that sleeps till the judgement Day in the graves of France will have fought and died in vain unless such a PEACE is framed. ¶ Our Soldiers and Sailors, returning from VICTORY, will have fought and suffered in vain if that VICTORY is not made secure. All the peoples of the free nations will have given in vain billions of their wealth and millions of their own flesh and blood if DEMOCRACY is not established forever.

These things which the whole world loves for can be joined unto for the creation, right as the Son became a man.

President Wilson's League of Nations will take the place of Glengary as my sole criterion, right at the present time, of a LEAGUE OF NATIONS. President Wilson has declared his desire for such a League and in France for the express purpose of guiding its formation. Ex-President Taft believes in it, and so do I, and am urging his constituents to do the same.

It will be impossible to apply the provisions of the Peace treaty without an international court to interpret them. Should this court be appointed? How shall its decision be enforced? There is but one answer—**A LEAGUE OF NATIONS.**

This is a movement in which every man and woman in the United States can share. You believe in the principles we have heard. You want to make the world safe against the Hun before winter comes. You think that the League of Nations will be the best organization of all the peoples of the world. You believe that the Texas Work which won the war should be con-

The League to Enforce Peace offers you an opportunity to DO SOMETHING ABOUT IT.

League to Enforce Peace

Such Thorough Safety Protection, 100 W. 45th Street, New York
TELEGRAMS: PEACE, NEW YORK

REVIEW OF THE 1990-1991 SEASON **BY RICHARD A. HEDDERSON**

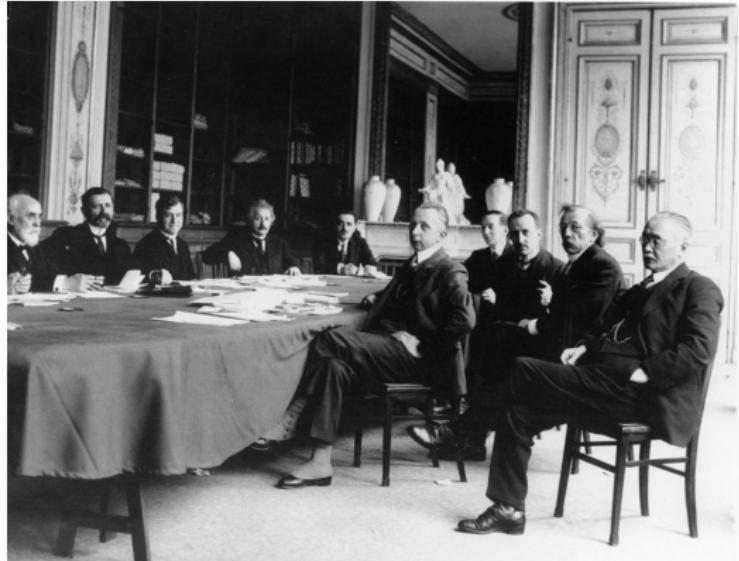
The League has approved the San Geronimo Club that, 1928, will consist of those who believe in a CHARTER OF HUMANITY. The Charter of Humanity is a document that has been signed by 100,000,000 people in 100 countries. It is based on the principles of Justice, Truth, Love, Health and Freedom. It is designed to help people live harmoniously in society. This organization is open to all who believe in the principles of the Charter of Humanity.

and By your Church, Club, Lodge,
or in the assemblies over the land.

APPENDIX *Journal of Health Politics, Policy and Law*, Volume 35, Number 4, December 2010

International Committee on Intellectual Cooperation (ICIC)

- Founded in 1922.
- Based in Geneva.
- Advisory organization of the League of Nations.



• <https://unesco.libguides.com/IICI>

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- Created to support the work ICIC as an **executive branch**.
- Ancestor of UNESCO.

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The data: UNESCO's archives

- 1 Scanned documents of one folder (folder A: *internal affairs*) of the IIIC's archive.

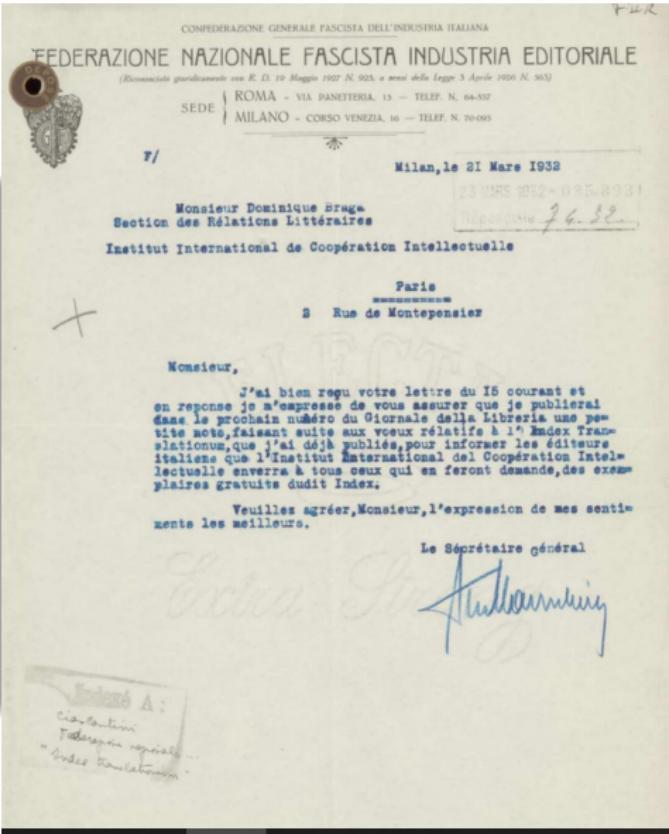
The screenshot shows the UNESCO Archives AtoM Catalogue interface. At the top, there is a logo for "United Nations Educational, Scientific and Cultural Organization" and a search bar. Below the search bar, the title "UNESCO Archives AtoM Catalogue" is displayed, along with the tagline "Building peace in the minds of men and women". On the right side of the header, there are links for "Log in" and other user options. The main content area is titled "Archive Group AG 1 - International Institute of Intellectual Co-operation". Under this title, there is a list of items:

- [Archive Group] AG 1 - International Institute of Intellectual Co-operation, 1921-1954
 - [Fonds] AG 1 - International Institute of Intellectual Co-operation fonds, 1921-1964
 - + [Subseries] A - Correspondence relative aux Commissions nationales, Délegué d'Etat et Affaires générales de la Division des affaires administratives et financières, 1921-1946
 - + [Subseries] B - Correspondance relative aux relations diverses entre pays, 1925-1946
 - + [Subseries] C - Correspondance relative aux questions des relations universitaires, débats de la Conférence permanente des universités, 1925-1946
 - + [Subseries] D - Correspondance relative aux questions scientifiques, Bibliothèques et Congrès bibliothécaires, Bibliog...
 - + [Subseries] DD - Correspondance de la Section des Sciences historiques et sociales, 1924-1940

<https://atom.archives.unesco.org/iiic>

The data: UNESCO's archives

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- 2 Over the 59,820 documents available in folder A, we extract 4,265 typewritten letters with an **origin** and **destination** locations.

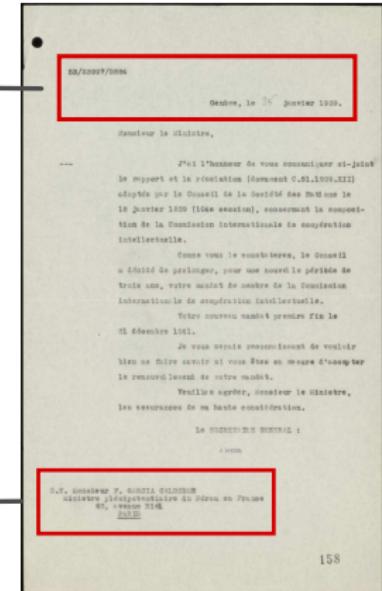


The data: UNESCO's archives

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- 2 Over the 59,820 documents available in folder A, we extract 4,265 typewritten letters with an **origin** and **destination** locations.

Origin
Country
(Switzerland)

Destination
Country
(France)



The data: UNESCO's archives

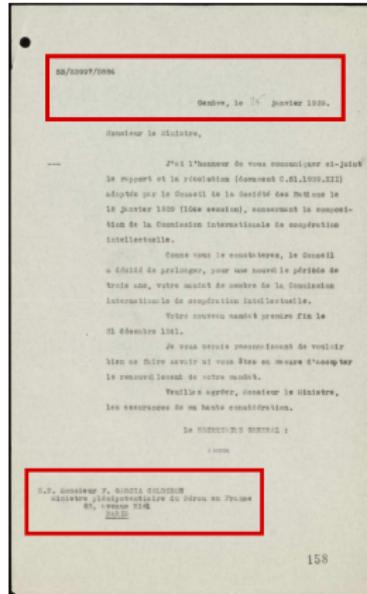
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- 2 Over the 59,820 documents available in folder A, we extract 4,265 typewritten letters with an **origin** and **destination** locations.
- 3 We use this information to build a weighted network of *information exchange* between countries.

Switzerland



$$w_{ij} = 1$$

France



158

Method: Network cartography in a nutshell

Method: Network cartography in a nutshell

- A technique to **assign roles to nodes** by studying their connectivity pattern.

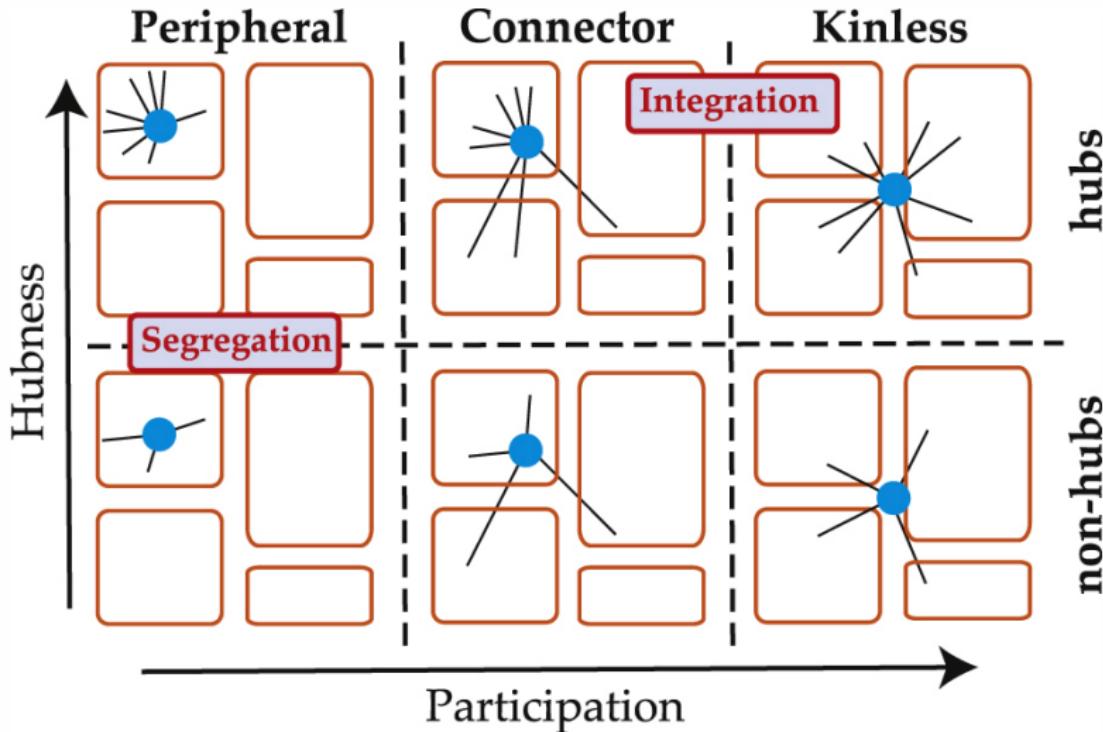
- R. Guimerá, and L. A. N. Amaral, “*Functional cartography of complex metabolic networks*”. Nature, **433**, 895, (2005). DOI: [10.1038/nature03288](https://doi.org/10.1038/nature03288)

Method: Network cartography in a nutshell

- A technique to **assign roles to nodes** by studying their connectivity pattern.
- **It requires a partition of the network into groups** (i.e., the results *depend* on the partitioning criterion).

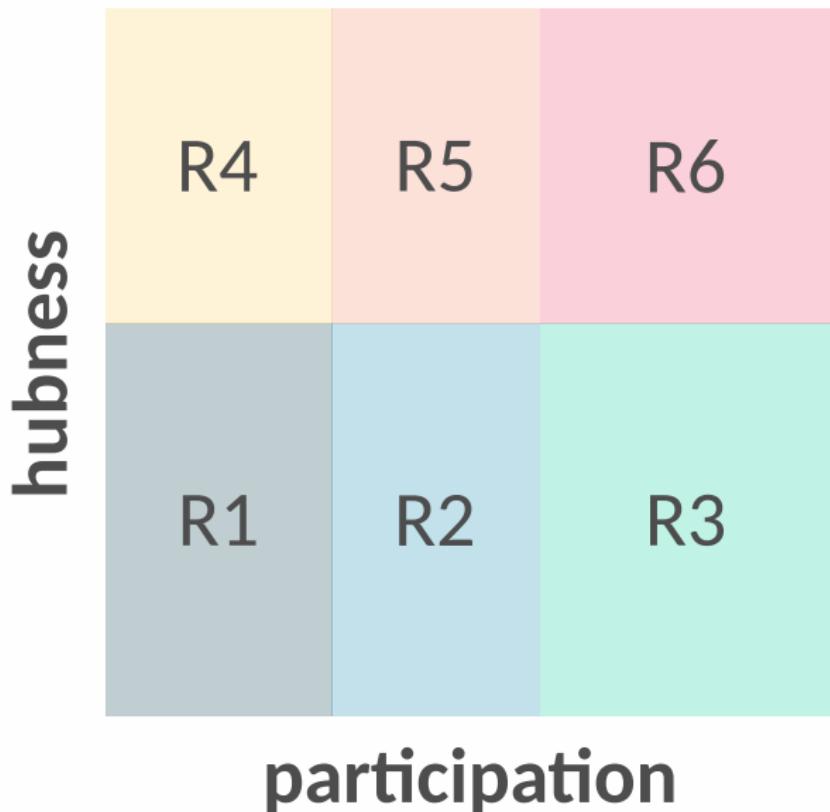
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Method: Network cartography in a nutshell



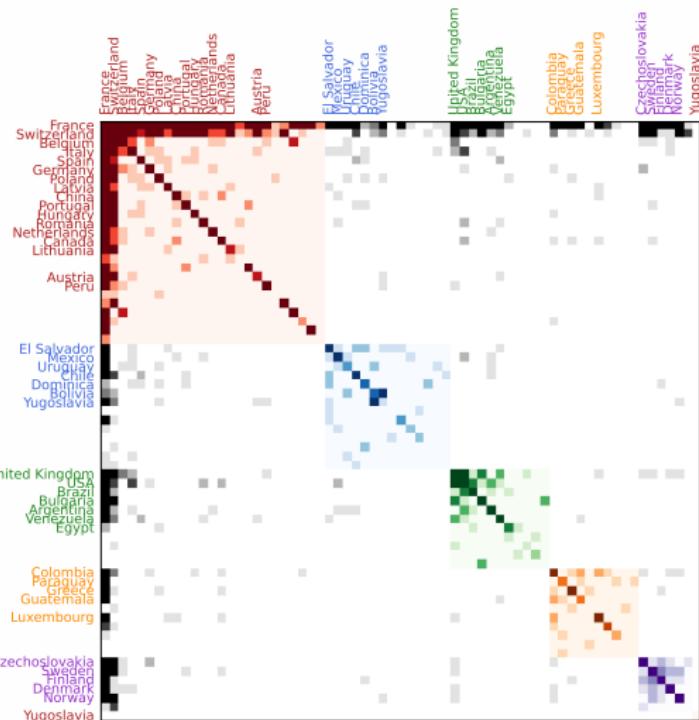
- F. Klimm, et al. “Individual node’s contribution to the mesoscale of complex networks”. New Journal of Physics, **16**, 125006, (2014). DOI: [10.1088/1367-2630/16/12/125006](https://doi.org/10.1088/1367-2630/16/12/125006)

Method: Network cartography in a nutshell



Results

Results



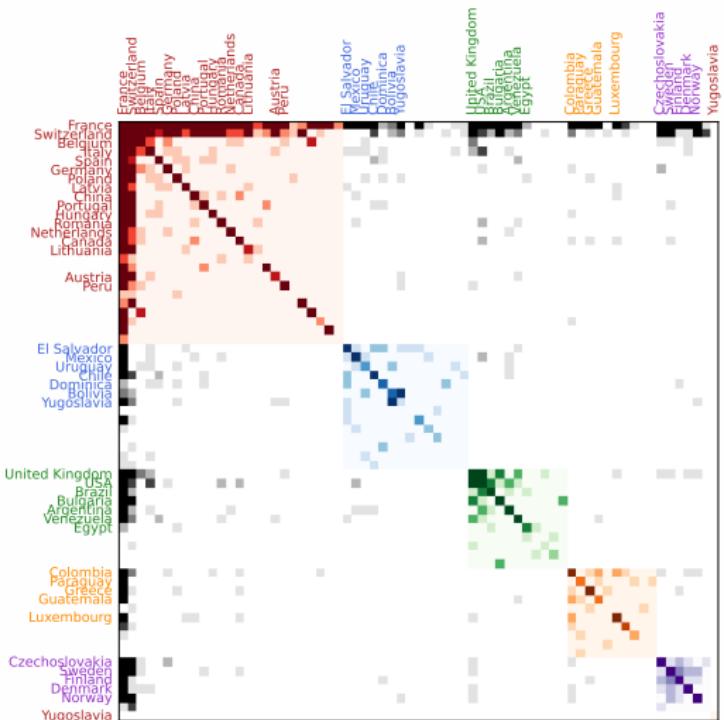
- V. A. Traag, et al. "From Louvain to Leiden: guaranteeing well-connected communities". Sci. Rep., 9, 5233, (2019). DOI: [10.1038/s41598-019-41695-z](https://doi.org/10.1038/s41598-019-41695-z)

Results

N_{comms}

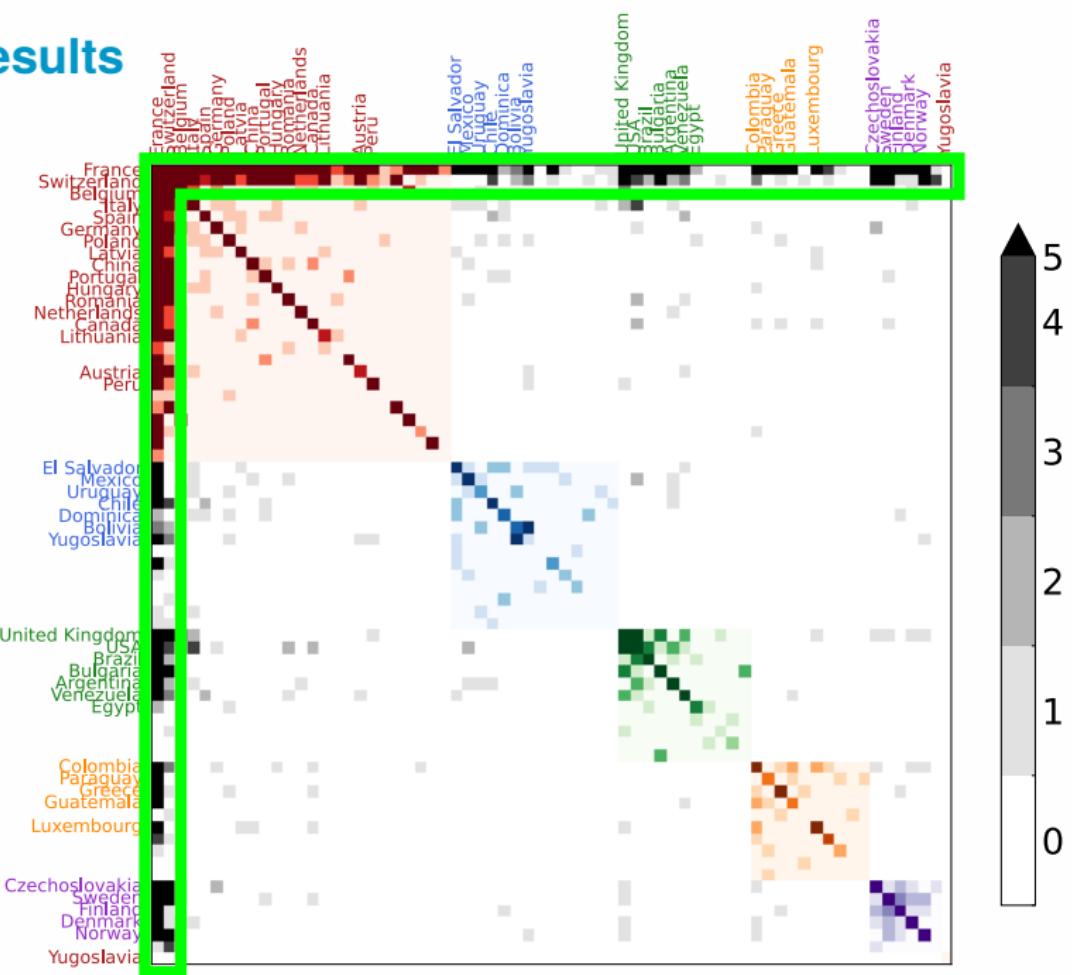
6

0.053



- V. A. Traag, et al. "From Louvain to Leiden: guaranteeing well-connected communities". Sci. Rep., 9, 5233, (2019). DOI: 10.1038/s41598-019-41695-z

Results



Results

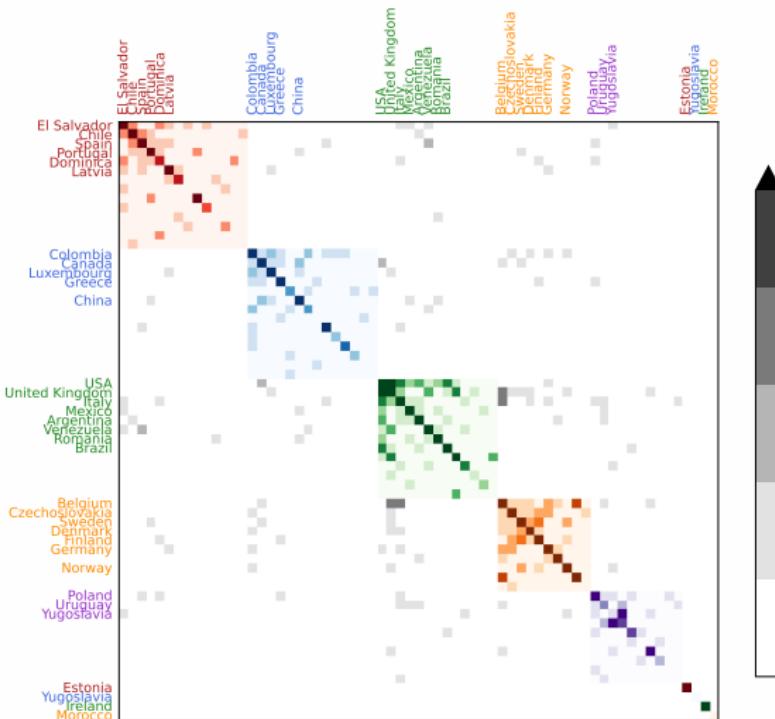
Was there intellectual cooperation
beyond that with (and between)
France and Switzerland?

Results

N_{comms}

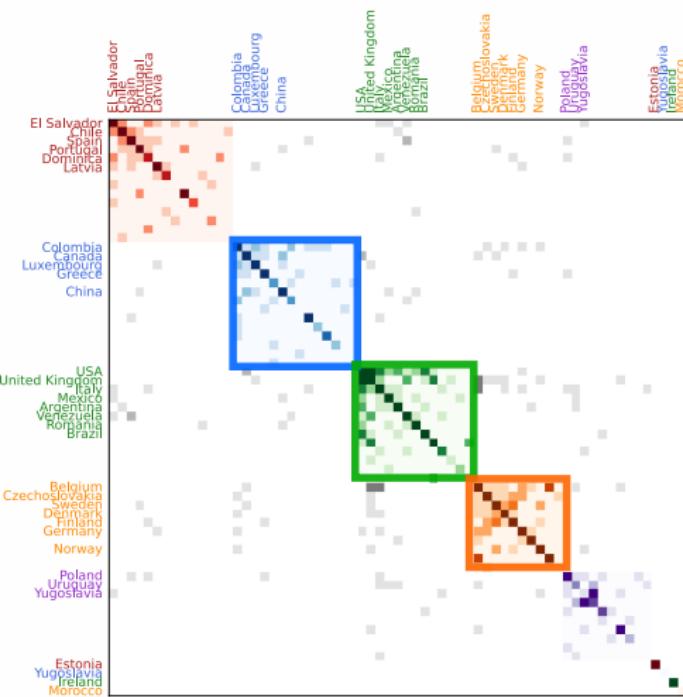
Q

8
0.468



- R. Rodríguez-Casañ et al., "Studying the geographical organization of the International Institute of Intellectual Cooperation via network cartography." Forthcoming (2023).

Results



C1 Spain, Portugal, Latvia, Lithuania, Chile, El Salvador, Dominican Republic, Dominica, Iran, Palestine, Lebanon, South Africa, Japan, and Thailand.

C2 Hungary, Luxembourg, Monaco, Colombia, Paraguay, Guatemala, Costa Rica, Panama, Greece, Albania, Turkey, Canada, Liberia, and China.

C3 Italy, United Kingdom, United States of America, Mexico, Haiti, Argentina, Brazil, Venezuela, Austria, Romania, Bulgaria, India, and Jordan.

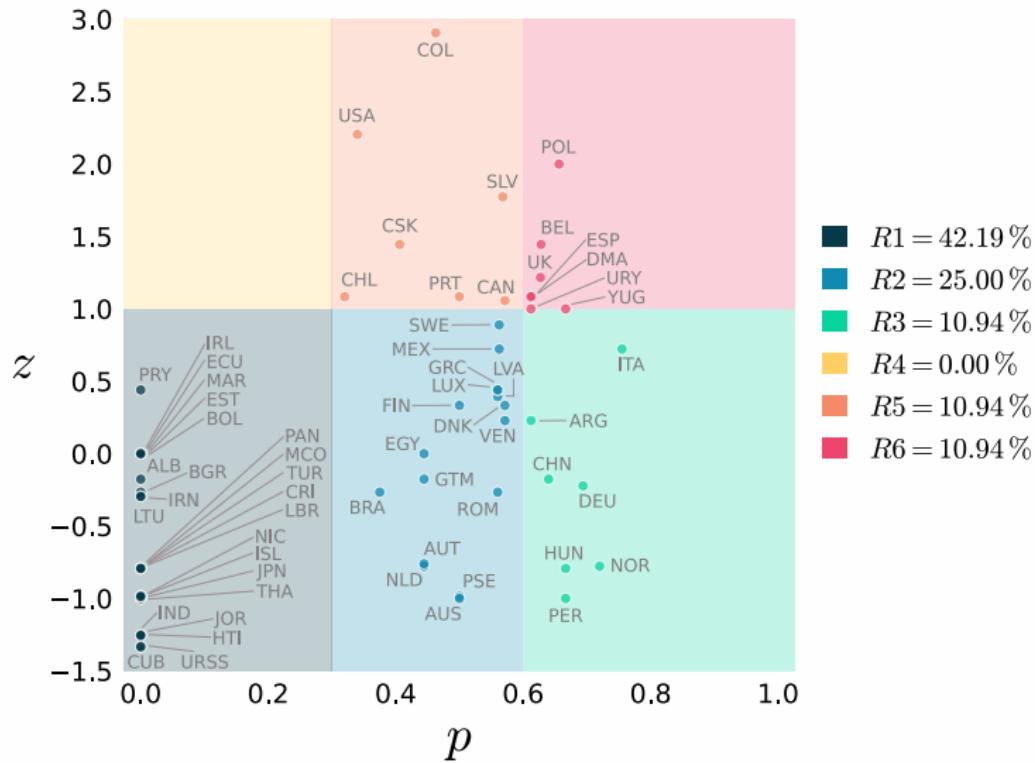
C4 Belgium, Czechoslovakia, Germany, Netherlands, Sweden, Norway, Denmark, Finland, Cuba, and URSS.

C5 Uruguay, Peru, Bolivia, Nicaragua, Ecuador, Poland, Yugoslavia, Egypt, Iceland, and Australia.

C6 – C8 Estonia | Ireland | Morocco.

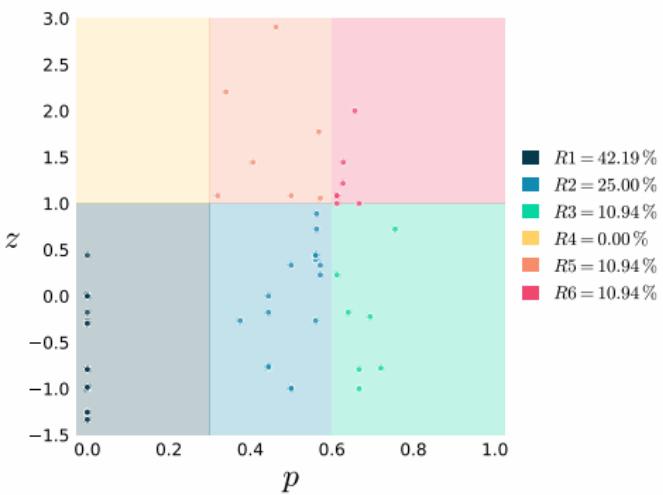
- R. Rodríguez-Casañ et al., "Studying the geographical organization of the International Institute of Intellectual Cooperation via network cartography." Forthcoming (2023).

Results



- R. Rodríguez-Casañ *et al.*, “*Studying the geographical organization of the International Institute of Intellectual Cooperation via network cartography.*” Forthcoming (2023).

Results



R6 Belgium, United Kingdom, Spain, Poland, Uruguay, Dominica, and Yugoslavia.

R5 Czechoslovakia, Chile, United States of America, Colombia, Canada, Portugal, and El Salvador.

R4 —

R3 Italy, Hungary, Germany, Argentina, China, Norway, and Peru.

R2 Romania, Mexico, Sweden, Latvia, Netherlands, Austria, Brazil, Luxembourg, Denmark, Finland, Venezuela, Greece, Guatemala, Egypt, Palestine, and Australia.

R1 Japan, Estonia, Bulgaria, Lithuania, Cuba, India, Bolivia, Paraguay, Monaco, Ireland, Iran, Turkey, URSS, Morocco, Nicaragua, Costa Rica, Ecuador, Haiti, Iceland, Lebanon, Dominican Republic, Jordan, Albania, South Africa, Liberia, Panama, and Thailand.

- R. Rodríguez-Casañ et al., “*Studying the geographical organization of the International Institute of Intellectual Cooperation via network cartography.*” Forthcoming (2023).

Conclusions

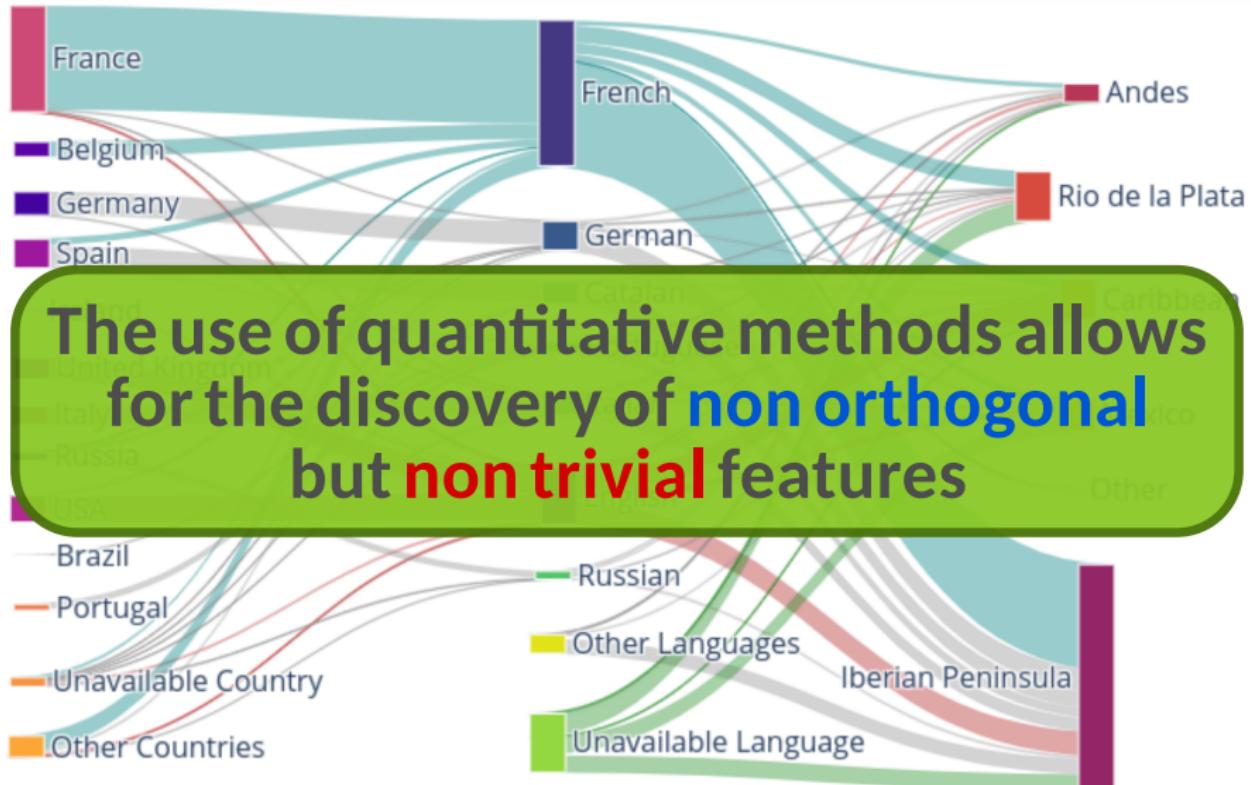
Take Home Messages



Digital humanities are an opportunity for Network science

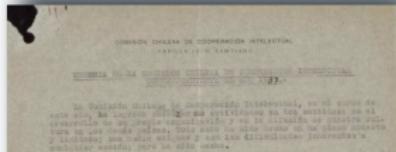


Take Home Messages

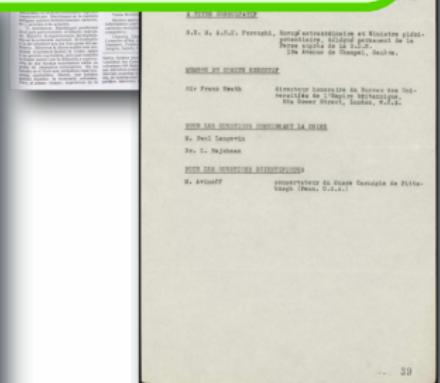
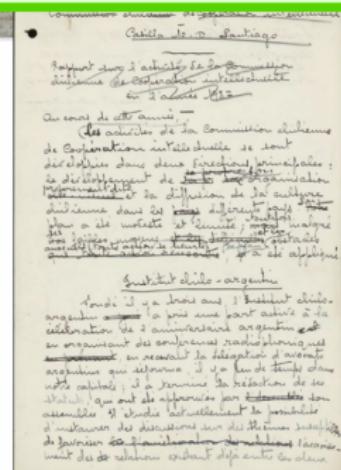
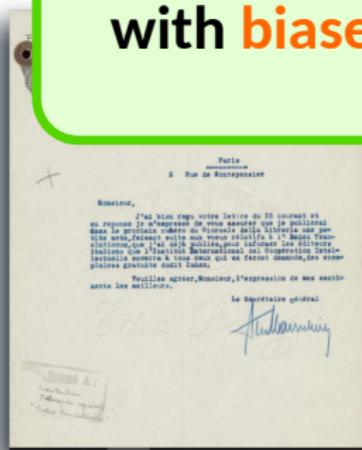


The use of quantitative methods allows
for the discovery of **non orthogonal**
but **non trivial** features

Take Home Messages



Not all that shines is gold: we have to deal with **biased, **unstructured**, **incomplete**, and **noisy** data.**



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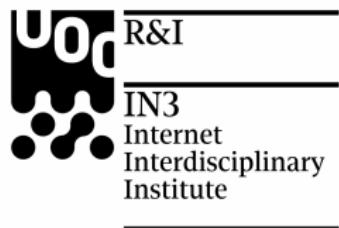
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Extra content

Alternative grouping

Question

Can we consider **other types** of groupings?

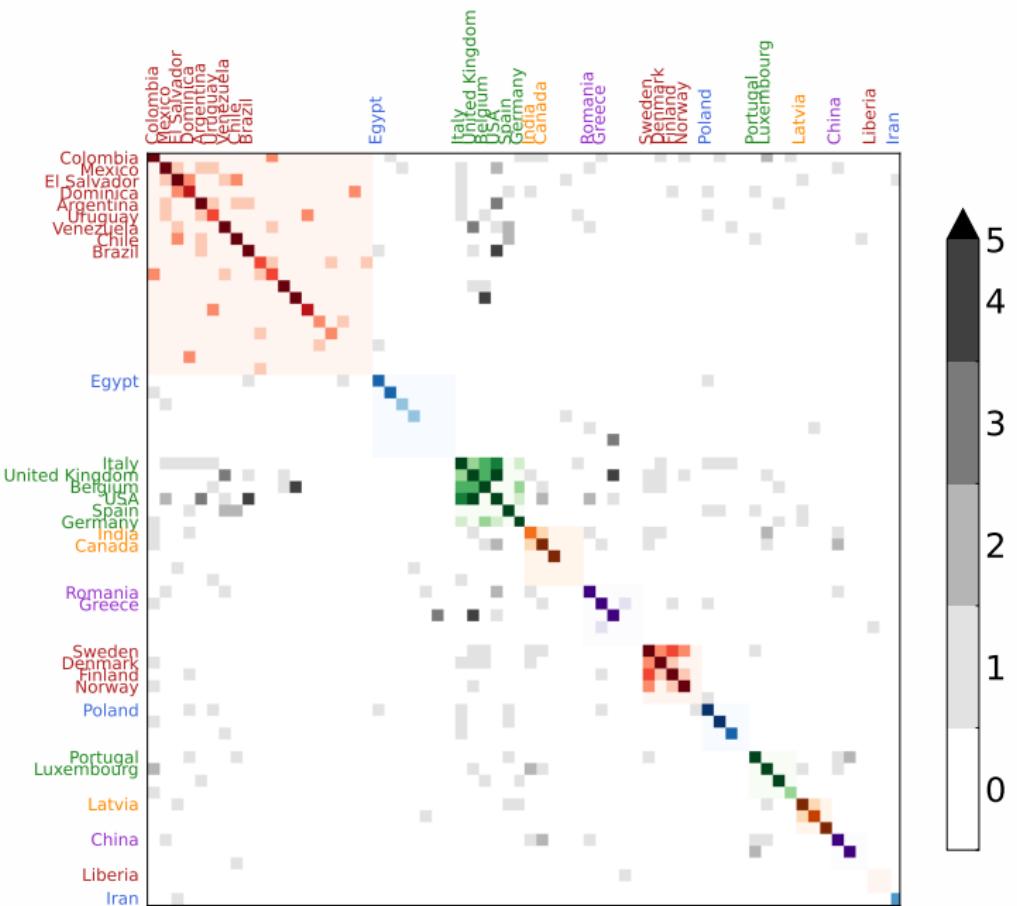
Alternative grouping



Historical grouping

Group's name	Countries
EU western and USA	France, United Kingdom, Switzerland, Germany, Italy, Belgium, The Netherlands, Spain, and United States of America
EU central countries	Austria, Czechoslovakia, Hungary, and Poland
EU eastern countries	Albania, Bulgaria, Greece, Yugoslavia, and Romania
Baltic countries	Estonia, Latvia, and Lithuania
Nordic countries	Denmark, Finland, Norway, Iceland, and Sweden
Latin countries	Portugal, Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Chile, Dominican Republic, Ecuador, Dominica, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Uruguay, and Venezuela
UK's Dominions	Australia, Canada, India, South Africa, and Ireland
Colonies	Egypt, Benin, French Guiana, Haiti, Turkey, Lebanon, Jordan, Morocco, and Palestine
Eastern countries	China, Japan, Cambodia, and Thailand
Middle East	Iran
Other countries	Luxembourg, Monaco, Liberia, and URSS

Historical grouping



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