



CitNetExplorer

Analyzing citation patterns in scientific literature

Getting started with CitNetExplorer version 1.0.0

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Universiteit
Leiden



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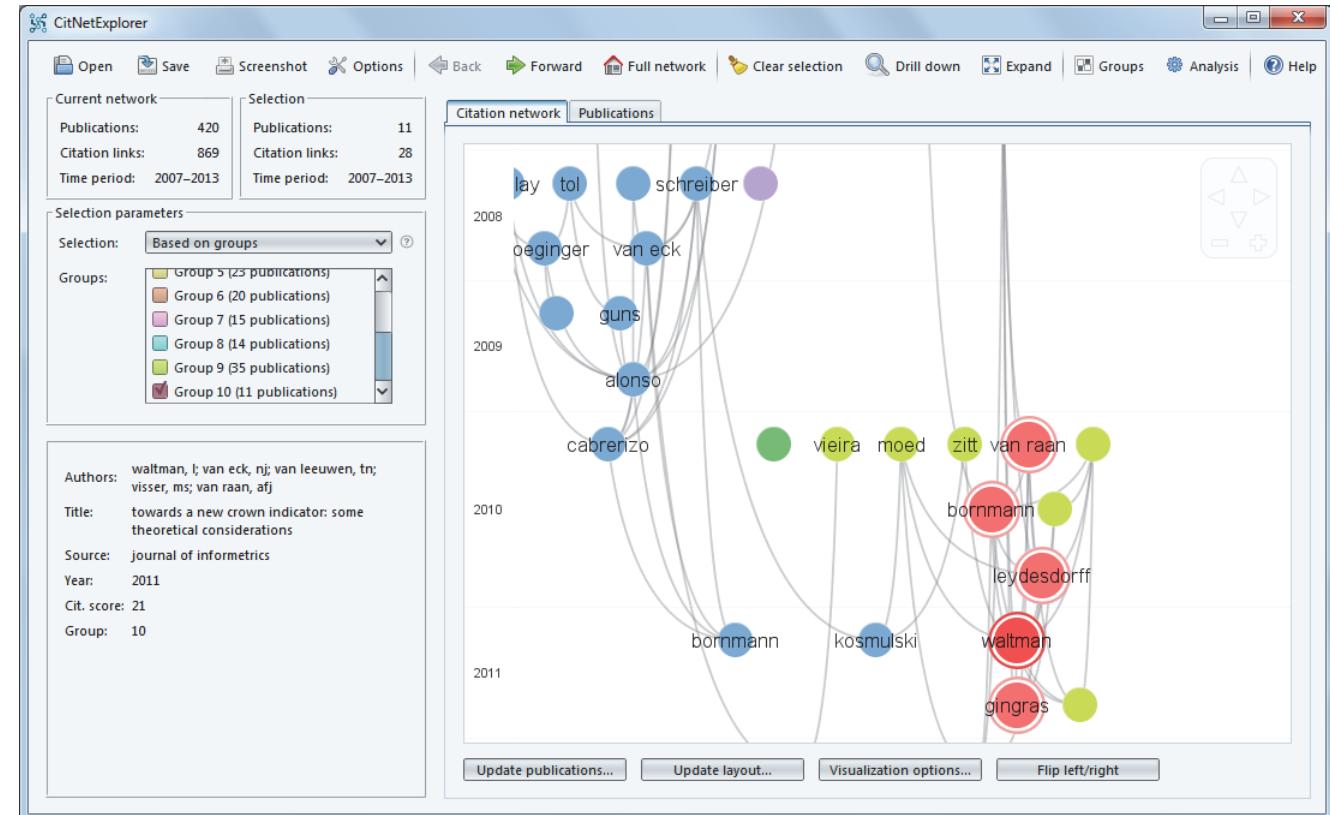
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- CitNetExplorer is a software tool for visualizing and analyzing citation networks of scientific publications
- For non-commercial research and teaching purposes, CitNetExplorer is freely available at www.citnetexplorer.nl

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- This tutorial offers an introduction into CitNetExplorer
- The citation network of all publications in the *Journal of Informetrics (JOI)* in the period 2007–2013 is studied



- The analysis is based on data from Web of Science and focuses on the topic of field-normalized citation impact indicators

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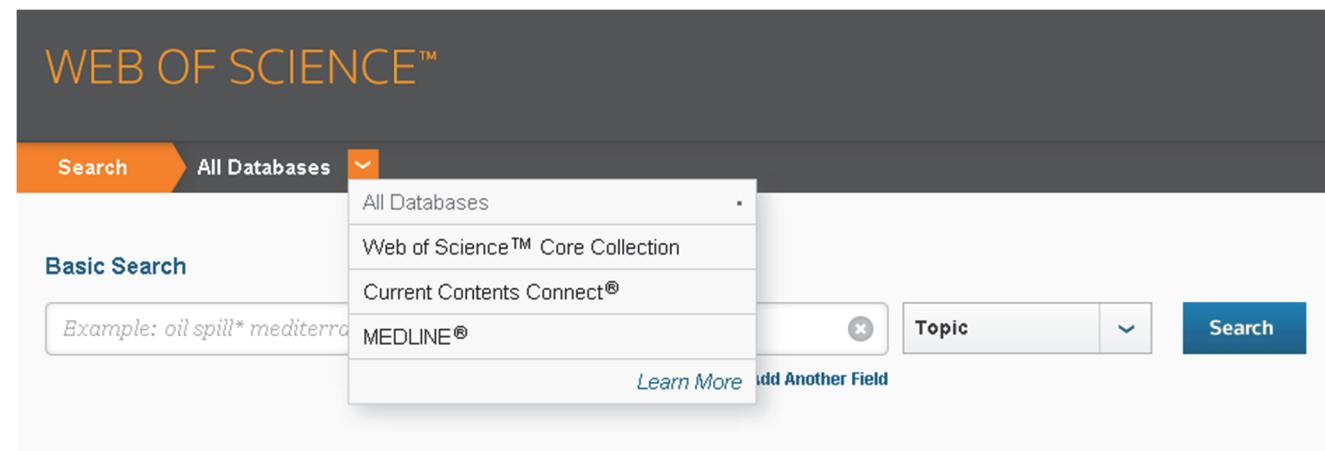
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Web of Science

We start by demonstrating how to download Web of Science data on all publications in JOI in the period 2007–2013

- Open a web browser and go to www.webofscience.com
- Change **All Databases** into **Web of Science™ Core Collection**



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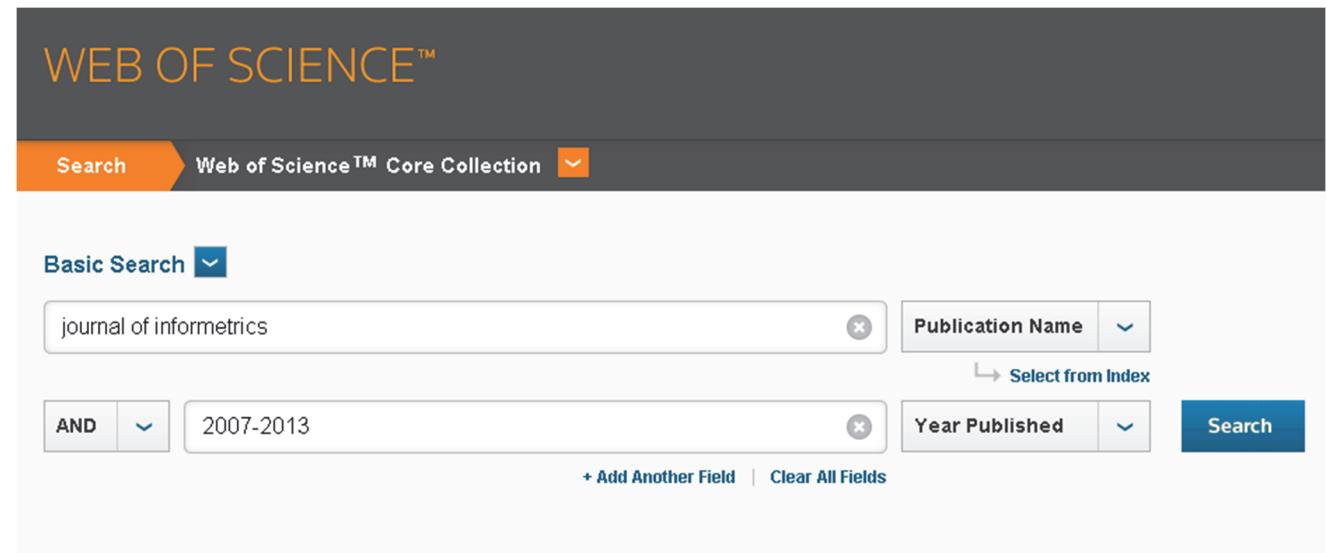
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- In the search field, choose **Publication Name** and enter ‘journal of informetrics’
- Click **Add Another Field**, choose **Year Published**, and enter ‘2007-2013’



The screenshot shows the 'Basic Search' interface of the Web of Science Core Collection. At the top, there's a search bar containing 'journal of informetrics'. To the right of the search bar are two dropdown menus: 'Publication Name' and 'Year Published', both currently set to their default values. Below the search bar, there's a logical operator 'AND' followed by another search field containing '2007-2013'. At the bottom of the search area, there are links for '+ Add Another Field' and 'Clear All Fields', and a large blue 'Search' button on the far right.

- Click **Search**

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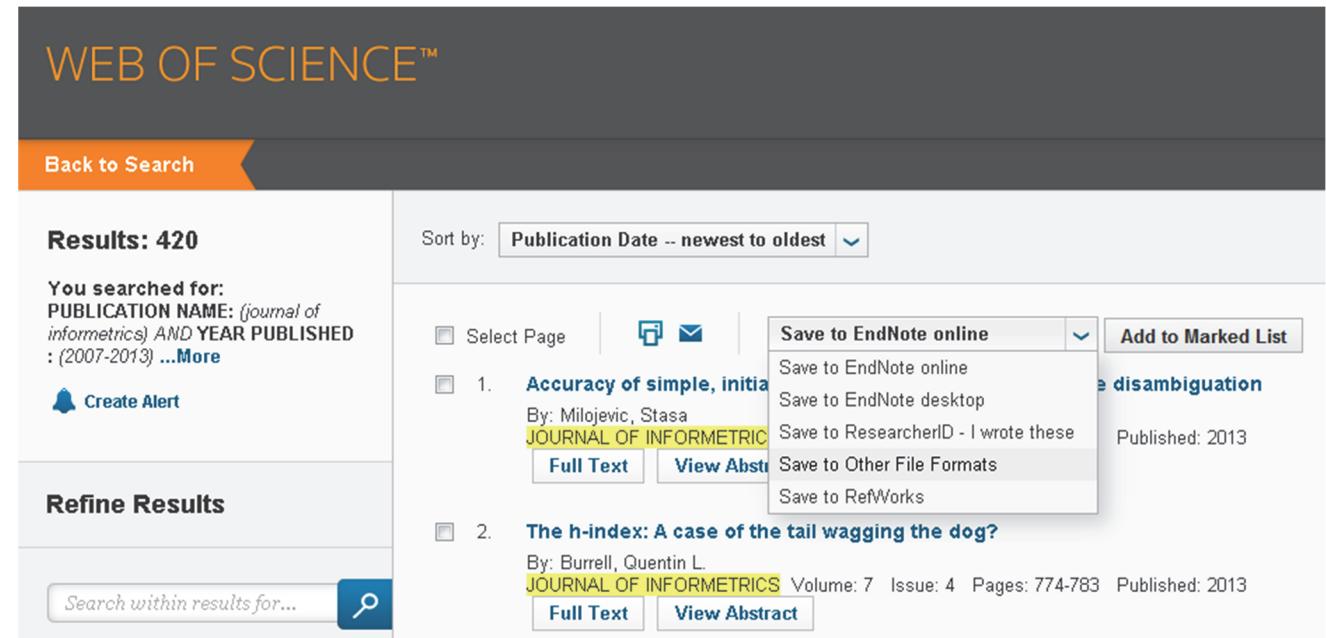
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- There turn out to be 420 publications in *JOI* in the period 2007–2013
- To save the bibliographic data of these publications in a file, choose the **Save to Other File Formats** option



The screenshot shows the Web of Science search results for the query "PUBLICATION NAME: (journal of informetrics) AND YEAR PUBLISHED : (2007-2013)". There are 420 results. The results are sorted by "Publication Date -- newest to oldest".

The first result is "Accuracy of simple, initial methods for estimating the h-index" by Milojevic, Stasa, published in JOURNAL OF INFORMETRICS. The second result is "The h-index: A case of the tail wagging the dog?" by Burrell, Quentin L., published in JOURNAL OF INFORMETRICS.

A context menu is open over the first result, showing options: "Select Page", "Save to EndNote online", "Add to Marked List", "Save to RefWorks", and "Save to Other File Formats". The "Save to Other File Formats" option is highlighted.

Below the results, there is a "Refine Results" section and a search bar.

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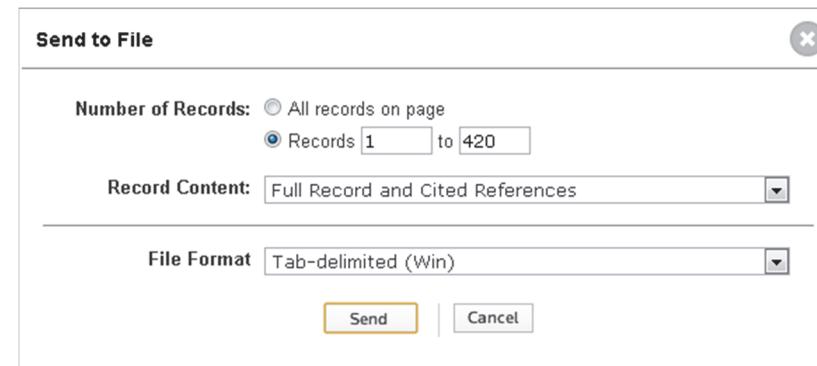
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- In the **Send to File** dialog box, select records 1 to 420
- Choose the **Full Record and Cited References** option
- Choose the **Tab-delimited (Win)** option. Alternatively, the **Plain Text** option can be chosen as well



- Click **Send**. The bibliographic data is downloaded in a file called 'savedrecs.txt'. Change the name of the file into 'JOL.txt' and save the file at a convenient location

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Open citation network

We now show how to open the citation network of JOI publications in CitNetExplorer, and we introduce the CitNetExplorer user interface

- If you have not yet done so, first download CitNetExplorer:
 - Go to www.citnetexplorer.nl/download/
 - Download the appropriate ZIP file for your system
 - Extract all files from the ZIP file and save the files at a convenient location
- Launch CitNetExplorer:
 - On Windows systems, run the Windows executable of CitNetExplorer. On other systems, run the Java JAR file of CitNetExplorer
 - CitNetExplorer is launched and the **Open Citation Network** dialog box appears

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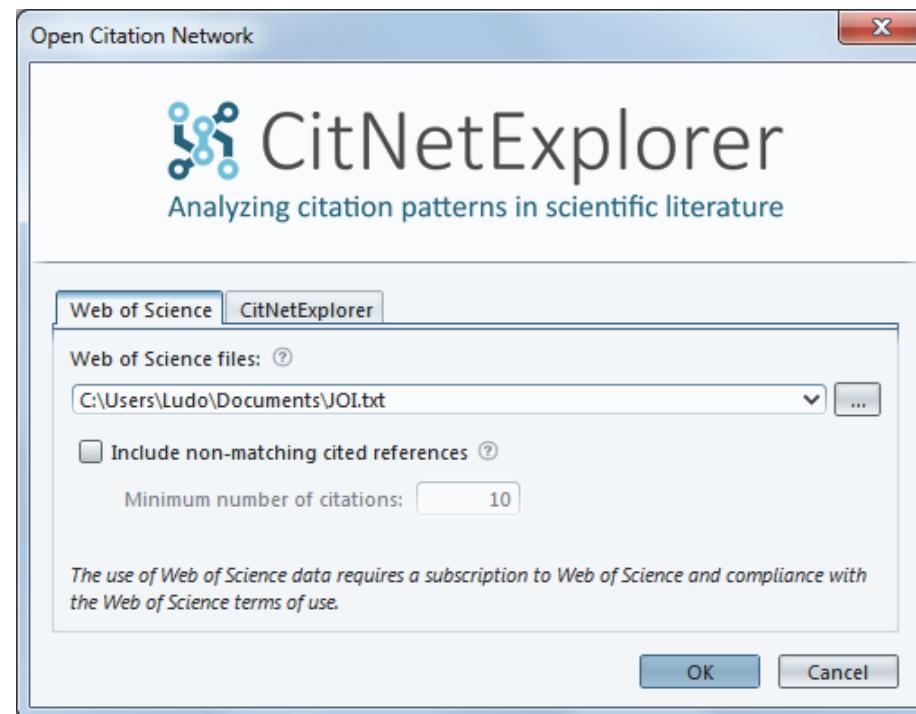
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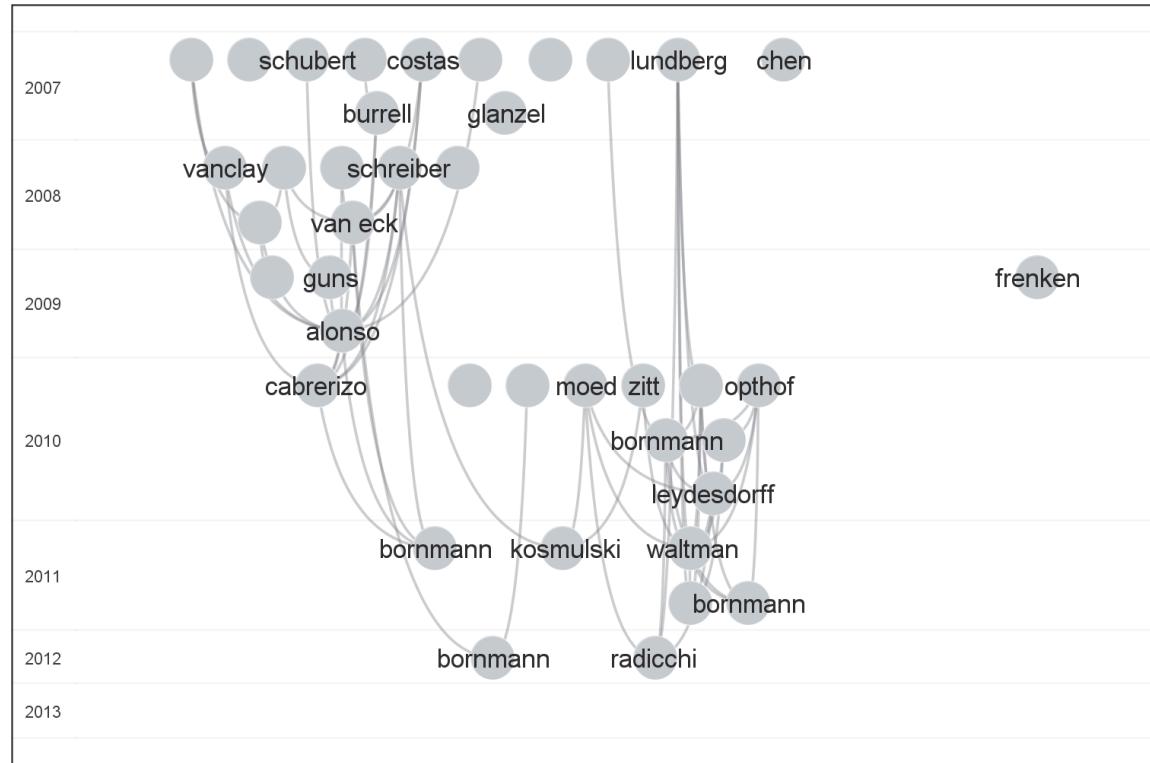
- In the **Open Citation Network** dialog box, select the Web of Science file 'JOI.txt'



- Uncheck **Include non-matching cited references**. In this way, publications in journals other than *JOI* that are cited by publications in *JOI* are not included in the citation network
- Click **OK**. A visualization of the citation network of *JOI* publications appears

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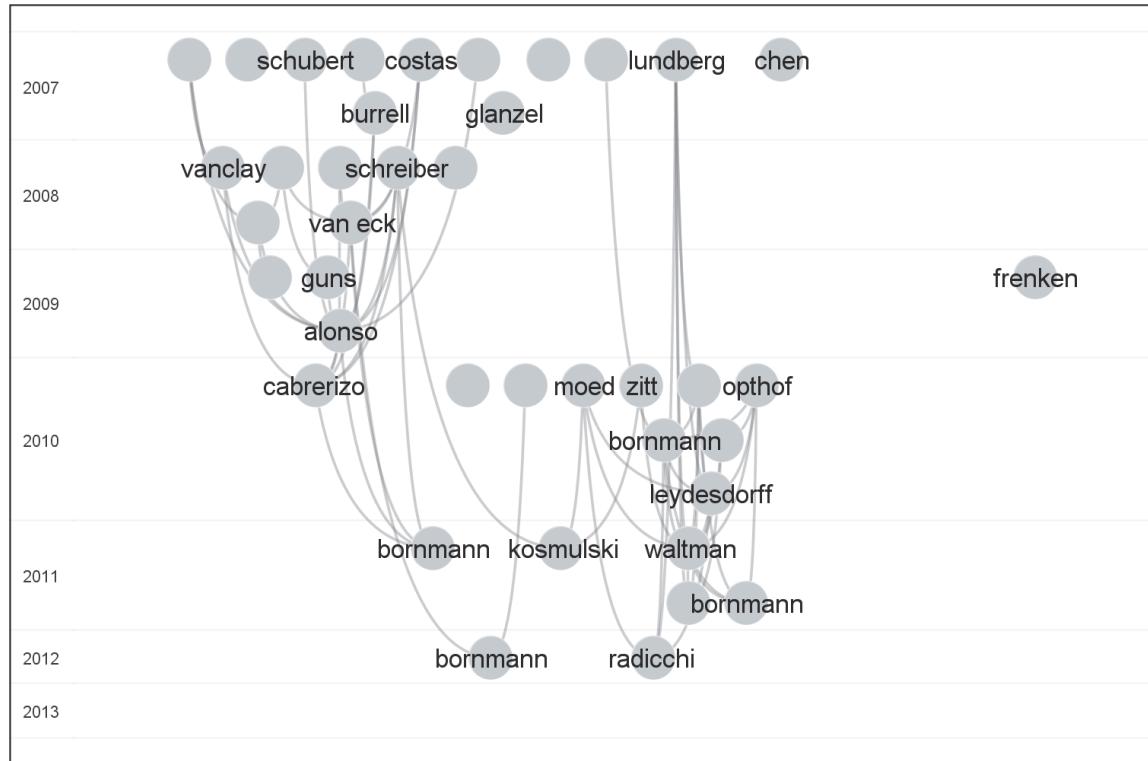
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- Each circle represents a publication
- Publications are labeled by the last name of the first author
- To avoid overlapping labels, some labels may not be displayed
- By default, only the 40 most frequently cited publications are included in the visualization

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Visualization



- The horizontal location of a publication is determined by its citations relations with other publications
- The vertical location of a publication is determined by its publication year
- The curved lines represent citation relations
- Citations point in upward direction. The cited publication is always located above the citing publication

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The **Current network** panel shows the number of publications and the number of citation relations in the citation network

Current network	
Publications:	420
Citation links:	869
Time period:	2007–2013

When the mouse is moved over a publication, some bibliographic information is shown in the information panel

Authors: van eck, nj; waltman, l
Title: generalizing the h- and g- indices
Source: journal of informetrics
Year: 2008
Cit. score: 15

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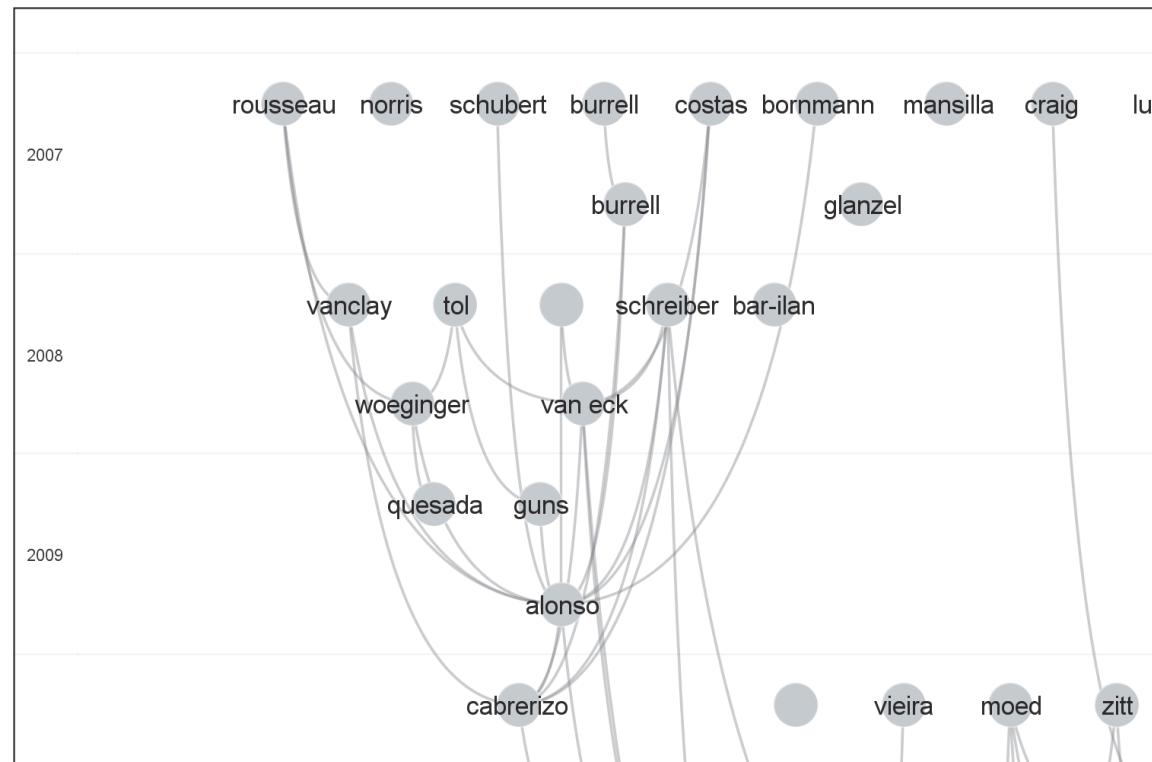
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- Use the mouse wheel or the right mouse button for zooming
- Use the left mouse button for panning/scrolling
- Alternatively, the navigation panel can be used



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Publication list

- Go to the **Publications** tab
- In the **Author** field, enter ‘van eck* OR waltman*’
- Click **Search**. There turn out to be 13 *JOI* publications by Van Eck and/or Waltman

Search

Author:	van eck* OR waltman*	First year:		Last year:	
Title:		Min. cit. score:		Max. cit. score:	
Source:		Group:			

Search **Clear**

All publications (13) Selected publications Marked publications

Authors	Title	Source	Year	Cit. score
waltman, l; van eck, nj; van leeuw...	towards a new crown indicator: s...	journal of informetrics	2011	21
van raan, afj; van leeuwen, tn; vis...	rivals for the crown: reply to oph...	journal of informetrics	2010	18
van eck, nj; waltman, l	generalizing the h- and g- indices	journal of informetrics	2008	15
waltman, l; van eck, nj; noyons, e...	a unified approach to mapping a...	journal of informetrics	2010	3
waltman, l; van eck, nj; van leeuw...	some modifications to the snip jo...	journal of informetrics	2013	3
waltman, l; van eck, nj	some comments on egghe's deriv...	journal of informetrics	2009	2
bornmann, l; waltman, l	the detection of 'hot regions' in t...	journal of informetrics	2011	2
waltman, l; tijsse, rjw; van eck, nj	globalisation of science in kilometre...	journal of informetrics	2011	2
waltman, l	an empirical analysis of the use of...	journal of informetrics	2012	2
waltman, l; van eck, nj	a systematic empirical comparison...	journal of informetrics	2013	1
waltman, l; van eck, nj	some comments on the journal w...	journal of informetrics	2008	0
van eck, nj; waltman, l	on the proper understanding of t...	journal of informetrics	2009	0
waltman, l; van eck, nj; wouters, p	counting publications and citatio...	journal of informetrics	2013	0

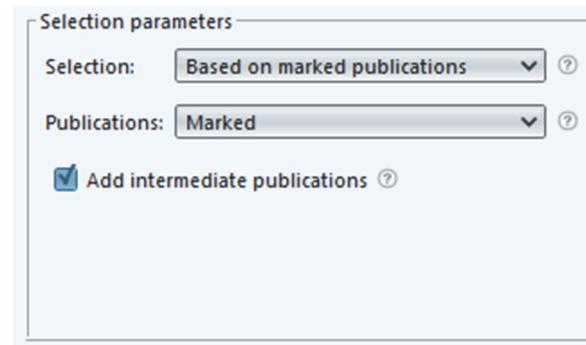
Mark publication **Unmark publication** **Mark all publications** **Unmark all publications**

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Drill down

We now demonstrate the use of the drill down and expand functionality of CitNetExplorer to explore the citation network of JOI publications on the topic of field-normalized citation impact indicators

- Go back to the **Citation network** tab
- In the **Selection parameters** panel, make sure that the **Based on marked publications** option is chosen



- Also make sure that **Add intermediate publications** is checked

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Drill down

- In the visualization, click ‘lundberg’ in 2007 and ‘radicchi’ in 2012. Both publications have now been marked
- Based on the current settings in the **Selection parameters** panel, a publication is selected if it is either a marked or an intermediate publication

Intermediate publications are publications located on a citation path between two marked publications

- The **Selection** panel shows that there are 10 selected publications. There are 26 citation relations between these publications

Selection	
Publications:	10
Citation links:	26
Time period:	2007–2012

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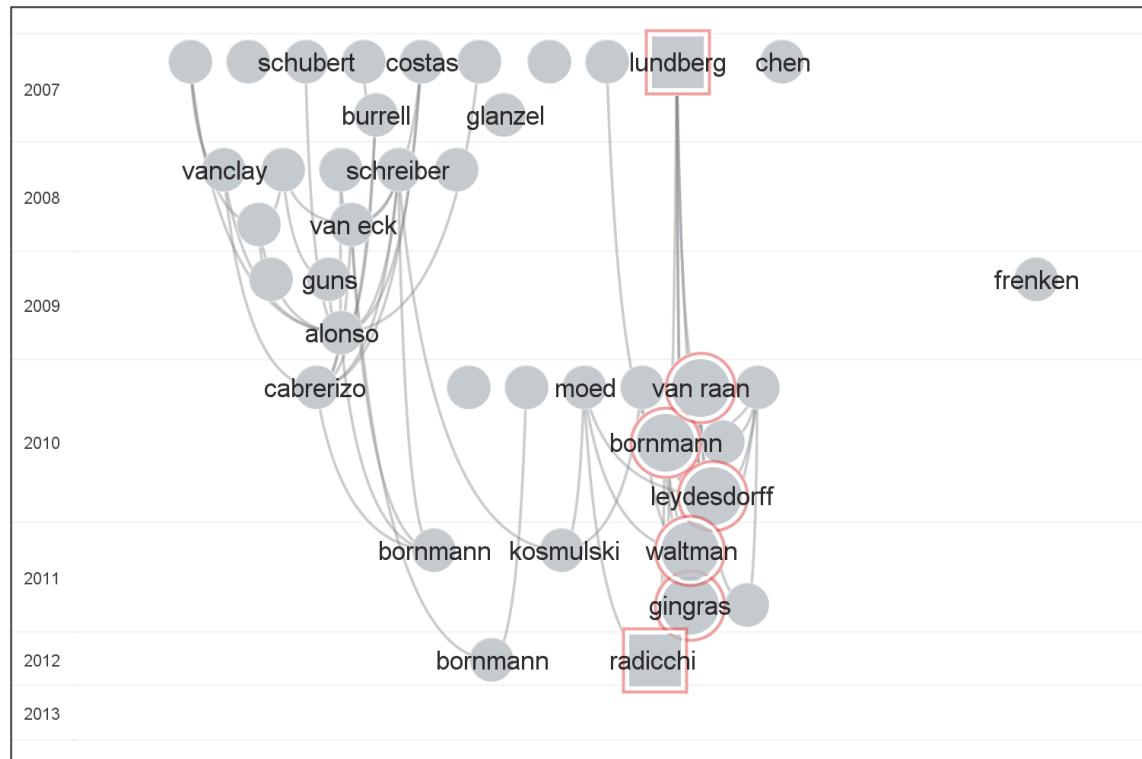
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- Marked publications are represented by a square instead of a circle
- Selected publications are indicated by a red border

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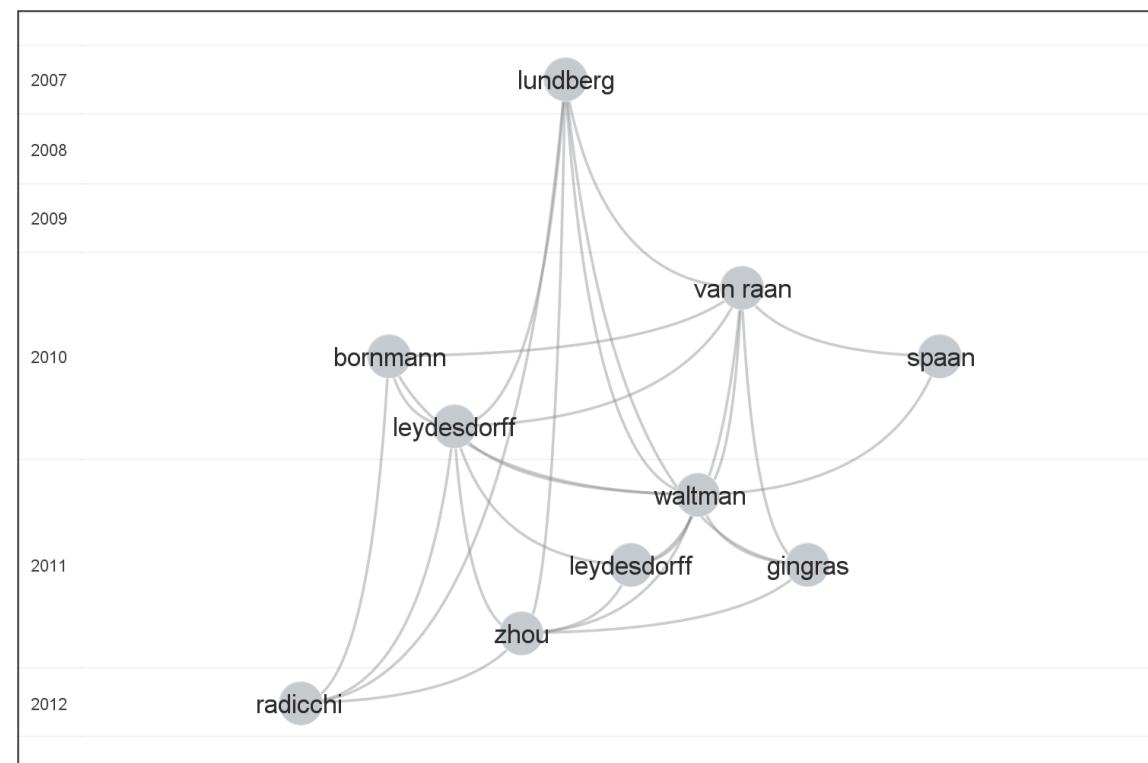
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Drill down

- Click  **Drill down** to drill down to the subnetwork consisting of the 10 selected publications
- The visualization is updated



- The **Current network** panel is updated as well

Current network	
Publications:	10
Citation links:	26
Time period:	2007–2012

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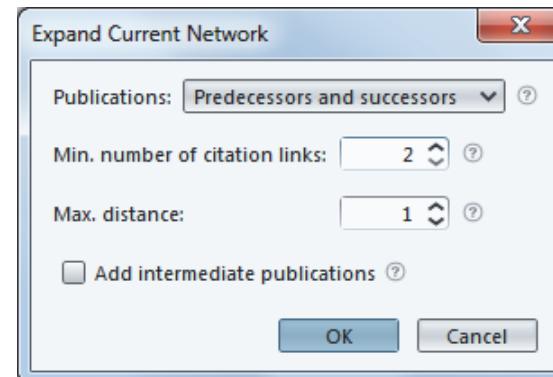
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Expand

- Click  **Expand**. The **Expand Current Network** dialog box appears



- Make sure that the **Predecessors and successors** option is chosen
 - Predecessors are publications cited by at least a certain minimum number of publications in the current subnetwork
 - Successors are publications citing at least a certain minimum number of publications in the current subnetwork
- Set **Min. number of citation links** to 2

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Expand

- Make sure that **Max. distance** is set to 1
 - Also make sure that **Add intermediate publications** is unchecked
- Intermediate publications are publications located on a citation path between two predecessors/successors
- Click **OK** to expand the current subnetwork

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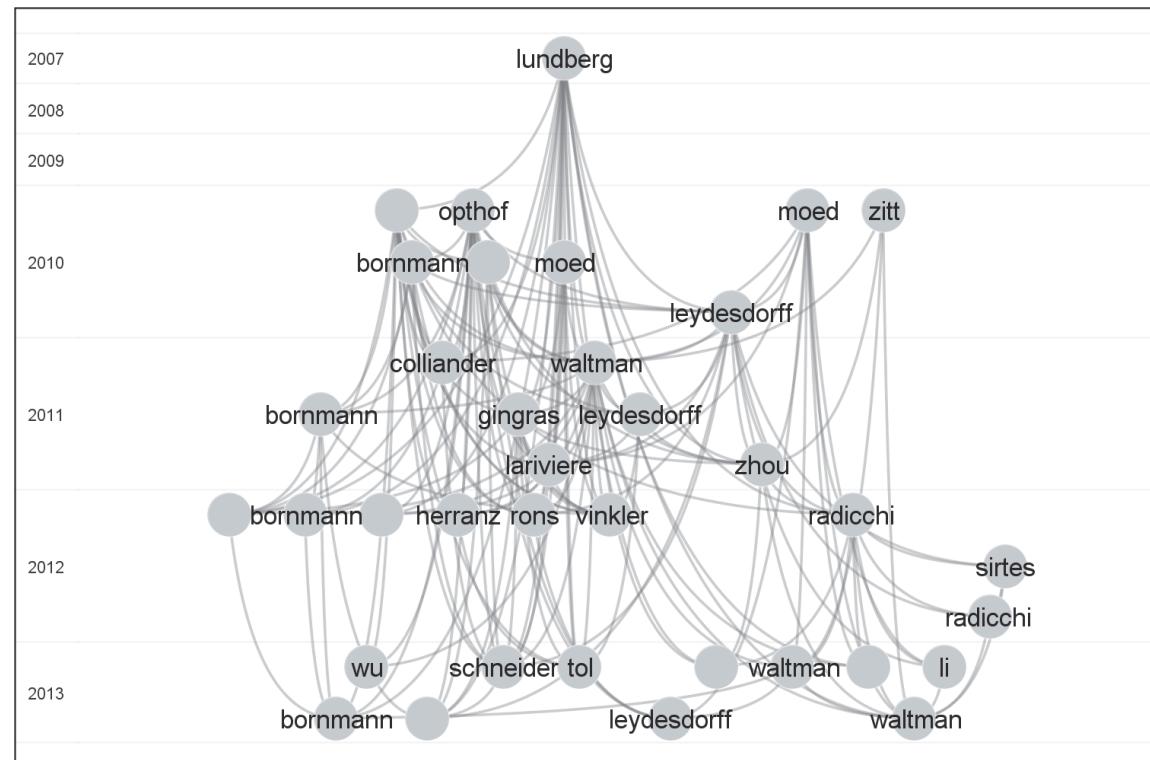
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Expand

- After the expansion, the current subnetwork includes 36 publications

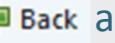
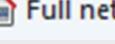
Current network	
Publications:	36
Citation links:	164
Time period:	2007–2013



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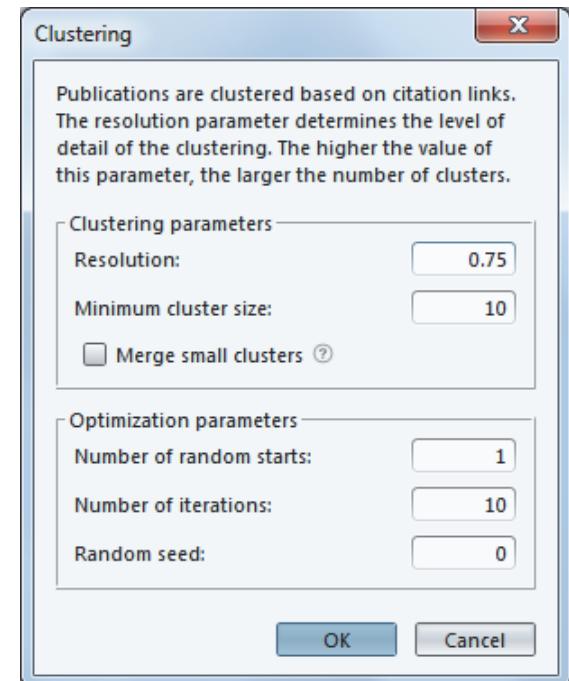
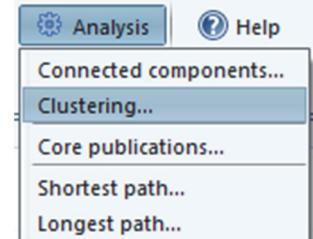
We have shown the use of CitNetExplorer's drill down and expand functionality to explore the citation network of JOI publications on the topic of field-normalized citation impact indicators. We now demonstrate an alternative approach that uses CitNetExplorer's clustering and core publications functionality

- Click  **Back** to move back to the previous subnetwork. This is the subnetwork that includes 10 publications
- Click  **Back** again to move back another time. You now get back to the original full network
 - The  **Back** and  **Forward** buttons can be used to move back and forward between subnetworks, analogous to the back and forward buttons in a web browser
 - The  **Full network** button can be used to move to the full network, analogous to the home button in a web browser
- Click  **Clear selection** to unselect all selected publications and to unmark all marked publications

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Clustering

- Click **Clustering** in the **Analysis** menu
- In the **Clustering** dialog box, set the **Resolution** parameter to 0.75. The values of the other parameters need not be changed
 - Publications are clustered based on their citation relations. Publications assigned to the same cluster tend to be closely connected to each other in the citation network
 - The **Resolution** parameter determines the level of detail of the clustering. The higher the value of this parameter, the larger the number of clusters that will be obtained
- Click **OK**



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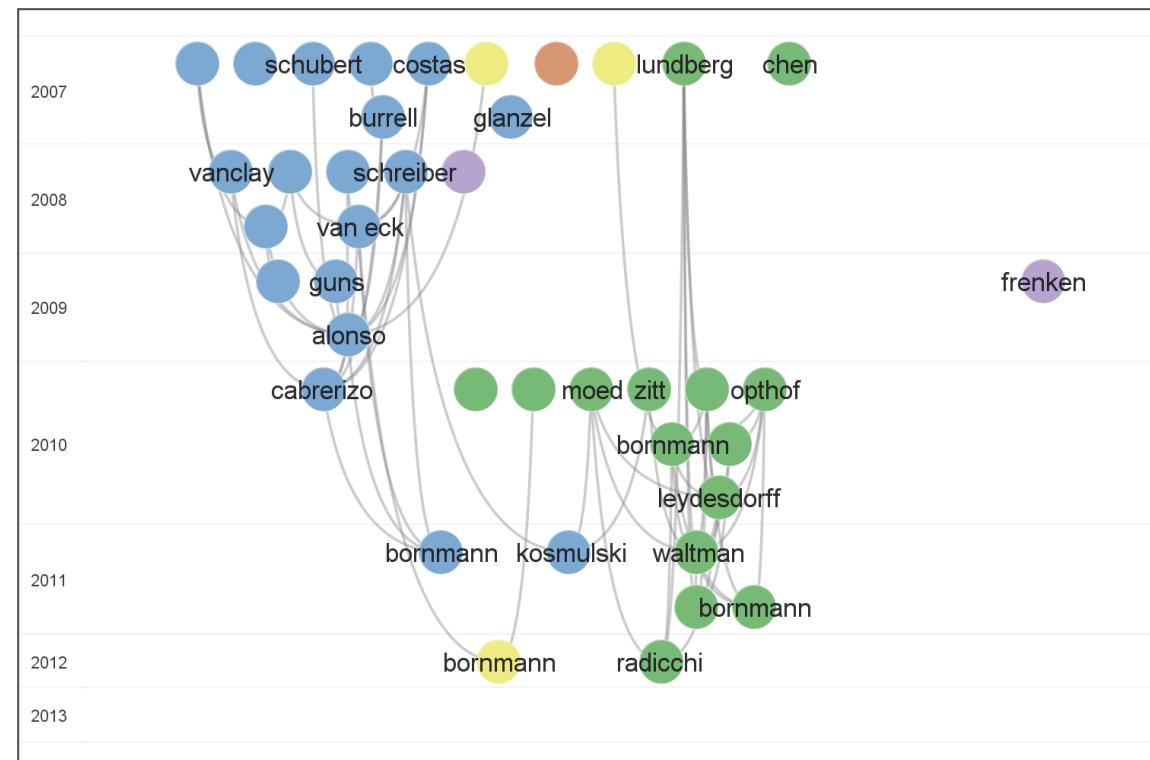
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Clustering

- 8 clusters of publications are identified and the visualization is updated

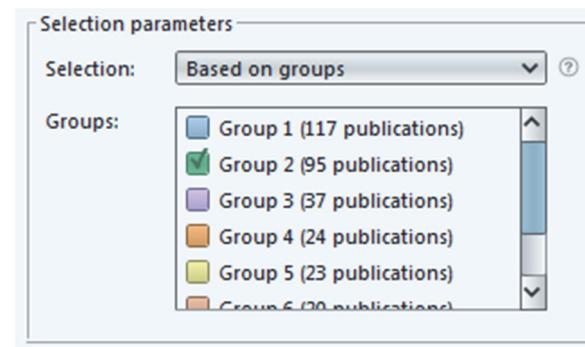


- The color of a publication indicates the group to which the publication is assigned
- Each group corresponds with one of the 8 clusters of publications that have been identified

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Clustering

- In the **Selection parameters** panel, choose the **Based on groups** option
- Check **Group 2** to select the 95 publications assigned to group 2



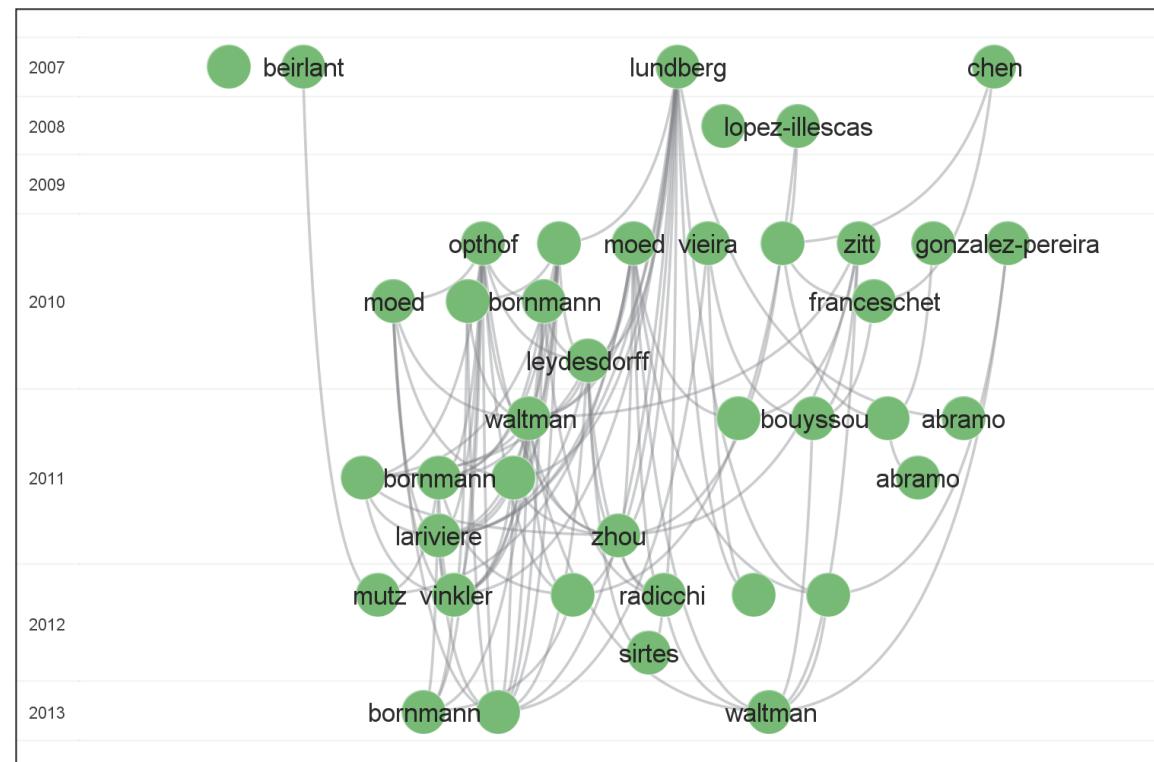
- Click  **Drill down** to drill down to the subnetwork consisting of these 95 publications

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Clustering

- After drilling down, the current subnetwork includes 95 publications

Current network	
Publications:	95
Citation links:	295
Time period:	2007–2013



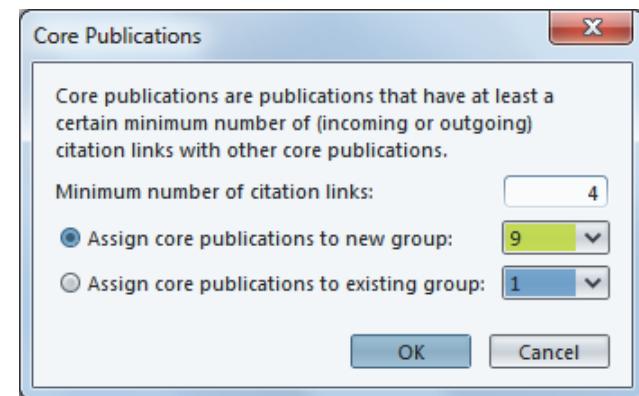
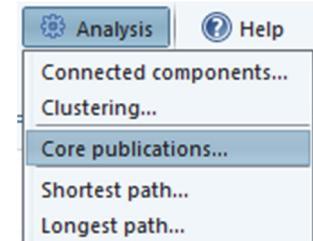
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Core publications

- Click **Core publications** in the **Analysis** menu
- In the **Core Publications** dialog box, set the **Minimum number of citation links** parameter to 4

- Core publications are publications that have at least a certain minimum number of citation relations with other core publications
- Incoming and outgoing citation relations are treated identically

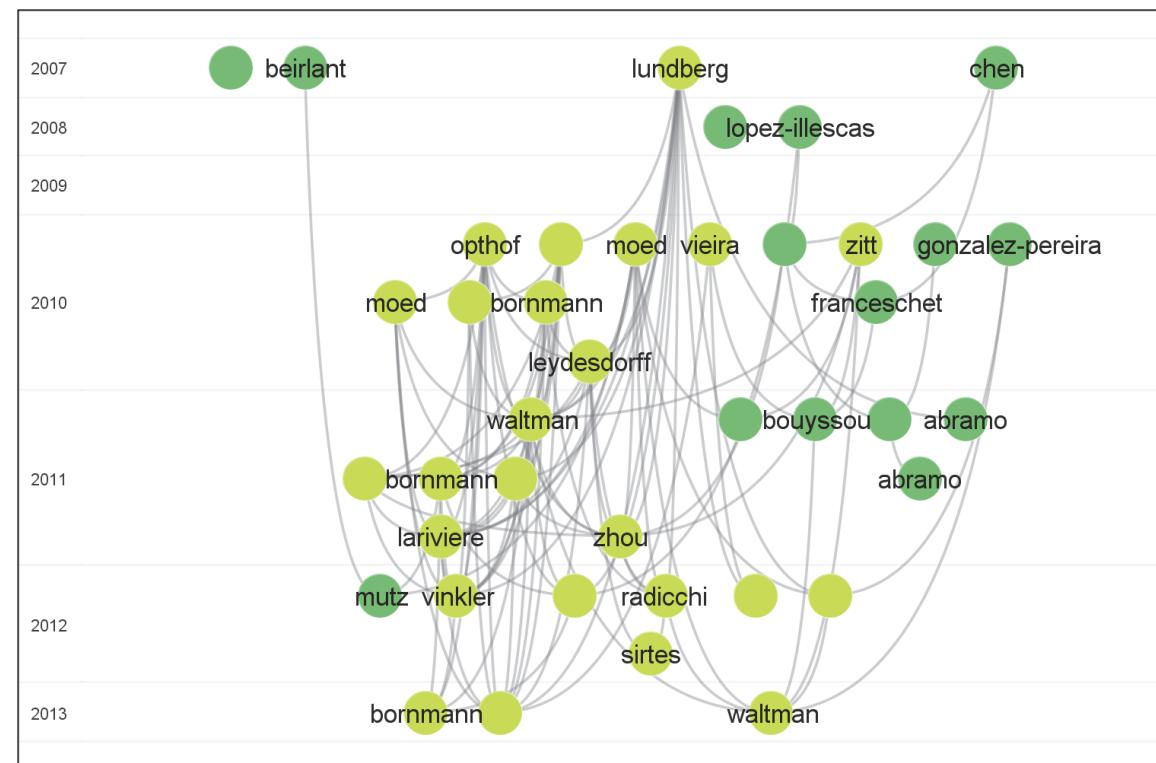
- Click **OK**



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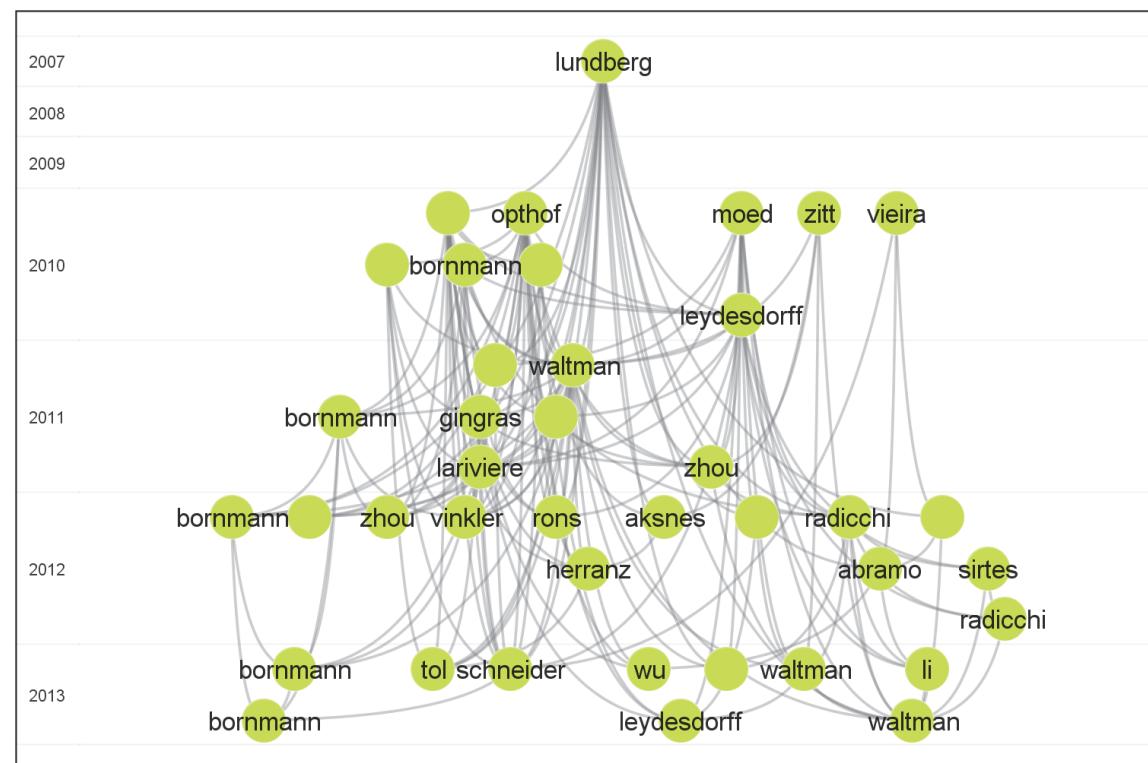
- There are 46 core publications. Each of these publications has at least 4 citation relations with other core publications
- The core publications are assigned to group 9 and the visualization is updated



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Core publications

- In the **Selection parameters** panel, check **Group 9** to select the 46 publications assigned to group 9
- Click  **Drill down** to drill down to the subnetwork consisting of these 46 publications

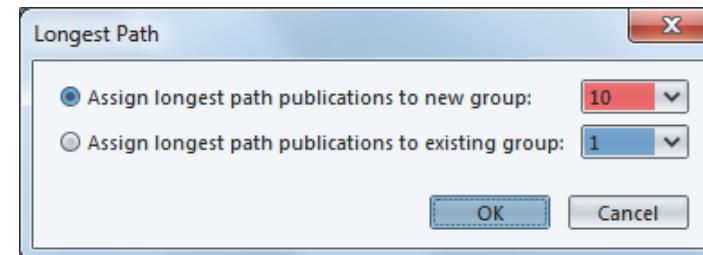
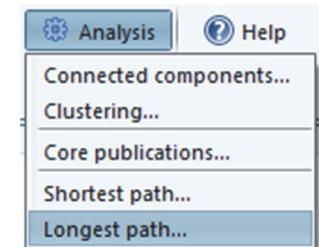


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Shortest/longest path

We now demonstrate the use of the shortest/longest path functionality of CitNetExplorer. We focus on the identification of the longest path between two publications. The shortest path can be identified in a similar way

- In the visualization, click ‘lundberg’ in 2007 and ‘leydesdorff’ in 2013 to mark these two publications
- Click **Longest path** in the **Analysis** menu

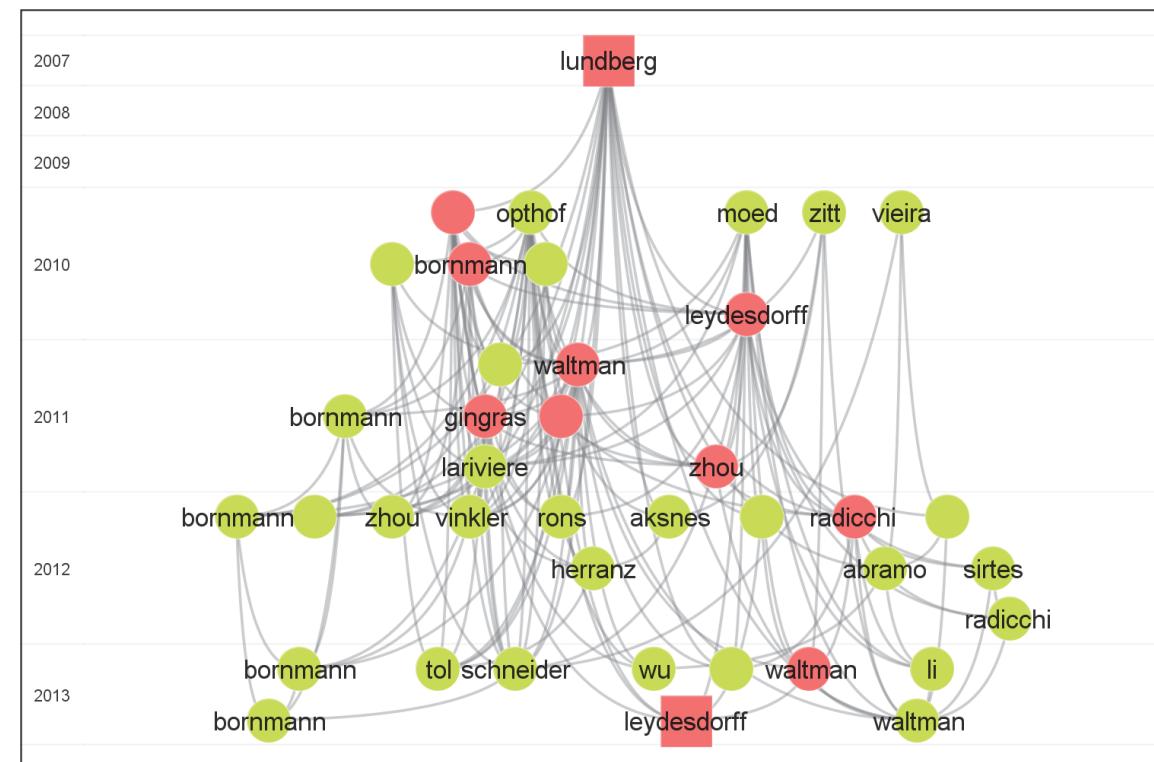


- In the **Longest Path** dialog box, click **OK**

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- Multiple longest paths of length 9 are identified. The publications on these paths are assigned to group 10 and the visualization is updated



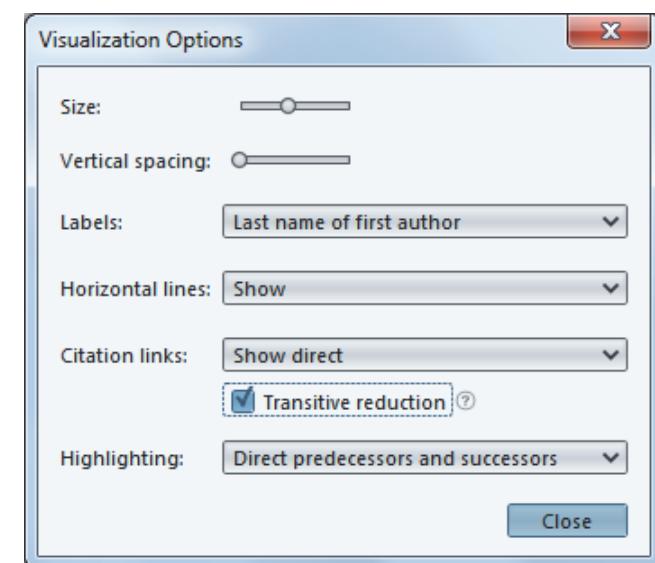
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Shortest/longest path

- In the **Selection parameters** panel, check **Group 10** to select the 11 publications assigned to group 10
- Click  **Drill down** to drill down to the subnetwork consisting of these 11 publications
- Click **Visualization options**
- In the **Visualization Options** dialog box, check **Transitive reduction**

- In the transitive reduction of a citation network, citation relations are kept only if they are necessary to preserve the connectivity structure of the network
- Example: If A cites B and C and if B cites C, the citation relation between A and C is not included in the transitive reduction, since A and C are also connected through B

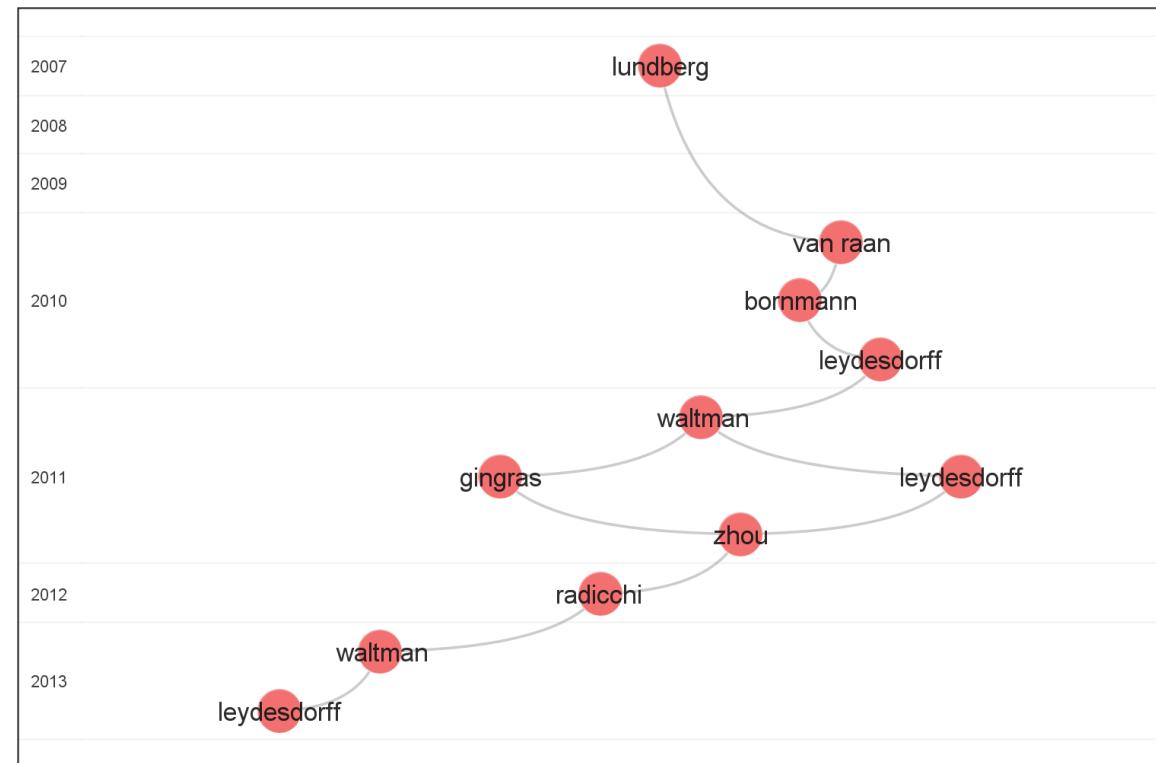
- Click **Close**



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Shortest/longest path

- The visualization shows that there are two longest paths. The two paths coincide almost completely

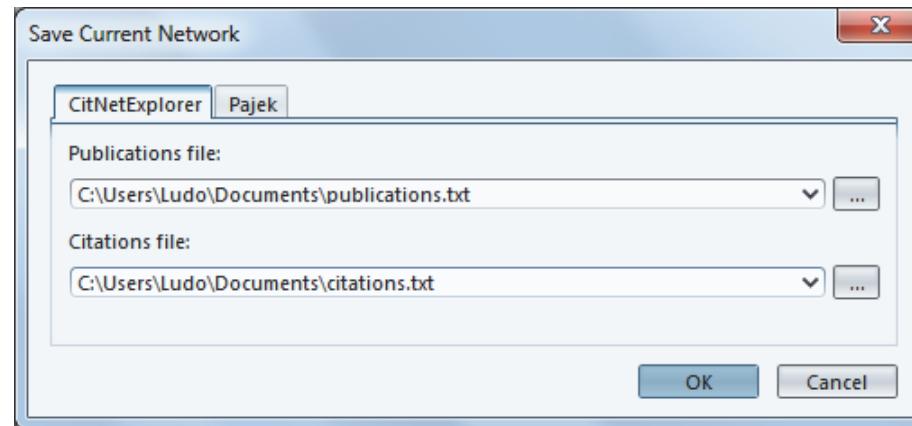
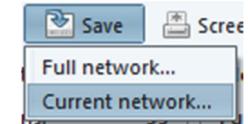


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- Clustering
- Core publications
- Shortest/longest path
- Save citation network

Save citation network

Finally, we show how to save a citation network and how to open it again

- Click  **Back** twice to move back to the subnetwork that includes 95 publications
- To save this subnetwork, click **Current network** in the **Save** menu
- In the **Save Current Network** dialog box, choose ‘publications.txt’ as the name of the publications file and ‘citations.txt’ as the name of the citations file

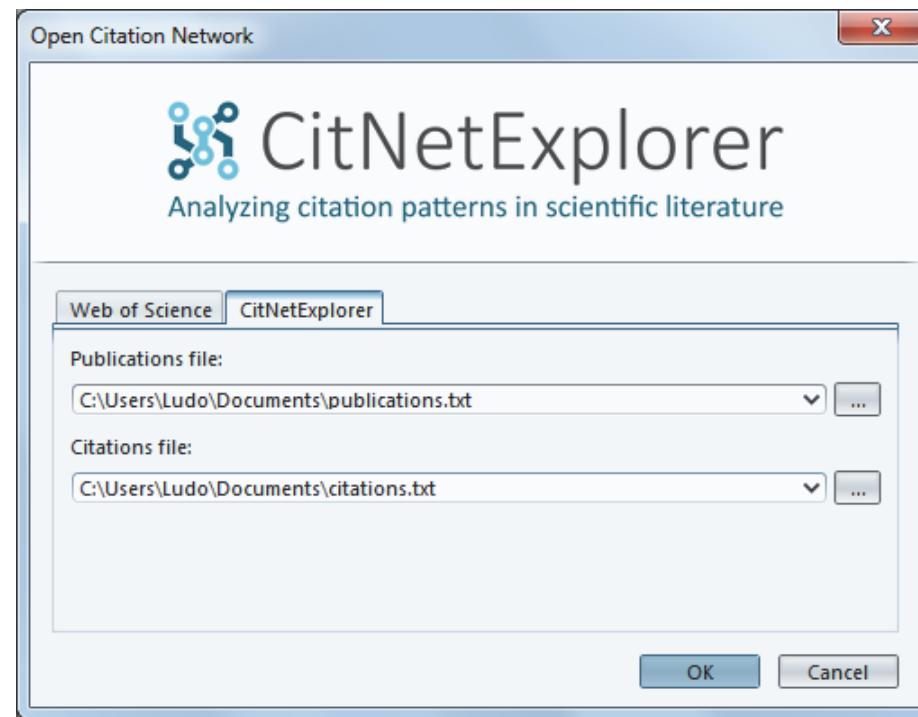


- Click **OK**

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Save citation network

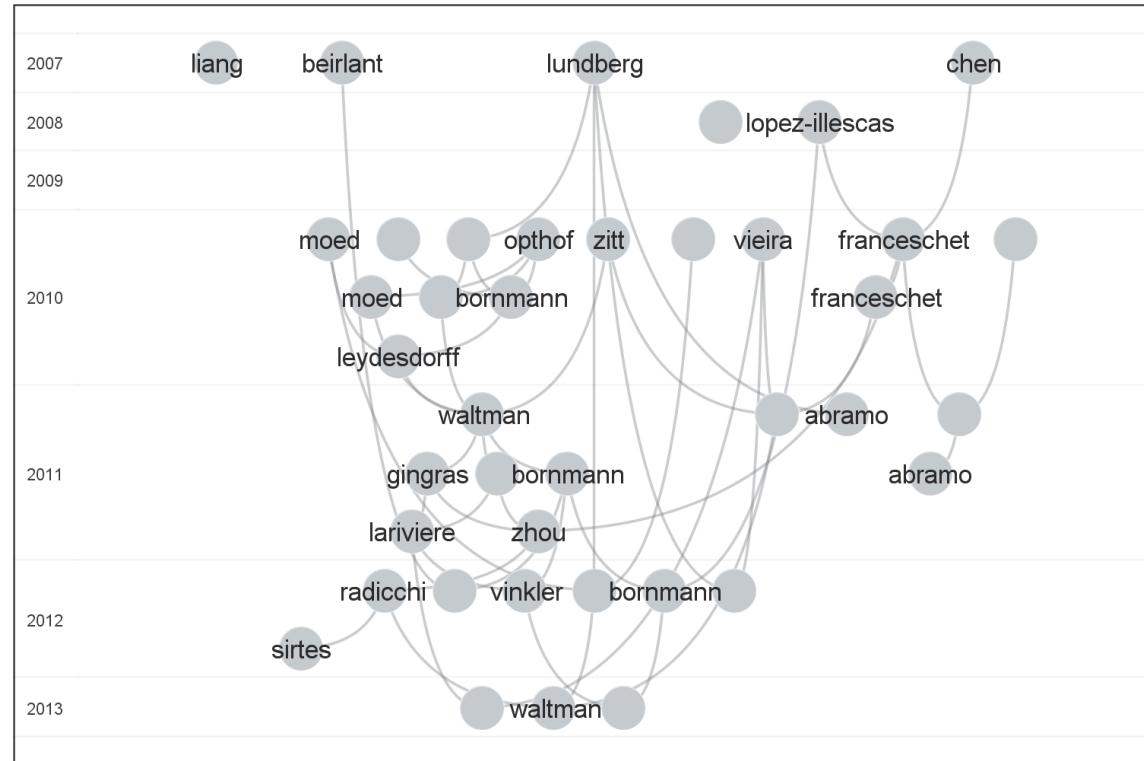
- Click  **Open** to open the citation network again
- In the **Open Citation Network** dialog box, go to the **CitNetExplorer** tab
- Select the publications file ‘publications.txt’ and the citations file ‘citations.txt’



- Click **OK**

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Save citation network



- When saving a citation network and opening it again, the selection of publications included in the visualization may change. To avoid this, use external citation scores instead of internal ones (see the **Options** dialog box)
- When saving a citation network and opening it again, the assignment of publications to groups is lost. Use **Export groups** and **Import groups** in the **Groups** menu if you do not want to lose this information