



# Network analysis and visualization for legal research

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Sunbelt, 29-6-2018

## Empirical case law

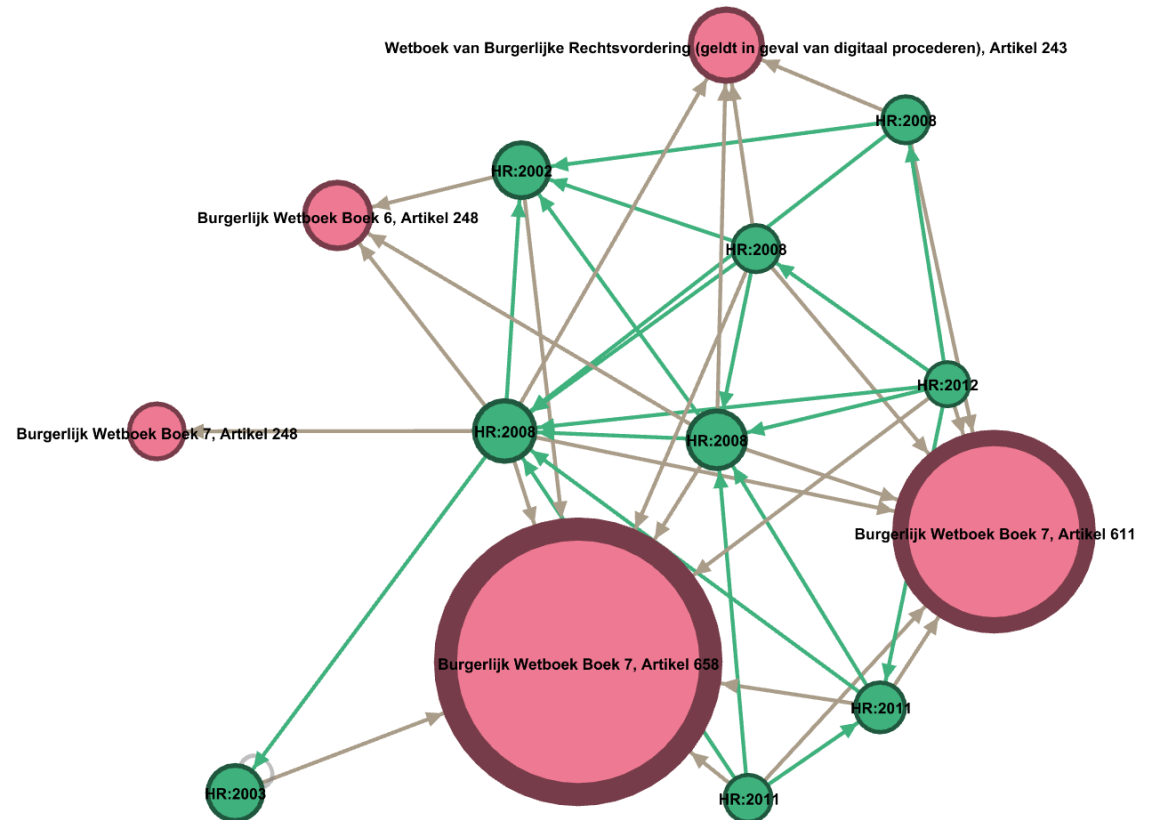
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Large body of unstructured data

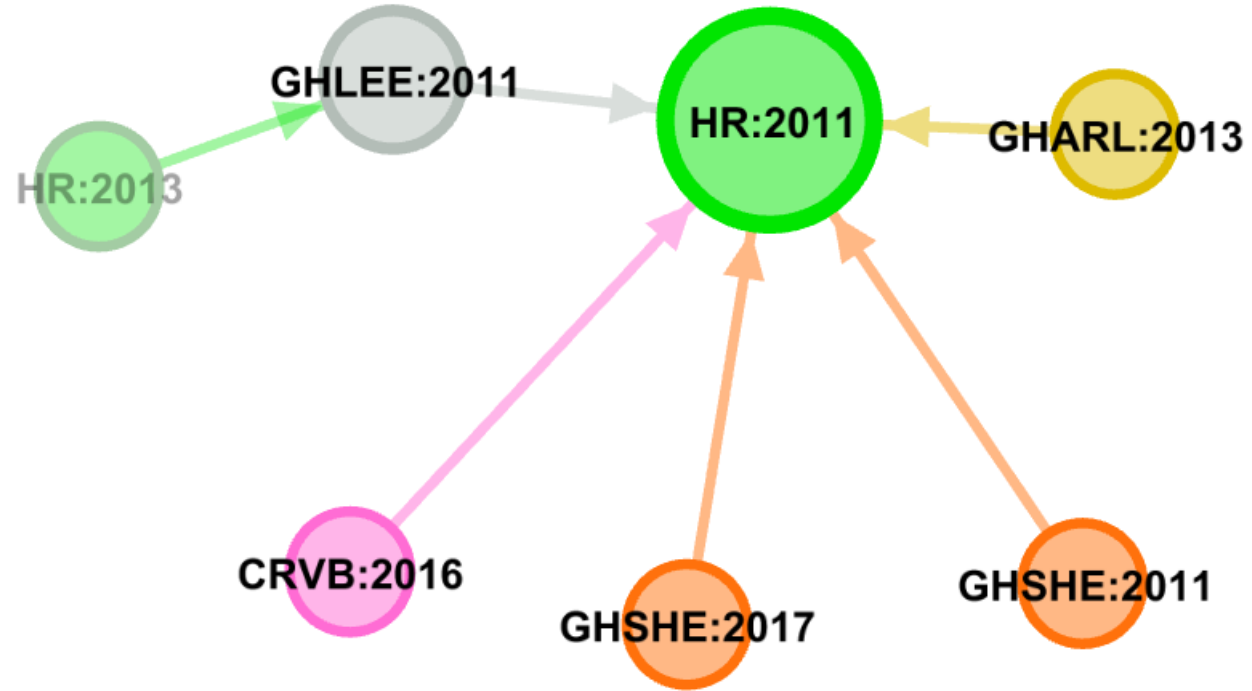
Very specific language: Natural language processing techniques are not adapted

Idea: reasoning is based on codes (legislation) and precedents (previous cases)



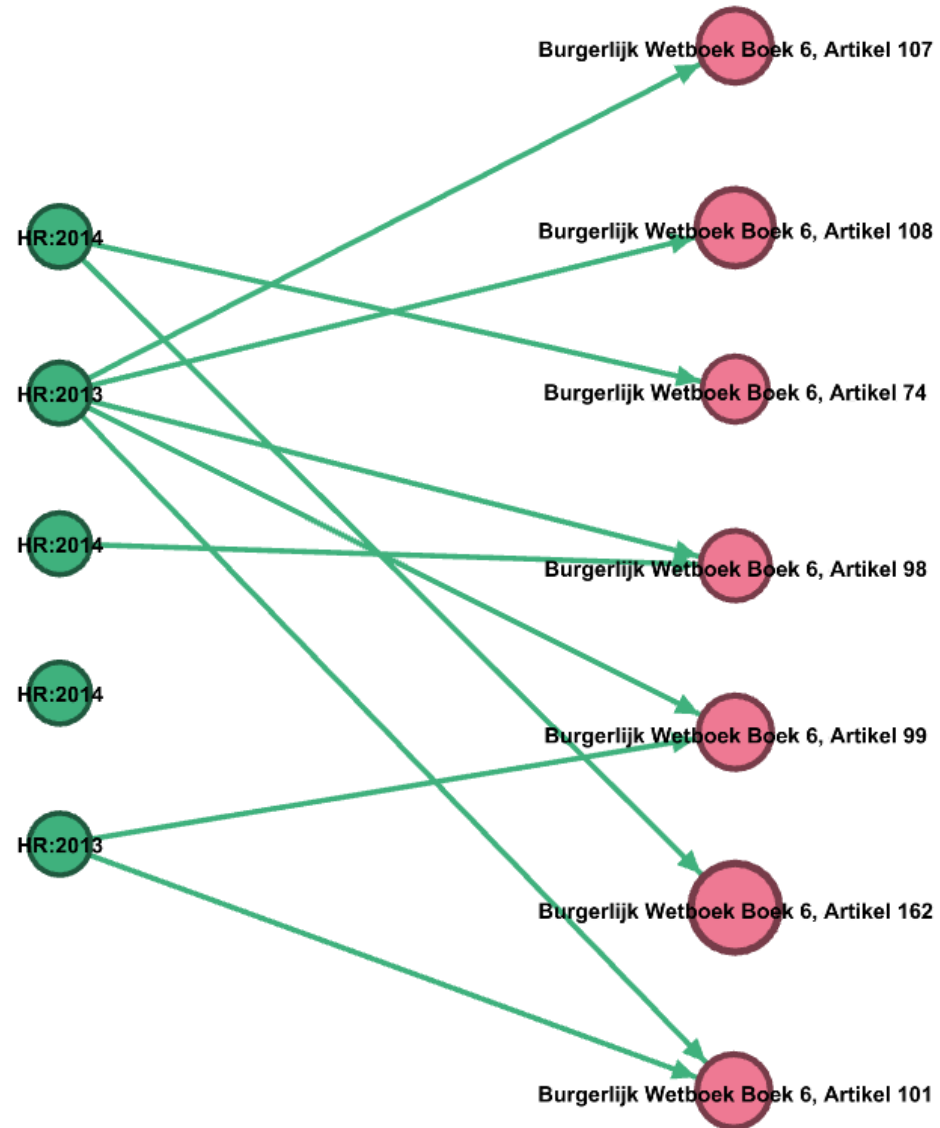
## Case-to-case citation network (directed acyclic graph)

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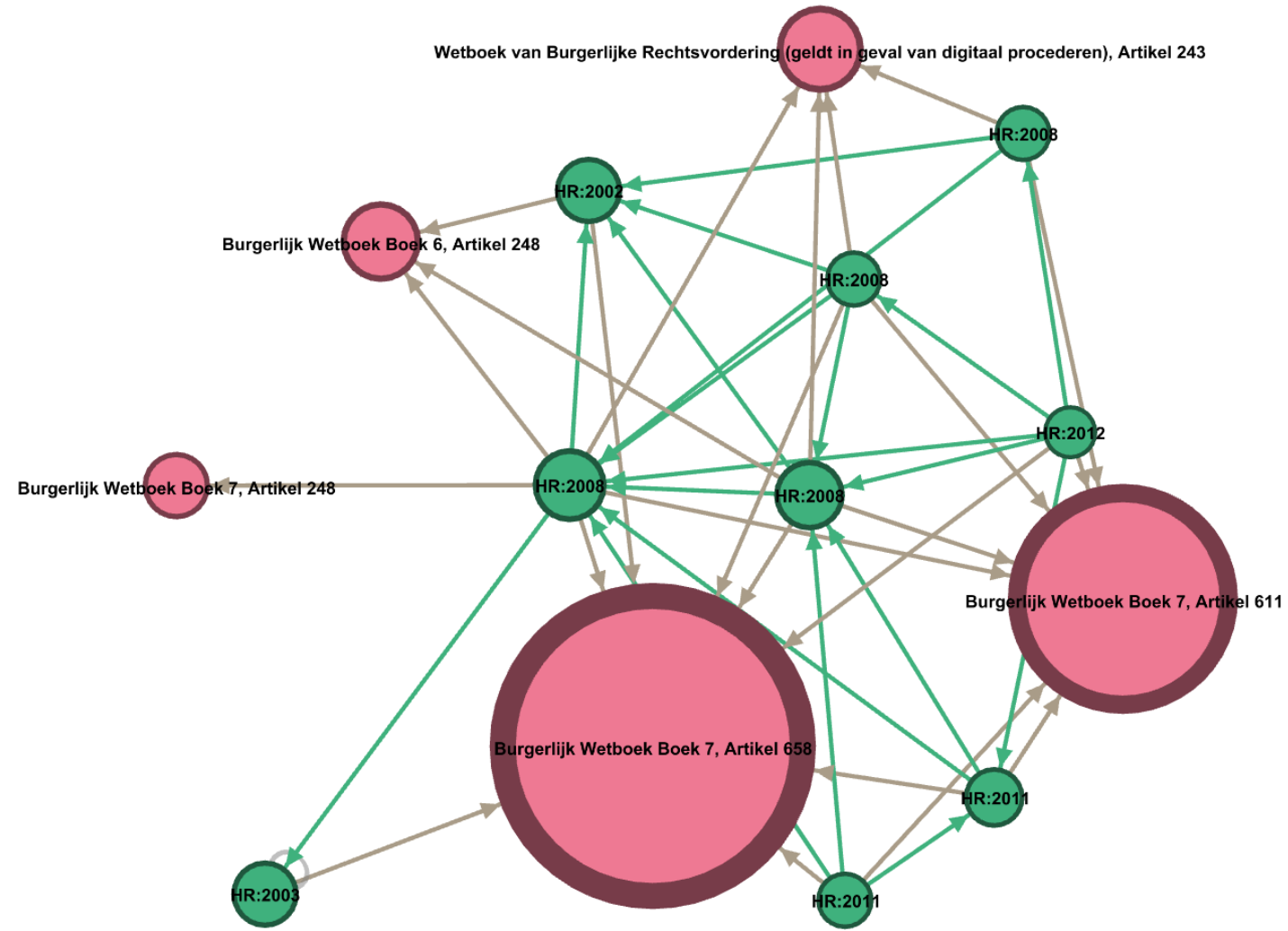


# Case to article citations (bipartite graph)

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# Case-to-case and case-to-article (bimodal, directed graph)







- What are important, often cited cases? (*degree centrality*) [[Fowler et al. \(2007\)](#)]
- Which cases refer to a landmark case? (*proximity in the network*) [[Lupu and Voeten \(2012\)](#)]
- What areas of case law can we differentiate? (*community detection*) [[Boulet et al. \(2011\)](#)]
- What is the collection of relevant cases for my research question? (*information retrieval*) [[Christensen et al. \(2016\)](#)]

# Case law visualization tool

## Case Law Analytics - Werkgever aansprakelijkheid

Version 0.4.0  
[Source code](#)

Bestand kiezen Geen bestand gekozen  
Download filtered nodes  
Showing 156 / 156 nodes

### Filters

In-degree: 0 - 6

year ▼ : 1969 - 2015

Adjust layout for slider:

Rechtsgebied  
Select Subject ▼

Instantie  
Select Creator ▼

Community  
Select Community ▼

Selection  
Filter selected:

### Appearances

Node Size  
in\_degree ▼

Node Color  
community ▼

A network graph visualization showing relationships between case law nodes. The nodes are represented by colored circles (blue, orange, red, yellow, green) and are connected by thin grey lines. A prominent node is labeled 'HR 2000'. The graph is dense in the center and has several smaller clusters and individual nodes scattered around.

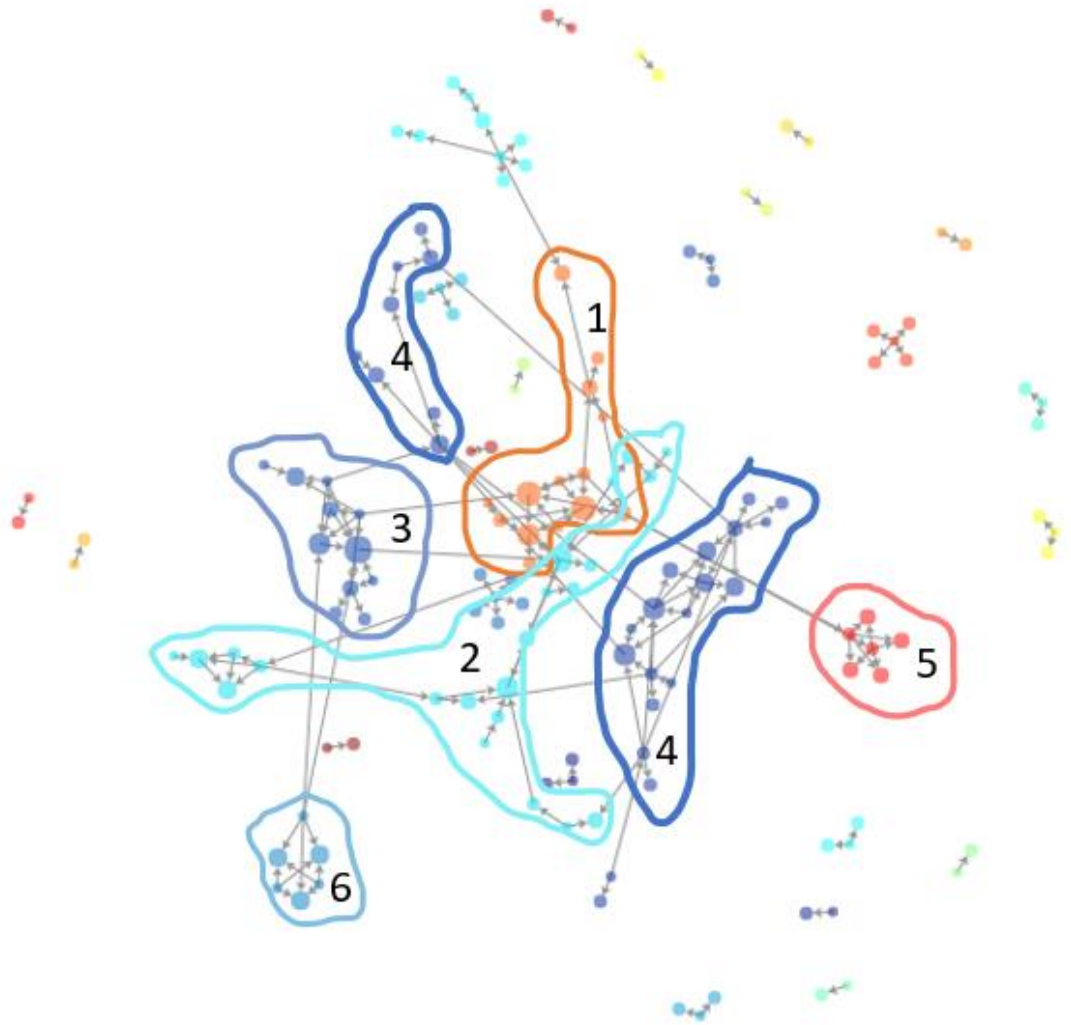
ECLI:NL:HR:2008:BB6175 Hoge Raad . 01-02-2008 / C06/044HR ✕

Date: 2008-02-01  
Articles: 7:611 bw  
Community: 2  
Abstract: Arbeidsrecht.  
Werkgeversaansprakelijkheid voor de door werknemer bij een verkeersongeval met eigen auto geleden letselschade in de uitoefening van zijn werkzaamheden; zorgplicht werkgever ex art. 7:658 en op grond van goed werkgeverschap in art. 7:611 BW; behoorlijke verzekering van aan gemotoriseerd verkeer deelnemende werknemer; bewuste roekeloosheid van werknemer, maatstaf.

## Example: employer liability communities

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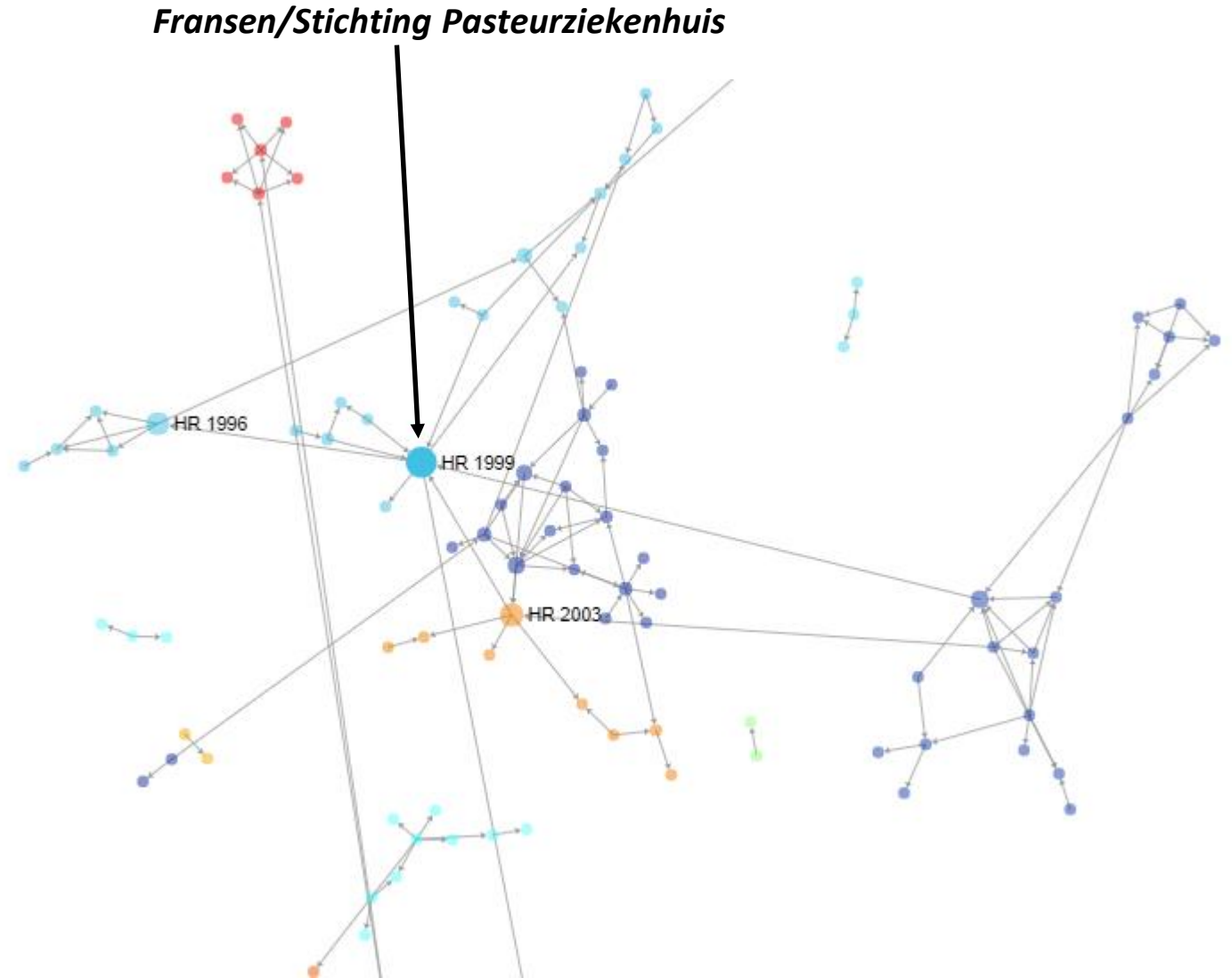
1. Asbestos
2. Duty of care (extent), recipients' liability, contributory negligence, gross negligence
3. Causality
4. Losses while carrying out work, duty to insure
5. Reversal rule
6. Experts, evidentiary burden



## Example: employer liability, landmark cases

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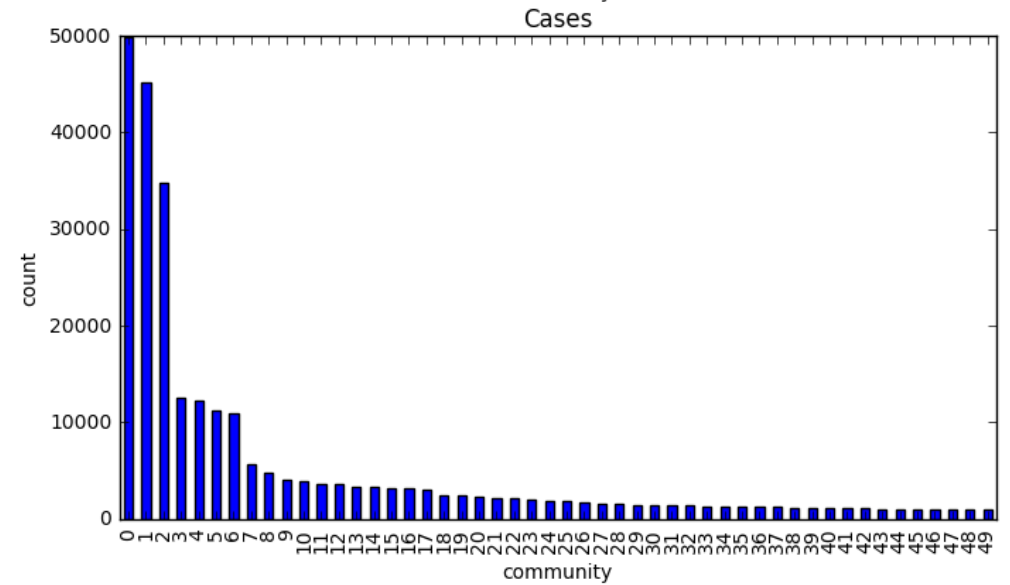
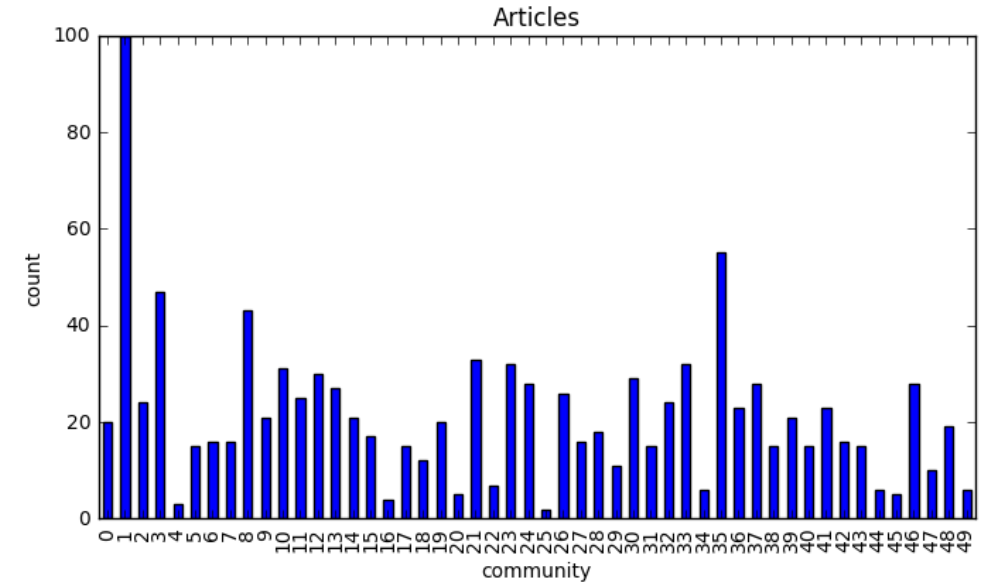
*Fransen/Stichting Pasteurziekenhuis*  
has highest **betweenness score**.  
This decision is a **landmark case**  
providing interpretation to the new  
Dutch civil code.



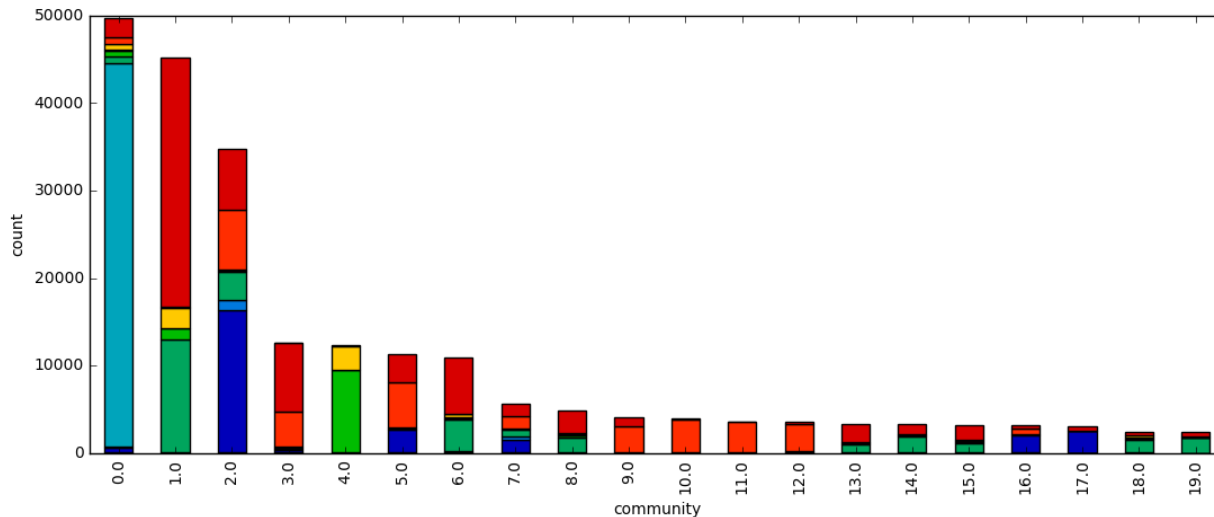
- Investigate legal areas using community detection
- Manual interpretation of communities
- Compare with legal literature

# Bimodal community detection on cases and legislation articles

419k cases, 38k articles, 6849 communities



# Interpretation of communities



## Law books per community

Community 0:

*Convention for the Protection of Human Rights and Fundamental Freedoms*

Community 1:

*Criminal law*

Community 3:

*Immigration law*

Community 4:

*Procedural articles about admissibility of appeal*

What is an optimal resolution for communities?

How to apply community detection on multi-modal structure? (cases + articles)



Can we trace domain-overarching concepts?

How did legal areas evolve?

Do we see different citing behaviors in different courts?

Network perspective on legal data gives insight in large body of legal documents

Network analysis and visualization is a useful tool for empirical legal research

Thank you!

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## Thanks to:

Gijs van Dijck

Rena Bakhshi

Willem van Hage

Rob van Nieuwpoort

## Get in touch:

[d.vankuppevelt@esciencecenter.nl](mailto:d.vankuppevelt@esciencecenter.nl)

## Demo:

<https://nlesc.github.io/case-law-app/>

## Paper:

van Kuppevelt, D., & van Dijck, G. (2017). Answering Legal Research Questions About Dutch Case Law with Network Analysis and Visualization. DOI: [10.3233/978-1-61499-838-9-95](https://doi.org/10.3233/978-1-61499-838-9-95)