Identifying Network Ties / AOM 2025 PDW 15383

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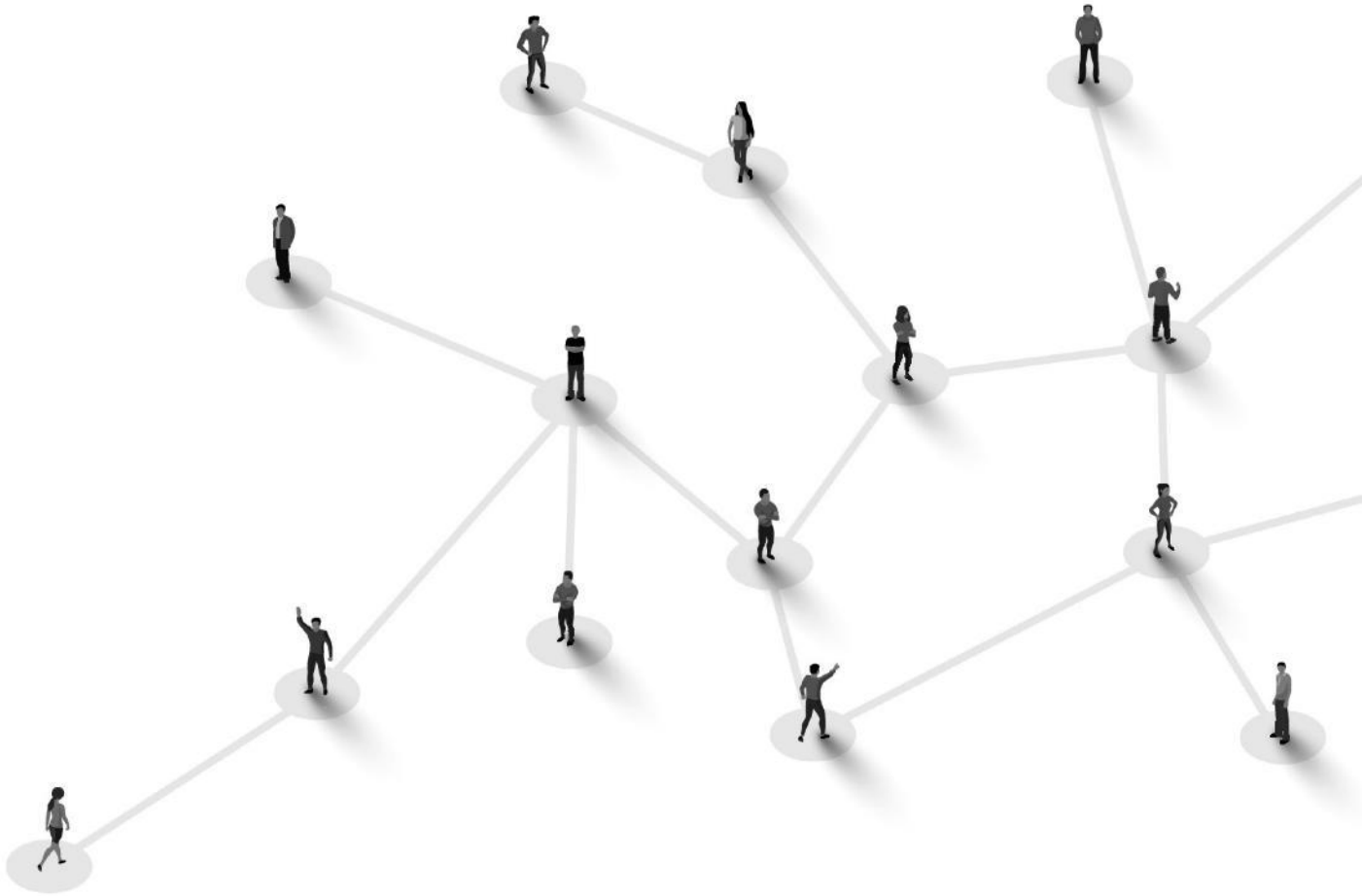


Harald Puhr | 2025-07-26

Funded by the European Union

Valuing Public Goods in a Populist World

Project Summary

Project Participants

- **Coordinator**
  - University of Innsbruck (Austria)
- **Project Partners**
  - Copenhagen Business School (Denmark)
  - WU Vienna (Austria)
  - Kozminski University (Poland)
  - Sabancı University (Turkey)
  - University of Graz (Austria)
  - LUISS Guido Carli (Italy)
  - Auckland University of Technology (New Zealand)
  - IN-JET APS (Denmark)

Democratic Governance Under Siege

- **Context**
  - Nations create socio-economic wealth for their citizens by ***ensuring access to public goods***, which are nonexcludable and non-rivalrous benefits for society.
  - Countries are the primary providers of these goods, but ***private firms, NGOs, politicians, and the media*** also play a role.
  - Institutions and the ***rule of law are crucial in correcting misallocations*** through subsidies, taxes, regulations, and monopolies.
  - Populist politics ***exacerbate inequities by forming in-groups and out-groups***, interfering with the creation and distribution of public goods.
- **Project Goal**
  - Analyze ***the interplay of the rule of law, populism, and societal networks in shaping the creation and equitable distribution of public goods.***

Tackling Inequities Through Data-Driven Research

- **Objectives**
  - Analyze the ***role of societal networks*** in misappropriating public goods.
  - Increase ***transparency in governance institutions*** managing public goods.
  - Promote ***civic engagement to enhance institutional legitimacy***.
- **Methodology**
  - *Key research areas:* ***Mapping societal networks*** to understand their structure and how the rule of law and populist politics influence the distribution of public goods.
  - *Data collection:* Data on societal networks, along with metrics on ***biodiversity***, **public infrastructure**, **free press**, and **education**, to analyze public goods.
  - *Innovative concept:* Introduce ***networked populism*** to explore how populist actors influence societal outcomes through their network positions.

Identifying Network Ties

Data Sources

Data Sources

- News Reports
  - Raw news reports from Factiva
  - 100 million news articles
  - 500 GB to 1 TB data size
  - Coverage: Austria, Belgium, Bulgaria, Denmark, Hungary, Ireland, Lithuania, Poland, Portugal
  - Time: 2004/2008 to 2024

- Social Media Data
  - Requests for API access (X, Meta)
  - Existing datasets (e.g., Twitter)
  - 2 billion social media posts
  - 2 TB data size

- Corporate Data
  - Annual reports and earnings calls from CapitalIQ and Refinitiv
  - Subsidiary data from Orbis
  - Management data from BoardEx
  - 40 GB data size

Identifying Network Ties

Machine Learning Pipeline

Step 1: Named Entity Recognition

- **Goal:** Identify key people, organizations, and institutions in documents.
- **Approach:**
  - Uses AI to scan large volumes of multilingual text (like news articles or reports)
  - Detects and labels entities (e.g., "European Central Bank," "Angela Merkel")
  - Smart text segmentation helps improve accuracy in complex or ambiguous contexts
    - Grouping sentences or paragraphs based on their meaning and thematic content
- **Outcome:** A comprehensive list of important actors found in the text

Step 2: Relationship Extraction

- **Goal:** Understand how the identified entities are connected
- **Approach:**
  - Analyzes text to find who is linked to whom, and how (e.g., partnerships, ownership)
  - Uses structured AI prompts and validation to reduce errors and improve reliability
    - Clear instructions that include examples and standard output formats
  - Supports multiple languages and adapts to different business or policy domains
- **Outcome:** Verified relationship links between people and organizations

Output: Standardized RDF Knowledge Graphs

- **Goal:** Turn findings into a structured, analyzable format
- **Approach:**
  - Outputs standardized graphs that map entities and their relationships over time
  - Compatible with visualization and analysis tools (e.g., Neo4j, GraphDB)
  - Designed to support trend analysis and integration with external databases
- **Outcome:** A dynamic knowledge network you can explore and analyze

Identifying Network Ties

A Simple Example

Political Connectiveness of Corporations

- Research project by Dario Jugo
  - WU Vienna and TU Vienna
  - eXplore! Big Data Inititiave
- Measure political connectedness based on board connections
- Use data from BoardEx to identify ties between board members and politicians (e.g., work, education)

- BoardEx dataset consists of person and company data
- Transform raw tabular data into a graph network where each node is either a person or a company
- Create person-person and person-company relationships
- Calculate the final score based on the proposed metric

Workflow

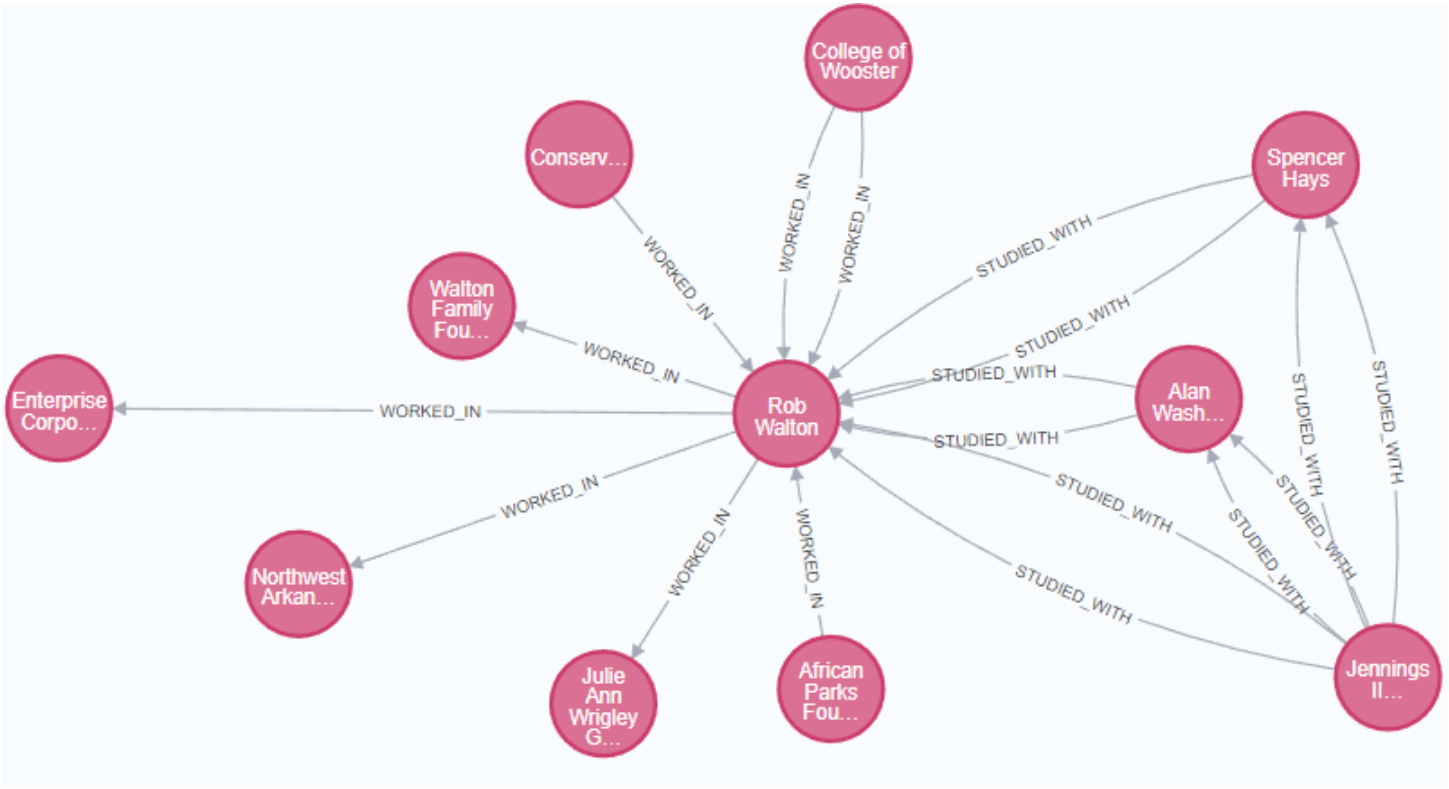
BoardEx dataset → Graph creation → NetworkX → Metric calculation →

$$\text{BDWI-DCP}(c) = \begin{cases} \frac{\sum_{p \in P} \text{Influence}(c,p)}{|P|}, & \text{if } \exists p \in P \text{ such that } d(c,p) < \infty \\ 0, & \text{if } \nexists p \in P \text{ connected to } c \end{cases}$$

$$\text{Influence}(c,p) = \begin{cases} 1, & \text{if } d(c,p) = 1 \text{ (direct connection)} \\ \frac{1}{d(c,p)}, & \text{otherwise} \end{cases}$$

→ Visualize and initialize graph database → Neo4j

Political Connectiveness of Corporations



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