# Droit et réseaux bipartis

## Le réseau juridique de la Cour Pénale Internationale

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# The context

**Large complex networks**:

- Computer science: Internet, Peer-to-peer, Web
- Biology: Gene regulatory networks, Protein-protein interaction networks
- Social science: friendship relations, co-authors networks
- And a lot more: economy, linguistic, ...

**Some characteristics of the networks**:

- Low density
- Heterogeneous degree distribution
- Small-world phenomenon
- ...

$\Longrightarrow$ leads to reconsider traditional approaches

Should lead to common solutions

# Study of a legal network

*A computer scientist point of view*

**Motivation :**

- New kind of networks
- New structural properties
- New interactions with legal studies (international criminal law)

**Some issues :**

- How to acquire knowledge on this network? **(measure)**
- Which relevant properties? **(analysis)**
- Which models best capture those properties? **(modeling)**

# Study of a legal network

*A legal expert point of view*

**Key dates :**

- CPI : Rome Treaty/Statute (1998) → creation of CPI (2002) → 1st Investigation (2004) → 1st arrest warrant (2006) → 1st trial (2009) → 1st conviction (2012) → appeal ($1^{st}$ dec. 2014)

**Key issues :**

- Mass of documents
- Long and complexe procedures
- Technical chains of decisions
- No case law reports

$\Longrightarrow$ how to extract relevant information?

# Plan

*Legal networks*

# Network of juridical decisions

## The International Criminal Court (ICC)

- Recent creation (2002)
- Number of current cases: 23
- Number of situations: 9
- Number of closed cases : 3
- Main production : decisions

## An example (ICC-01/04-01/06-2126-Anx)

Appeals Chamber, Judgement on the appeals of The Prosecutor and The Defence against Trial Chamber I's Decision on Victims' Participation of 18 January 2008, 11 July 2008, ICC-01/04-01/06-1432, para. 95. See also Trial Chamber II, Decision on the Modalities of Victim Participation at Trial, 22 January 2010, ICC-01/04-1/07-1788, para. 30. See also \Defence for Germain Katanga's Additional Observations on Victims' Participation and scope thereof", 10 November 2009, ICC-01/04-01/07-1618: "It has been held that article 69(3) gives the Court a general ...

# Network of juridical decisions

## Directed graphs

- Nodes : decisions of the ICC
- Links : citations between decisions

## Standard metrics :

- Degree distribution, density, average degree, average distance, ...
- Local density, communities, ...

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**The legal network is not a flat structure**

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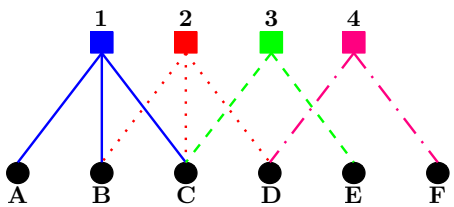
# A complex network

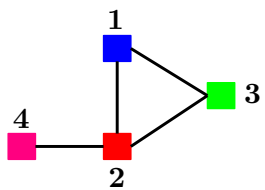
**In reality :**

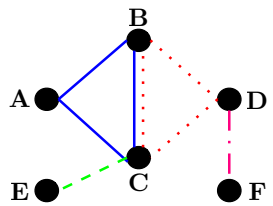
- Different levels, different nodes
- Articles, norms, regulation
- Decisions
- 2 kinds of links : direct et bipartite

**Proposition :** represent the network with bipartite graphs $G = (\top, \bot, E)$

- $\top$ = article level, $n_\top = |\top|$
- $\bot$ = decision level, $n_\bot = |\bot|$
- $E \subseteq \top \times \bot$, $m_{\texttt{bip}} = |E|$




**Specific metrics :** redundancy, dispersion, ...

*Complex network analysis*

# Dataset

**Record :**

- All decisions from `http://www.legal-tools.org/`
- Situation in DRC, Lubanga case
- 1st verdict of the ICC
- Approx. 3 300 documents (2 000 decisions) , 17 000 (7 000) links (directed graph)
- Approx. 500 articles / 1 500 alineas , 12 000 links (bipartite)
- Temporal (DAG) and hierarchical process.

**Representation as different graphs:**

- Directed graph between decisions
- Bipartite graph decisions/articles
- Non directed graph between decisions (projection of bipartite)

# The issues

## At the computer science level (network approach)

- Position as regard usual complex networks?
- What is the interpretation of usual metrics?
- New patterns? New models?
- Structure bipartite vs. flat structure

## At the juridical level (international criminal law approach)

- Evolution of the notion of international crime
- Dynamics of citation between decisions
- Opposition Civil Law vs. Common Law
- Interpretation of the judges : criminal responsibility, evidence, remedy and reparations for victims ...

# General statistics

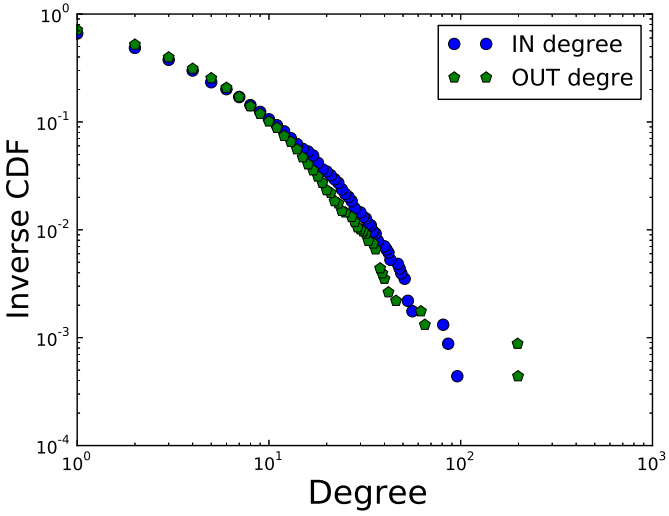
| | Simple graph | |
|---|---|---|
| | Citations | Projection |
| $n$ | 1 992 | 1 992 |
| $m$ | 6 795 | 442 924 |
| $\delta$ | 3.4 $(10^{-3})$ | 2.2 $(10^{-1})$ |
| $k$ | 3.4 | 222 |
| $d^+$ | 199 / 110 | 1341 |
| cc | 0.14 / 0.16 | 0.61 |
| tr | 0.37 / 0.39 | 0.59 |

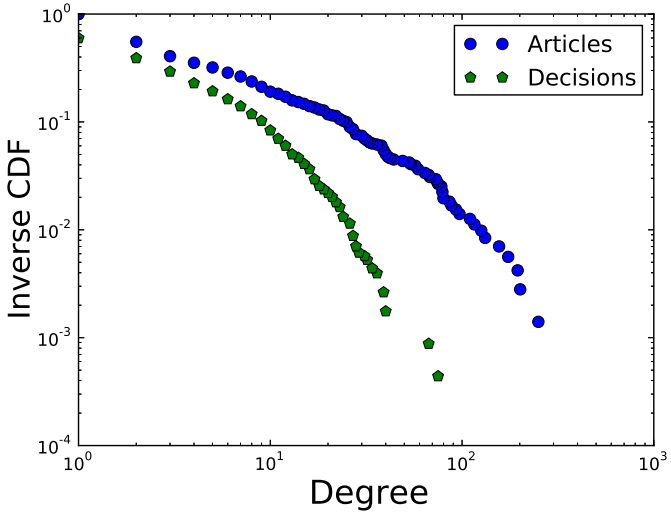
| | Bipartite graph |
|---|---|
| $n$ $(\top/\bot)$ | 1545 / 1 992 |
| $m_b$ | 12 257 |
| $\delta_b$ | 3.9 $(10^{-3})$ |
| $k$ $(\top/\bot)$ | 7.9 / 6.1 |
| $d^+$ $(\top/\bot)$ | 237 / 116 |
| $\mathtt{cc}_{\mathtt{bip}}$ | 0.17 |
| $\mathtt{rd}_{\mathtt{bip}}$ | 0.82 |

- Low global density vs. high local density
- Degree max >> average degree
- ...

Match well all standard features of real networks!

# Degree distribution

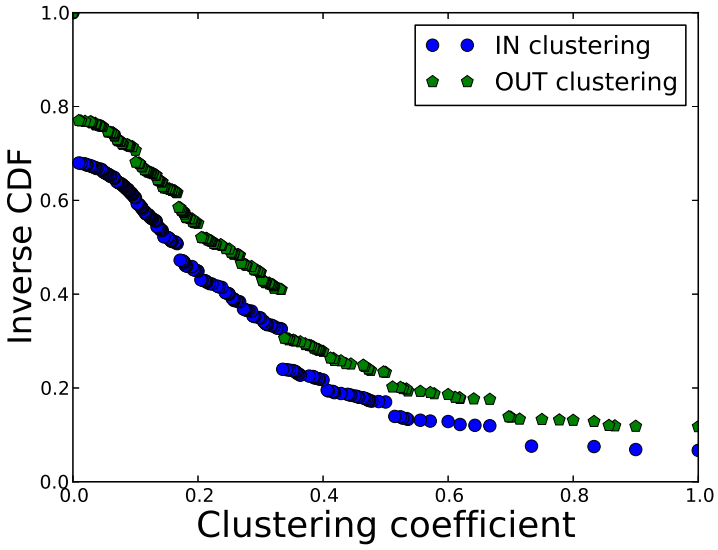


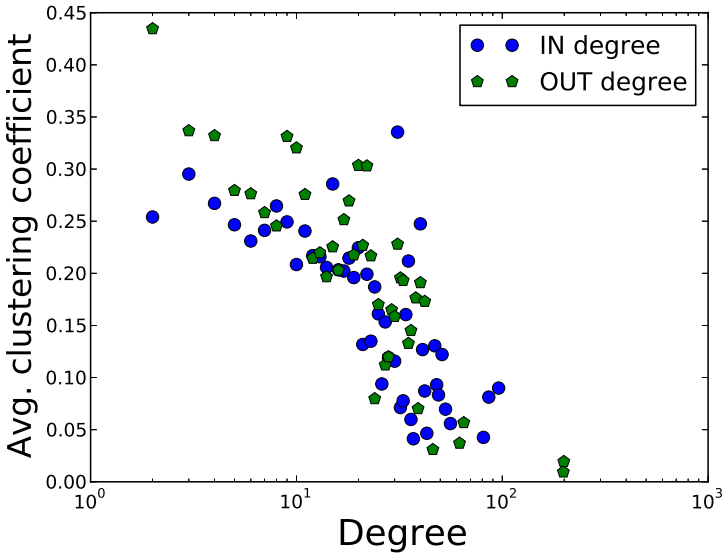




## Highlights

- Heterogeneous distributions on several orders of magnitude
- Some articles/decisions often referred to:
  - *Judgement on culpability*, *Decision on the confirmation of charges*
  - *Decision on the consequences of non-disclosure of exculpatory materials*
  - *Decision on victims participation*
  - Art. 68 (participation of the victimes) & 67 (right of the defendant)
  - Art. 64 (trial chamber) & 54 (prosecutor): duties and power

# Clustering coefficients

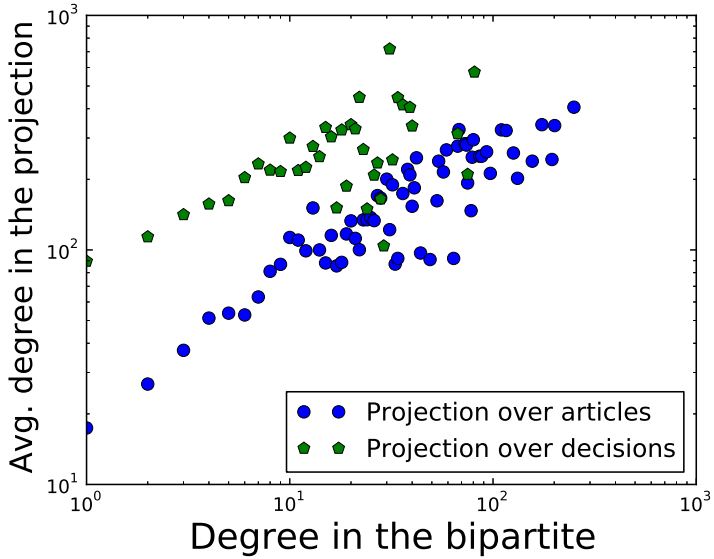


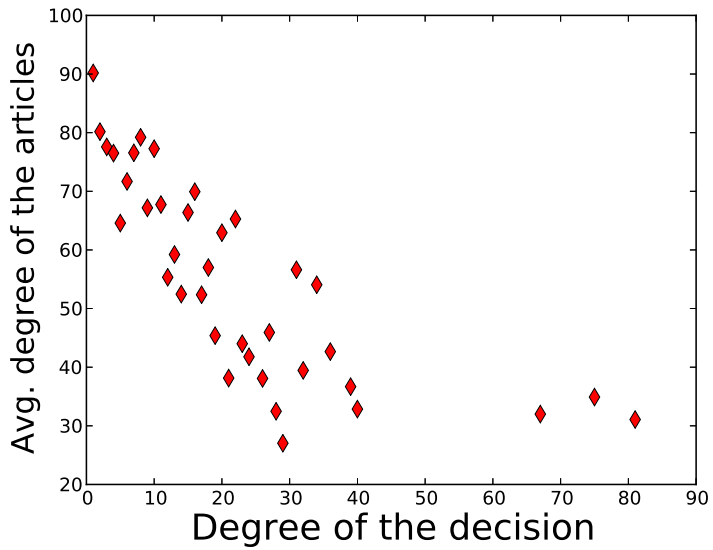




## Highlights

- Clustering uniformly distributed but non trivial correlations
- Points out some over-represented patterns:
  - Appeals
  - Chains of decisions: *Decision on the release of Thomas Lubanga Dyilo*, ...

# Bipartite vs. projected structures

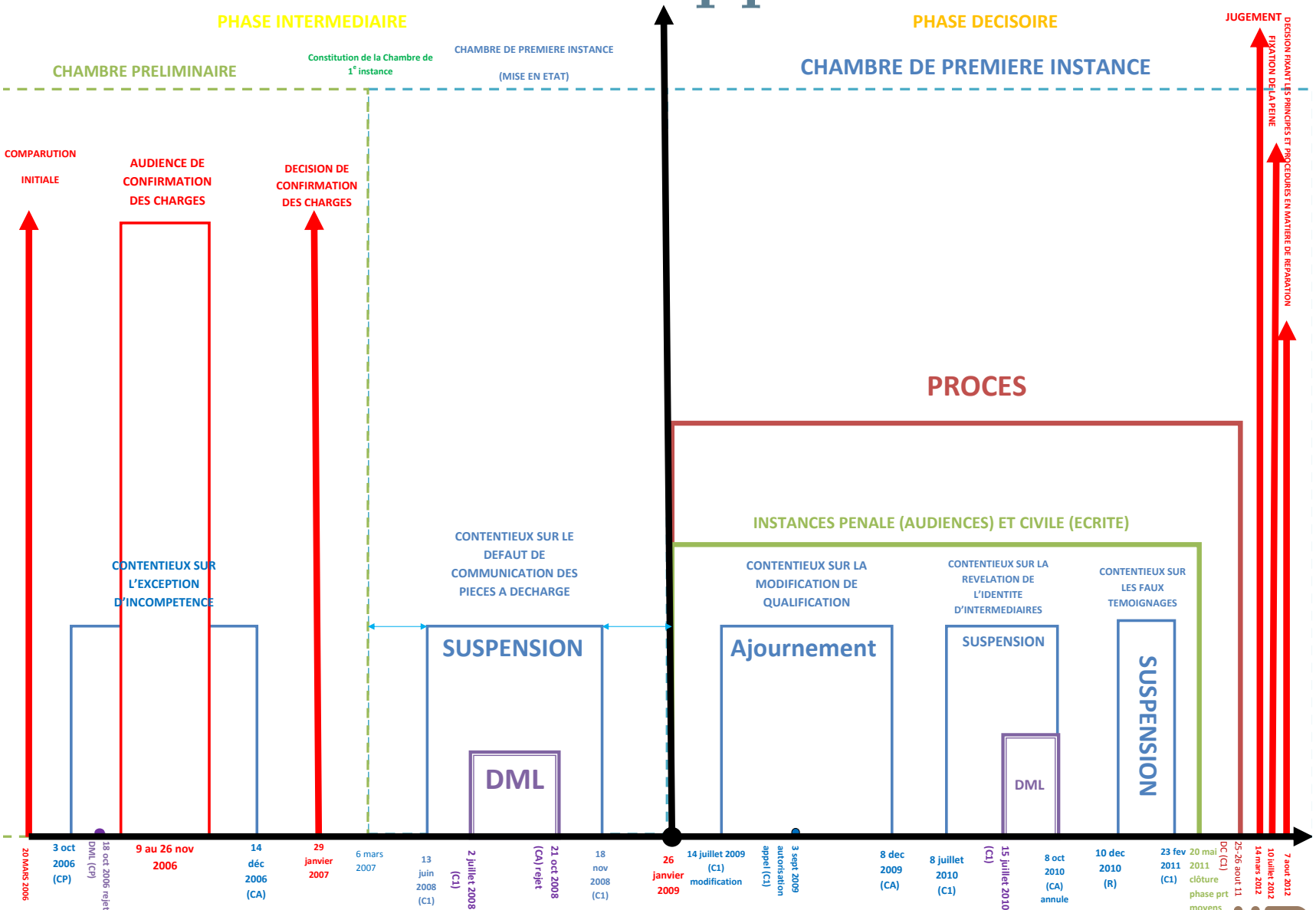



## Highlights

- Non trivial correlation
- Points out a high overlapping between articles
- Procedural *v.s.* on the merits

# Juridical approach



# Juridical & structural results

**On a case law perspective (directed graph) :**

- Expected decisions : conviction, sentence
- Less expected decisions :
  - participation of the victimes
  - non disclosure of evidences, bribery, ...
    $\rightarrow$ lead to litigations

$\rightarrow$ Reveal some fundamental aspects of the case

**On a legal bases perspective (bipartite graph) :**

- Right of victimes (Art. 68)
- Right of defendants (Art. 67)
- Functions and power of trial chamber (Art. 64)
- Duties and powers of prosecutor (Art. 54)

$\rightarrow$ Reveal the vision of the Court: emphasis on reparation ($\neq$ conviction)

# Conclusions

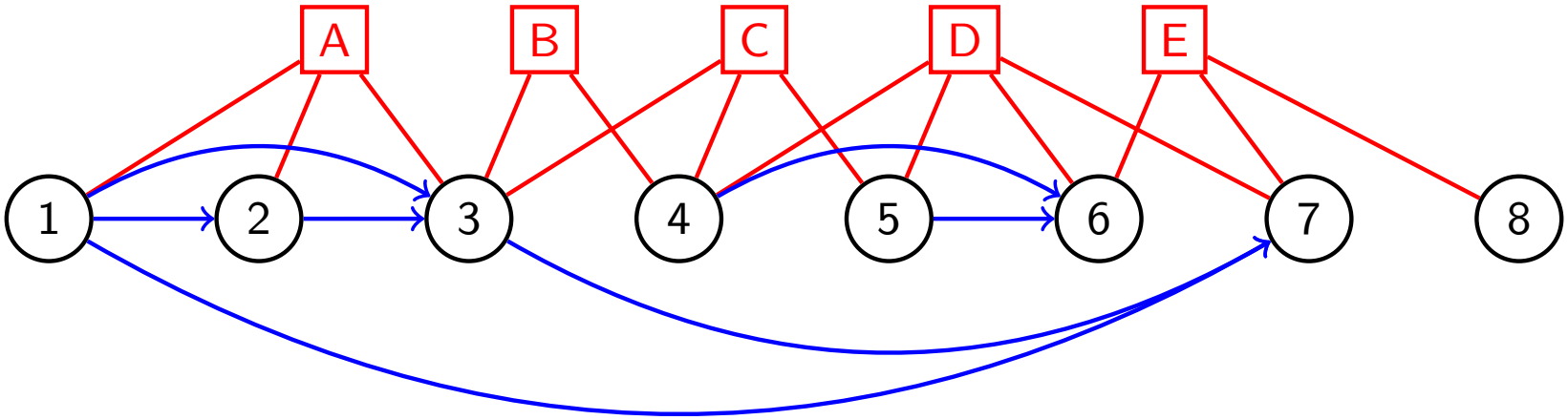
**Current state :**

- Study of a case of the ICC
- Independant analysis of directed and bipartite graphs
- Exhibit usual properties of real complex networks
- Relation between bipartite metrics and projected ones
- Integration of a juridical and structural analysis

**Perspectives :**

- Study of the whole network
- Refine the metrics
- Exploit temporal aspects
- Propose a model for the network(s)
- Analyse correlations between the two levels
- Study the relevance of a notion of hybrid bipartite graph

# Towards an hybrid bipartite graph




**Hybrid bipartite graph :** $G = (\top, \bot, E_{\mathtt{MP}}, E_{\mathtt{PP}})$

- $\top$ = articles level
- $\bot$ = decisions level
- $E_{\mathtt{MP}} \subset \top \times \bot$ : links decisions–articles
- $E_{\mathtt{PP}} \subset \bot \times \bot$ : links decisions–decisions

$\rightarrow$ Allow to study correlations between the two structures (covering coefficient)

# Thanks!

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