



# **Main findings of the study**

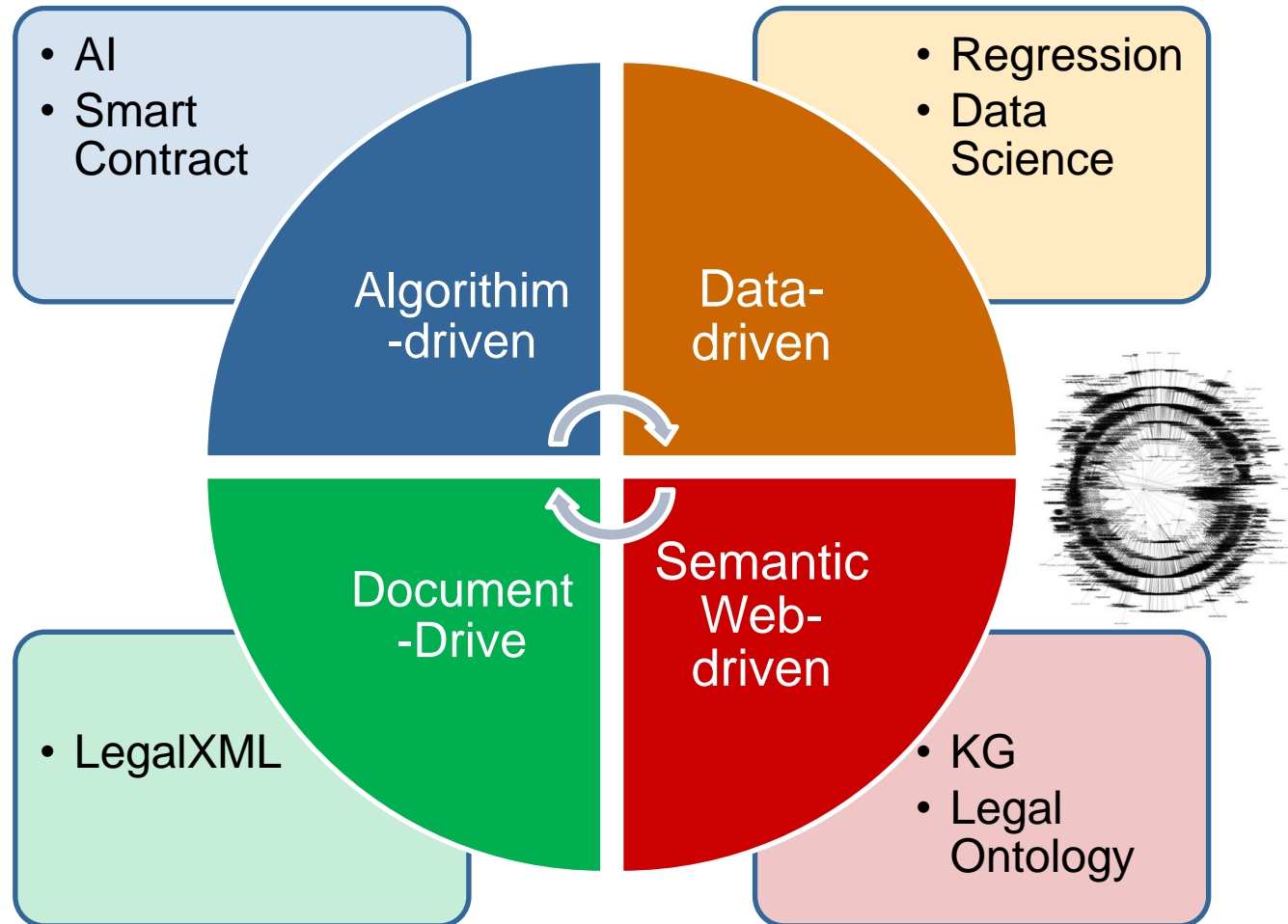
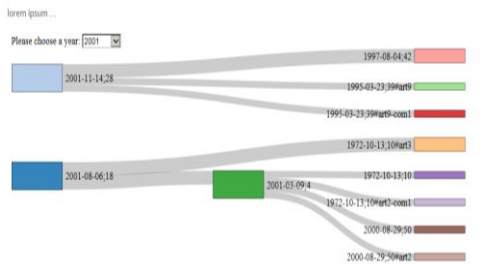
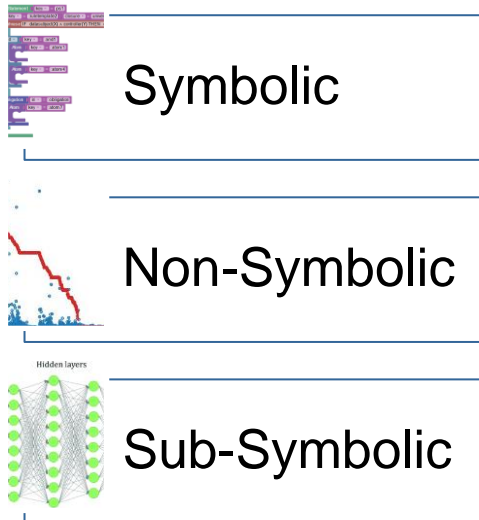
## **“Drafting legislation in the era of AI and digitisation”**

By Prof. Monica Palmirani – University of Bologna,  
CIRSFID-ALMA AI – Italy.



# Hybrid AI for Legal Domain

## ■ Content, Context, Semantic, Processing



# Weakness of ML in legal domain

- **Granularity** vs. **Structure**: ML works at **sentence level** and this approach is not capable to link different **parts of the speech semantically connected** (e.g., obligation-exception, duty-penalty)
- **Content** vs. **Context**: ML loses the **context** (e.g., jurisdiction, temporal parameters)
- **Past** vs. **Future**: ML depends on the **past data series** (e.g., new brilliant solution has no historical series)
- **Internal** vs. **External** info: ML does not consider the **normative and juridical citations**.
- **Static** vs. **Dynamic**: The normative references evolve over time (e.g., art. 3 is not the same forever)

# “White box” approach in AI

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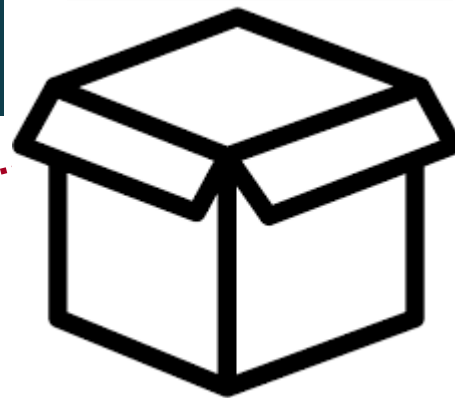


AKOMA NTOSO

Architecture for Knowledge-Oriented Management of African Normative Texts using Open Standards and Ontologies

OASIS LegalXML

LegalRuleML



What are your rights in respect of your personal data?

Your right of data access



8.1. You are entitled to receive a copy of your personal data that is in our possession (your right of data access).

Your right to erasure and rectification



8.2 You may request the deletion of personal data or the correction of inaccurate personal data (your right to erasure and rectification). Please note that we may keep certain information concerning you, as required by law, or when we have a legal basis to do so (e.g., our legitimate interest to keep the platform safe and secure for other users).

Your right to object to processing



8.3 You have the right to object at any time (i) to the processing of your personal data for the purpose of direct marketing, or (ii) to the processing of your personal data for other purposes on grounds relating to your particular situation (your right to object to processing). Please note that in the latter case, this right only applies if the processing of your personal data is based on our legitimate interest.

Your right to restriction to processing



8.4 You have the right to restrict the processing of your personal data (your right to restriction of processing). Please note that this only applies if (i) you contested the accuracy of your personal data and we are verifying the accuracy of the personal data, (ii) you exercised your right to object and we are still considering, as foreseen by the applicable law, whether our legitimate grounds to process your personal data in that case override your interests, rights and freedoms; or (iii) your personal data has been processed by us in an unlawful way but you either oppose the erasure of the personal data or want us to keep your personal data in order to establish, exercise or defend a legal claim.

Lawyer-readable



Machine-readable



Human-readable



# Integration in LEOS



**Visualization/ Portals/LEOS**

**Services of AI (support during drafting, classification, clustering, aggregation, correlation)**

**Workflow management**

**Advanced Ontology and Rule-base system**

**Extraction of the Legal Knowledge using AI**

**ELI/ECLI**

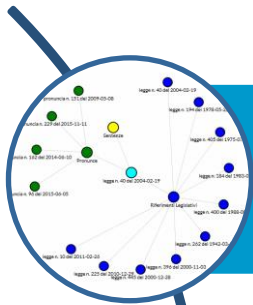


**AKOMA NTOSO – XML**

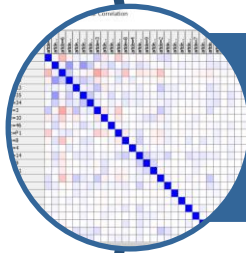
# AI for Legislative drafting

**Study on 'Drafting legislation in the era of AI and digitisation' with EU Commission – Directorate General Informatics Unit B2 – Solutions for Legislation, Policy & HR**

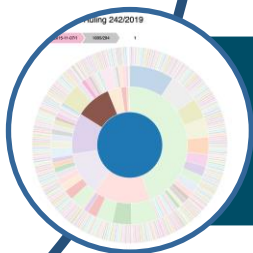
## ■ 4 use-cases



Legal Drafting supported by AI system for improving quality, effectiveness, efficacy, semantic annotation (e.g., Law as Platform)



Decision support System/AI for making better the legislative process and anticipating needs of the society (e.g., same-sex marriage, end of life, etc.)



Legal System data analytics for understanding the legislative hidden knowledge (e.g., patterns, frequent errors)

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# **DEROGATION**

# Anatomy of a derogation

$R1_{t1}$  derogated to  $R2_{t2}$

<action>

<normDerogated>

<jurisdiction>

<temporalParameter>

<scope>

By way of derogation from paragraphs 1 and 2, in Cyprus, Croatia, Malta and Slovenia, the amount referred to in those paragraphs may be set at a value lower than EUR 500, but not less than EUR 200 or, in the case of Malta, not less than EUR 50.



# Dataset

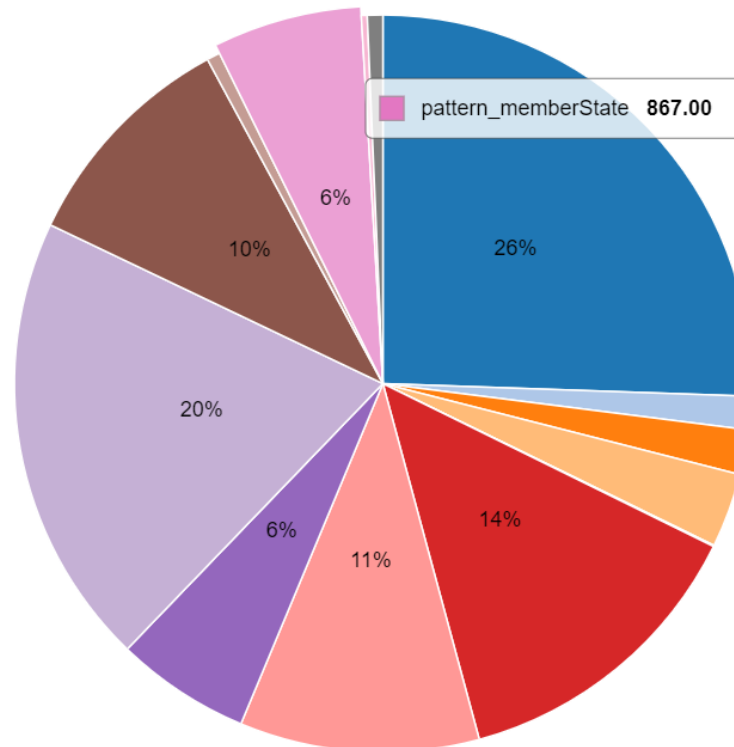
- The dataset is composed by legislative act in the span of time 2010-2020 for a total of 15.328 documents.
- Regulation, Directive, Implementation instruments
- The documents are converted in Akoma Ntoso in order to have the structure of the document and the context annotated
- We have extracted 13.587 partitions involved in the derogation using a preliminary taxonomy of “RegEx”

# Study on "Drafting legislation in the era of AI and digitisation"

## Manage the derogations: classification

Pie Chart

derogation\_pattern\_1 derogation\_pattern\_1b derogation\_pattern\_1c derogation\_pattern\_1d derogation\_pattern\_2  
derogation\_pattern\_3 derogation\_pattern\_potential exception\_pattern\_1 exception\_pattern\_potential notapply\_pattern\_1  
notapply\_pattern\_potential pattern\_delegatedsActs pattern\_memberState pattern\_memberStateReq pattern\_temporaryDer



# Akoma Ntoso: detection of knowledge

<alinea eld="body\_\_art\_2\_\_al\_3">

<content eld="body\_\_art\_2\_\_al\_3\_\_content">

<mod eld="body\_\_art\_2\_\_al\_3\_\_content\_\_mod\_1">

<p>By way of derogation from the second paragraph, Member

States may

choose not to apply the provisions of point ORO.FTL.205(e) of

<ref eld="ref\_1" href="/akn/eu/act/regulation/2012-02-17/965-2012/!main/>annex\_III">Annex

III to Regulation (EU) No 965/2012 </ref> and continue to

apply the

existing national provisions concerning in-flight rest until<date

date="2017-02-17" refersTo="#derogationTime">17

February 2017</date>.</p>

</mod>

</content>

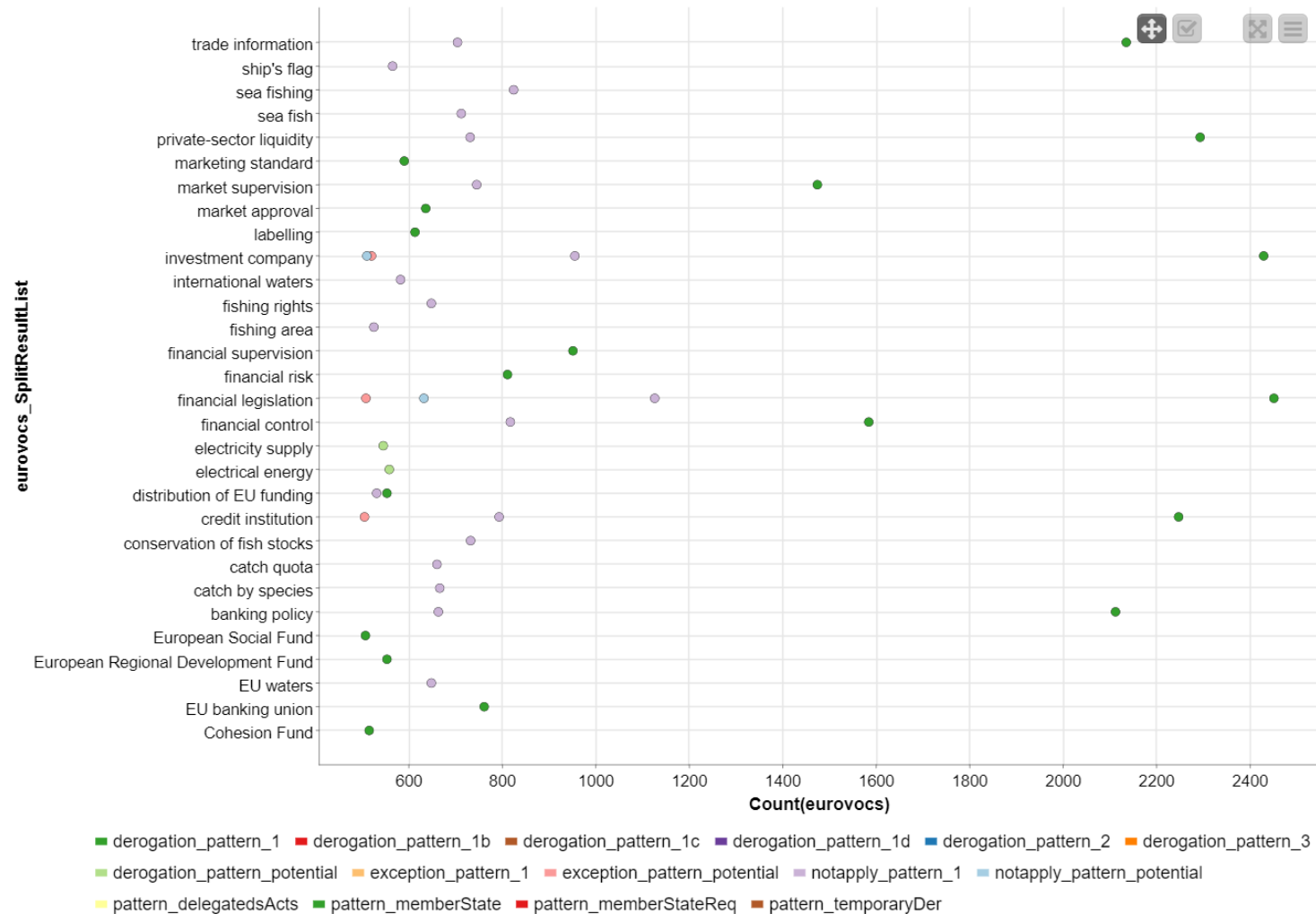
</alinea>

# Legal Knowledge extraction and Akoma Ntoso serialization

```
<scopeMod type="exceptionOfScope">
  <source href="body__art_2__al_3__content__mod_1"/>
  <destination
    href="/akn/eu/act/regulation/2012-02-17/965-
2012/!main/annex_III"/>
  <force>
    <date date="2014-02-20"/>
  </force>
  <duration>
    <date date="2017-02-17" refersTo="#endDate"/>
  </duration>
  <condition/>
  <domain/>
</scopeMod>
```

# Distribution of the derogations classification for thematic topic using Eurovoc

er Plot



# <https://cirsfid.gitlab.io/derograph/>

## Analysis of the Derogations in EU Legislation using Network Analysis

This is a visualization map for AKN derogations of the EU legislation from 2010 to 2020

### Eurovocs:

Select a Eurovoc

### Places

Select a Place

### Duration:

22/03/2015



01/04/2022



### Conditions:

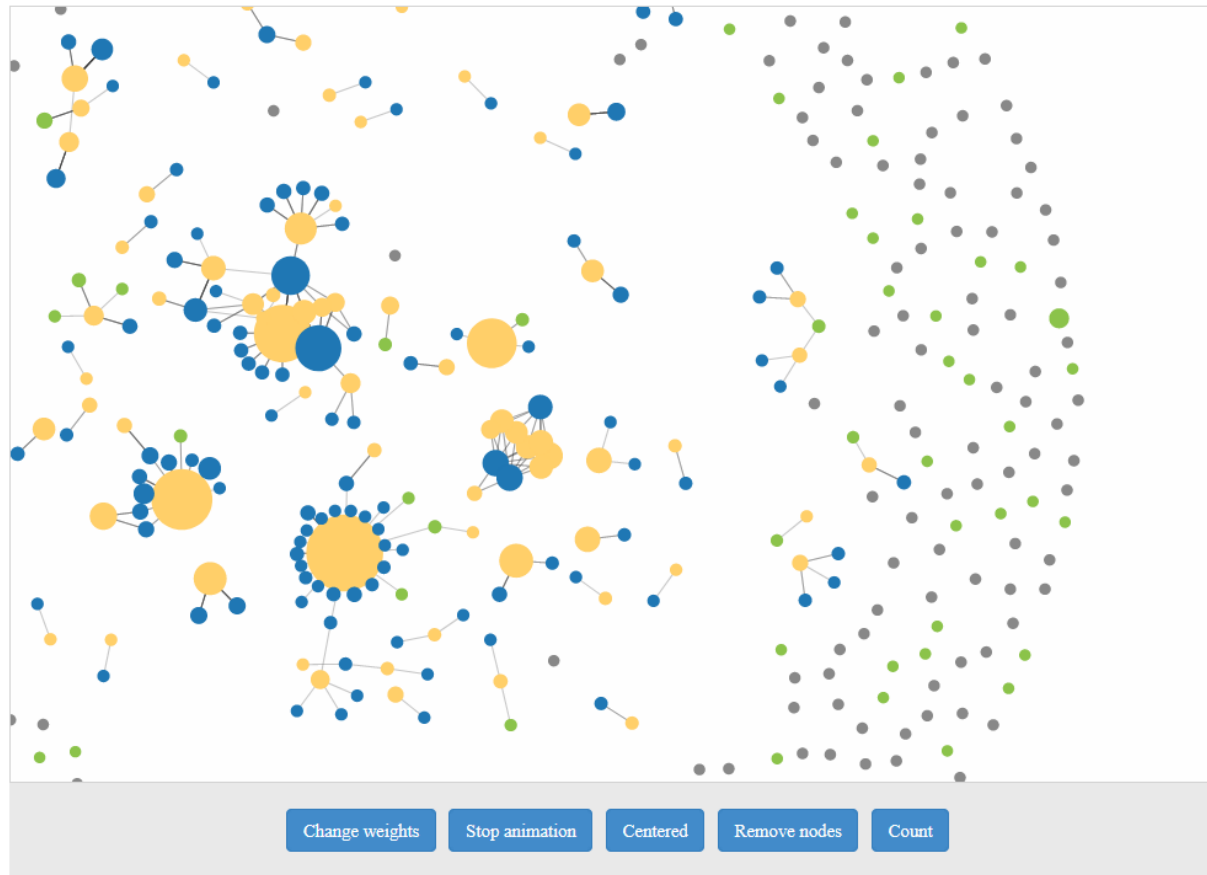
Select a Condition

### Domains:

Select a Domain

☒ Match all filters (narrow results)

Update



$$w = k * (\#ActiveDerogations + \#ReflexiveDerogations + \#PassiveDerogations)$$

---

**DIGITAL READY**

# Positive list of word

## Article 21

### General requirements for the pharmacovigilance system master file

- 1. The information in the pharmacovigilance system master **file** required under Article 77(2) of Regulation (EU) 2019/6 shall be accurate and reflect the pharmacovigilance system in place.
- 2. The contractual arrangements between marketing authorisation holders and third parties concerning pharmacovigilance activities shall be clearly documented, detailed and up-to-date.
- 3. Marketing authorisation holders may, where appropriate, use separate pharmacovigilance systems for different categories of veterinary medicinal products. Each such system shall be described in a separate pharmacovigilance system master file.

electronic identification

electronic signature

electronic seal

electronic signature

web

electronic tickets

e-book

e-reader

non-cash payment

electronic payment

digital means of exchange

**file**

database

wifi

digital service

digital certification

digital content



# Negative list of word

## «Article 4

*Requirements for certificates for terrestrial animals and germinal products*

*1. The official veterinarian shall complete certificates for consignments of terrestrial animals and germinal products in accordance with the following requirements:*

*(omissis)*

*(c) the certificate must consist of one of the following:*

*(i) a single sheet of **paper**;*

*(ii) several sheets of **paper** where all sheets are indivisible and constitute an integrated whole;*

*(iii) a sequence of pages with each page numbered so as to indicate that it is a particular page in a finite sequence; »*

Certified copy

Cheque

Courier

Stamp

Facsimile

Fax

Hard copy

In writing

Ink

Mail

Microfiche

Newspaper

Original copy

**Paper**

Pen

Pencil

Post

Print

Printout

Scan

Seal

Telex

Written

Person

identification

Signature

Paper

documentation

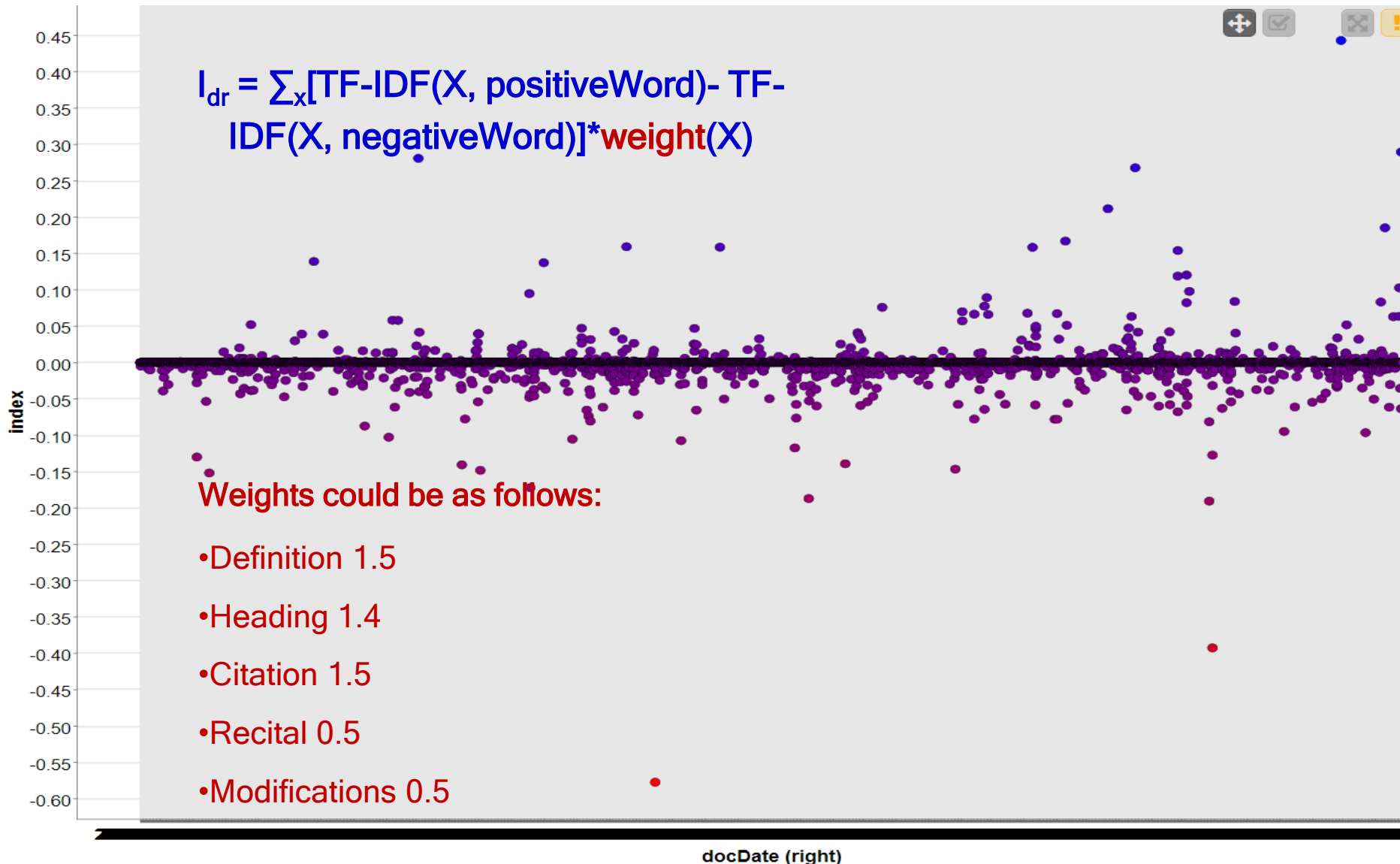
Paper tickets

cash payment

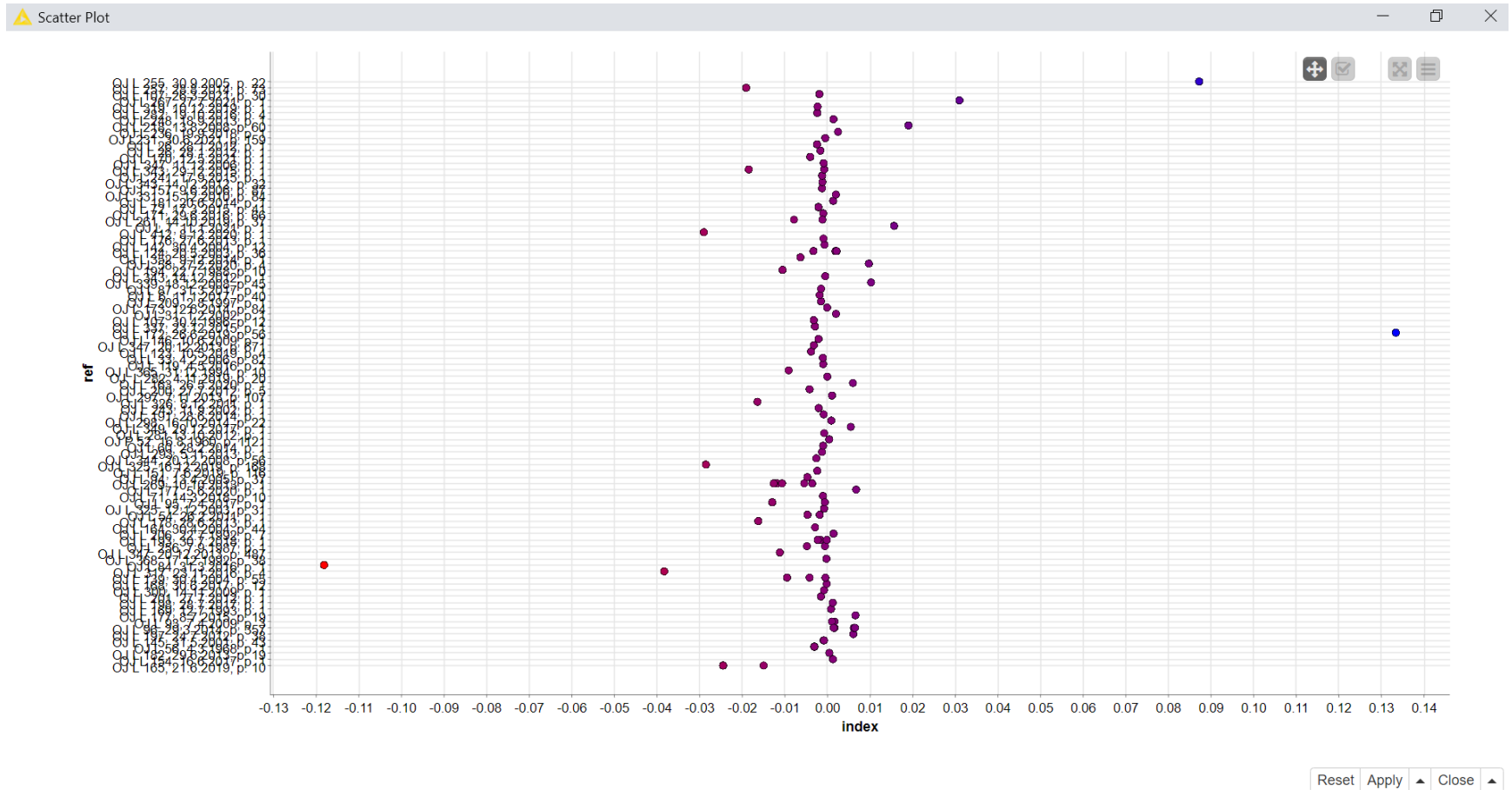
Digital service

Durable medium

# Digital-ready index in the EU legislation – TF-IDF at article level



# Relationship between the index of «digital-ready» and the normative references in the same portion



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# **IMPLEMENTATION DIRECTIVE**

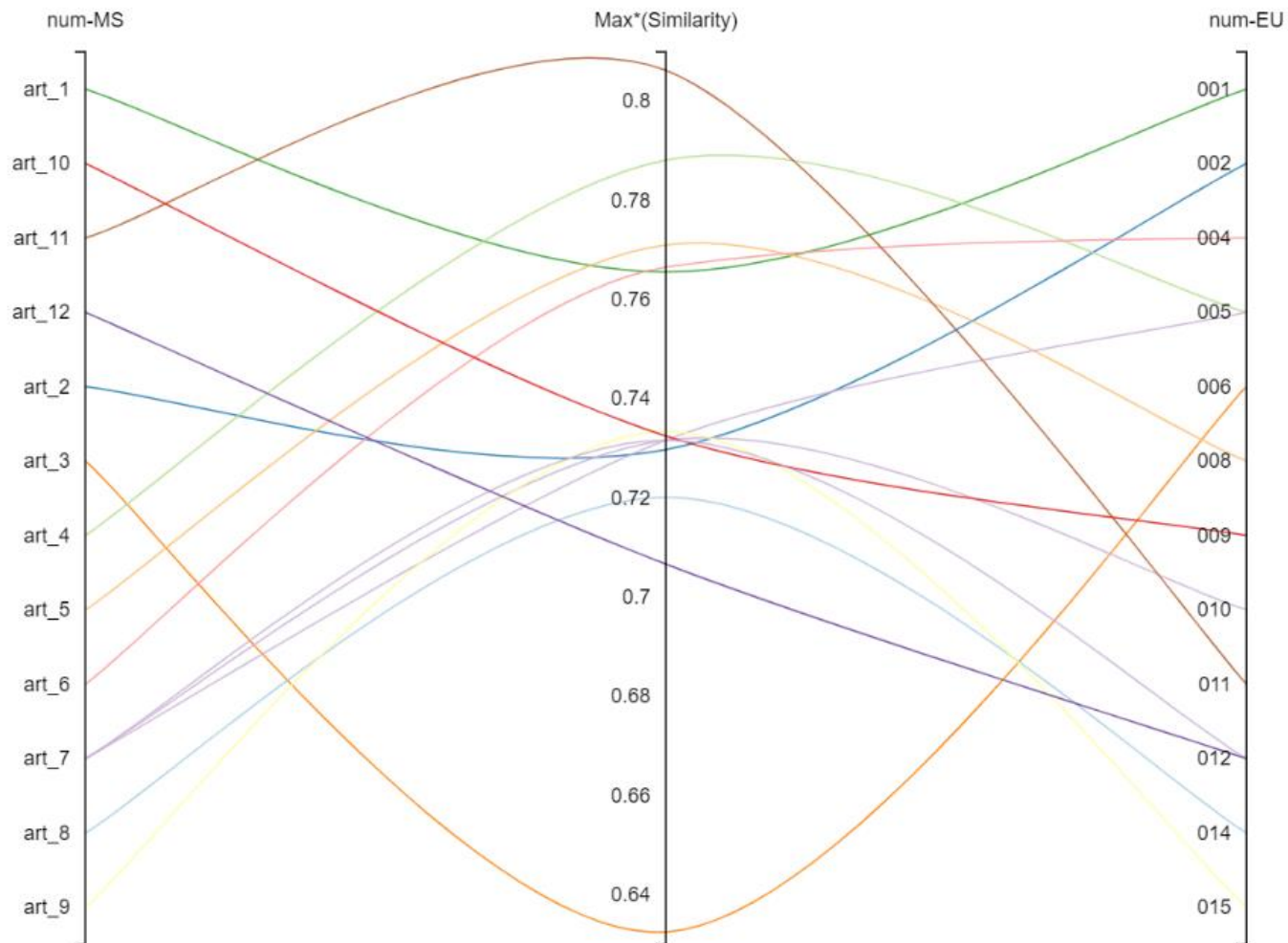
# Support the transposition and implementation of the Acquis

- Akoma Ntoso LegalXML creates interoperability methodology
- AI + Semantic Web + AKN support the implementation of the directive in the Member States
  - **Harmonize the definitions with the Acquis**
  - **Manage the derogations to the Acquis**
  - **Measure the deflections and similitudes**
  - Synchronize the domestic law for the future modifications of the directives
  - Comparative law approach

# Study on "Drafting legislation in the era of AI and digitisation"

## Similarity between Italian implementation of Directive and the EU Directive

2-gram distance



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**thank you  
for your attention**

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