



HYPERMODELEX



Contributions to AI research in Parliaments

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

3rd July 2023



ChatGPT is now writing legislation. Is this the future?



Analysis by [Cristiano Lima](#)
with research by [Aaron Schaffer](#)

January 23, 2023 at 8:55 a.m. EST

But in what may be a first, a Massachusetts state senator has used a [surging new tool](#) to help write a bill aimed at restricting it: ChatGPT, the artificial intelligence chatbot.

Speech with ChatGPT in the Senate of Italy

Parla il senatore che si è fatto scrivere un intervento in aula da ChatGPT


La provocazione dell'esponente di Azione-IV Marco Lombardo, che rilancia: "È adesso che bisogna parlarne"



Artificial Intelligence (AI) in parliaments – preliminary analysis of the Eduskunta experiment

Fotios Fitsilis 

Pages 621-633 | Published online: 10 Sep 2021

 Download citation

 <https://doi.org/10.1080/13572334.2021.1976947>

 Check for updates

GPT Takes the Bar Exam

December 29, 2022

Michael Bommarito II ^{1,2,3}, Daniel Martin Katz ^{1,2,3,*}

1 Illinois Tech - Chicago Kent College of Law (Chicago, IL USA)

2 Bucerius Law School (Hamburg, Germany)

3 CodeX - The Stanford Center for Legal Informatics (Stanford, CA USA)

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Abstract

Nearly all jurisdictions in the United States require a professional license exam, commonly referred to as “the Bar Exam,” as a precondition for law practice. To even sit for the exam, most jurisdictions require that an applicant completes at least seven years of post-secondary education, including three years at an accredited law school. In addition, most test-takers also undergo weeks to months of further, exam-specific preparation. Despite this significant investment of time and capital, approximately one in five test-takers still score under the rate required to pass the exam on their first try. In the face of a complex task that requires such depth of knowledge, what, then, should we expect of the state of the art in “AI”? In this research, we document our experimental evaluation of the performance of OpenAI’s TEXT-DAVINCI-003 model, often-referred to as GPT-3.5, on the multistate multiple choice (MCB) section of the exam. While we find no benefit in fine-tuning over GPT-3.5’s zero-shot performance at the scale of our training data, we do find that hyperparameter optimization and prompt engineering positively impacted GPT-3.5’s zero-shot performance. For best prompt and parameters, GPT-3.5 achieves a headline correct rate of 50.3% on a complete NCBE MBE practice exam, significantly in excess of the 25% baseline guessing rate, and performs at a passing rate for both Evidence and Torts. GPT-3.5’s ranking of responses is also highly-correlated with correctness; its top two and top three choices are correct 71% and 88% of the time, respectively, indicating very strong non-entailment performance. While our ability to interpret these results is limited by nascent scientific understanding of LLMs and the proprietary nature of GPT, we believe that these results strongly suggest that an LLM will pass the MBE component of the Bar Exam in the near future.

	GPT	GPT Top 2	GPT Top 3	NCBE
Evidence	63%	84%	98%	65%
Torts	62%	72%	93%	71%
Civil Procedure	52%	63%	79%	59%
Constitutional Law	49%	67%	87%	72%
Real Property	45%	72%	83%	65%
Contracts	45%	77%	86%	70%
Criminal Law & Procedure	35%	62%	86%	71%

Table 2. Summary of performance by question category for GPT-3.5 and NCBE-Reported Students

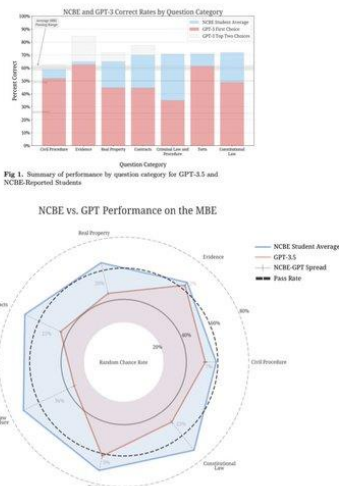


Fig 2. Accuracy by Question Category for GPT and Average Test-Takers

 View PDF

Download full issue



ELSEVIER





Computer Law & Security Review

Volume 48, April 2023, 105772





Comment

Representing legislative Rules as Code: Reducing the problems of ‘scaling up’

[Andrew Mowbray](#) ^a , [Philip Chung](#) ^b , [Graham Greenleaf](#) ^c  

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+ Add to Mendeley  Share  Cite



Matthew Waddington

5.099 Tweet

Following



Seguito da Legislative Drafting Office, Jersey, Pierpaolo Vivo e altri 27 che segui

Tweet

Tweet e risposte

Contenuti multimediali

Mi piace



Tweet fissato



Matthew Waddington @mattwadd · 5 feb



I finally cracked- with encouragement from 1 of my daughters I signed up for [#ChatGPT](#).

Asked it to draft some UK-style legislation - Act regulating bakeries, with 3 typical elements.

Plenty errors, but 1st go good & 2nd go improved- but just look at the sensible elements it added

COMMERCIAL BAKERY WITHOUT A LICENCE FROM THE STATUTORY BODY, WHO enables people to appeal against a refusal of a licence, or against an unreasonable condition imposed on a licence.



The Commercial Baking Regulation Act 2023

Preamble:

WHEREAS it is desirable to regulate the commercial baking industry to ensure the protection of public health and safety and the promotion of fair competition;

BE IT ENACTED by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

Section 1: Establishment of Statutory Body

(1) There shall be established a statutory body to be known as the Commercial Baking Regulation Authority (CBRA).

(2) The CBRA shall have the power to regulate the commercial baking industry, including the licensing of commercial bakeries.

Section 2: Licensing of Commercial Bakeries

(1) No person shall operate a commercial bakery without first obtaining a licence from the CBRA.

(2) An application for a licence shall be made in the prescribed form and shall be accompanied by the prescribed fee.

(3) The CBRA may refuse to grant a licence if it is satisfied that the applicant does not meet the prescribed standards of public health and safety or if it is in the public interest to do so.

Section 3: Offence and Penalty

(1) Any person who operates a commercial bakery without a licence from the CBRA shall be guilty of an offence and shall be liable on conviction to a fine not exceeding £50,000 or to imprisonment for a term not exceeding seven years, or to both.

"licence" means a licence granted under this Act;

"prescribed" means prescribed by regulations made under this Act.

ENACTED by the authority of the Parliament of the United Kingdom.



Thanks, that is a very good start. Please can you add a provision enabling the CBRA to add conditions to a licence, and requiring it to consider whether the applicant is a fit and proper person to hold a licence. Please also change section 5 so that it is the Secretary of State who makes the Regulations, instead of the CBRA.



The Commercial Baking Regulation Act 2023

Preamble|

WHEREAS it is desirable to regulate the commercial baking industry to ensure the protection of public health and safety and the promotion of fair competition;

BE IT ENACTED by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

(1) Any person who is aggrieved by a decision of the CBRA to refuse a licence, impose unreasonable conditions **[Load failed] [Regenerate response]** on a licence, or revoke a licence, may appeal to the Secretary of State within 28 days of the decision being made.

(2) The Secretary of State may affirm, vary or set aside the decision of the CBRA, and make such order as he thinks fit.

Section 5: Regulations

(1) The Secretary of State shall make regulations to give effect to the provisions of this Act and to provide for the licensing and regulation of commercial bakeries.

(2) Without prejudice to the generality of subsection (1), the regulations may provide for—

(a) the form of the application for a licence;

(b) the fee to be paid on making an application for a licence;

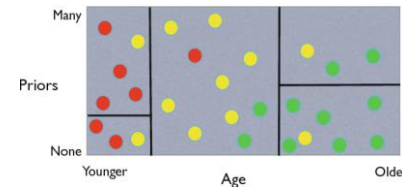
eLegal evolution

EUR-Lex

at4am

EU Open Data Portal

Classification by Linear Partitioning



```
pragma solidity ^0.4.17;
contract SimpleStorage {
    uint storedData;

    function set(uint x) public {
        storedData = x;
    }

    function get() public view returns (uint) {
        return storedData;
    }
}
```



1990s

2000s

2010s

2020s

2030s

AI and Law

Logic programming – AI simbolica

Semantic Web e Knowledge representation

ML, Classification, clustering, NLP, predict

Legal data analytics

Blockchain & Smart Contract

«Rule As Code»

CRACKING THE CODE
RULEMAKING FOR HUMANS AND MACHINES

@OPSIGOV OPSI Observatory of Public Sector Innovation OECD ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

NSW GOVERNMENT digital.nsw

Digital Transformation Policy Design System Get Involved Blog

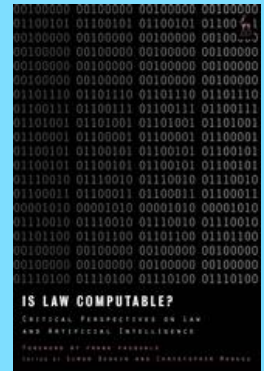
Rules as Code - NSW Joins the Worldwide Movement to Make Better Rules

Integration of Legal Theory and ICT for a Legal Smart Legal Order

Hybrid AI Framework for Legal Analysis of the EU Legislation Corrigenda

Monica PALMIRANI¹, Francesco SOVRANO², Davide LIGA³, Salvatore SAPIENZA⁴ and Fabio VITALI⁵

¹CIRSFID-ALMA-AL, University of Bologna
²DISI, University of Bologna



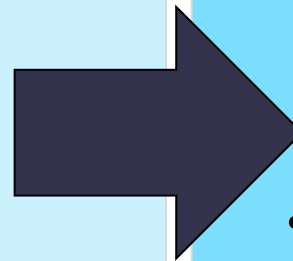
Legal Theoretical Framework

- Normativity and legitimacy in smart legal order
- Interpretation and legal theory using **computational linguistics approach**
- Explicability & Transparency using **HCI**

From code to text

Several critical issues

- *Computational legalism*
- Democratic risks
- Ethical concerns



AI and Legislation Domain: critical analysis

- Law is **not only rules** (e.g., principles and values).
- Norms have been adapted according to the **evolution of the society – dynamic model**
- **‘artificial languages’** (e.g., programming language) is a subset of natural language (Chomsky 2006)
- Norms sometime are intentionally **vague** for implementing flexibility and interpretations (hermeneutic)
- **Prediction** based on the past should be mitigated to the new events (computational legalism)
- Predictions influence decision-makers and future human behaviour (Hildebrandt 2021)
- **Autonomy** and transparency are pillars of normativity (Günther 2021)
- The **right of disobey** as moment of creativity of new norms

Hallucination AI

Lawyer apologizes for fake court citations from ChatGPT

By [Ramishah Maruf](#), CNN

Updated 3:28 PM EDT, Sun May 28, 2023

US judge orders lawyers to sign AI pledge, warning 'they make stuff up'

By [Jacqueline Thomsen](#) ✓

May 31, 2023 8:56 PM GMT+2 · Updated 10 hours ago

[Home](#) / [News](#) / [Technology](#) / [Artificial Intelligence](#) / [EU Commission issues internal guidelines on ChatGPT, generative AI](#)

EU Commission issues internal guidelines on ChatGPT, generative AI

By [Luca Bertuzzi](#) | [EURACTIV.com](#) © Est. 4min

📅 31 mag 2023

Different goals of AI in Parliaments

1. **Generation** of the legislation/amendment/debates/summary— *ex-ante*
2. **Modelling**/representing/classifying/extracting the source of the law— *ex-post*
3. **Prediction** of some output— *pro-futuro*
4. **Executing**/reasoning rules— *real-time*

Different applications

Summarization
of debates

Transcript

Dossier

Preamble

Amendment

Consolidation

Definitions

Smart
Legislative
Drafting

Semantic
annotation

Classification

Clustering

Analysis of
impact

Analysis of
effectiveness

Policy
Checking

Simplification

Similarity in
comparative
law

Transposition

Check
compliance

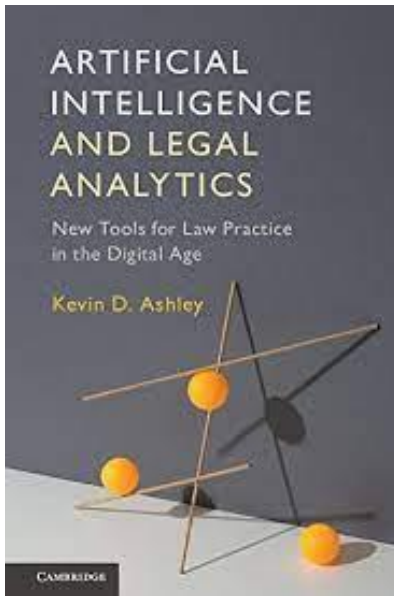
Detection of
the needs

Prediction of
the success of
bill

Prediction of
the correlation

Smart Search
Engine

Conversional
Query



Klaus Günther

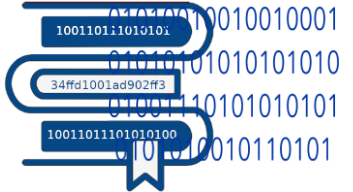
From Normative to Smart Orders?

Abstract: The increasing penetration of new digital technologies, especially artificial intelligence, into almost all areas of society's life has led to the emergence of smart orders. These are orders that are designed to minimize or eliminate deviations from their norms through intelligent design and algorithmic operations. The article explains some examples of smart orders and shows that, at least in principle, a distinction can be made between algorithmically optimized, norm addressee-oriented prevention and addressee-substituting pre-emption of deviant behavior by digital technologies. The focus of the article is then on the question of whether and, if so, in what sense smart orders are still normative orders at all. In the course of the analysis, it becomes apparent that while legal orders and other normative orders pursue the goal of effective enforcement of their norms, they do not pursue the ideal of complete non-deviance. It becomes clear that one of the essential aspects of normative orders is that they are addressed to persons who must embrace them as autonomous and, at the

HyperModeLex Research Questions

11010010101010100

11010111010010011



What is the Law in digital era?

Go beyond post-reductionism textualism / normativism of philosophy of law for a new theory of eLegislation

01

How to model interpretation?

Analyse Legal Hermeneutic in eLegislation

02

How to defend democracy?

Define Constitutional legitimacy of eLegislation and its e-enforceability

03

How to preserve legal language ?

Integrate Legal language role in normativism with computational linguistics models

04

How to keep autonomy ?

Implement *Better Regulation* with Legal Design and HCI

05



HyperModeLex: three sub-projects

1. Hybrid AI: Human and Machine



Pre-requirements

- Legitimacy
- Authoritativeness

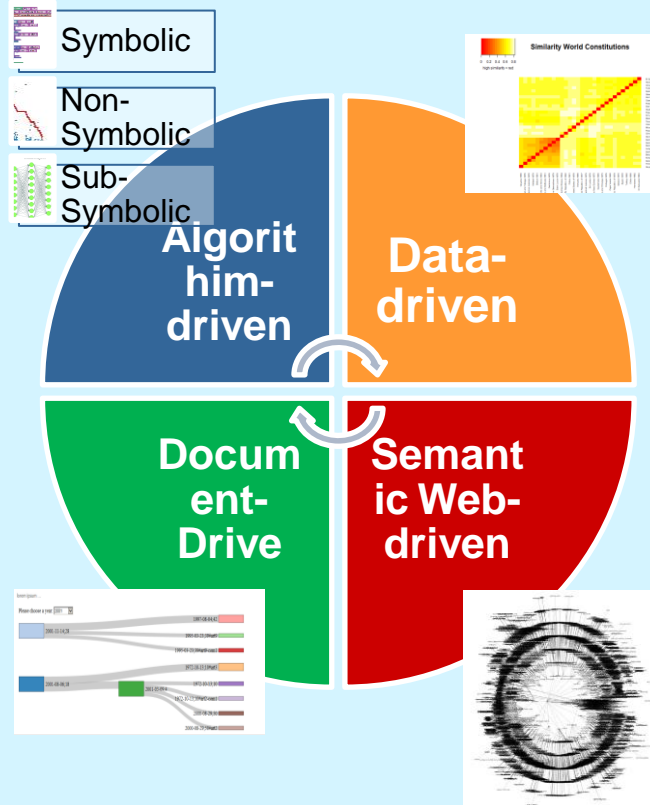
Theoretical grounding

- Institutional Theory
- Interpretation Theory

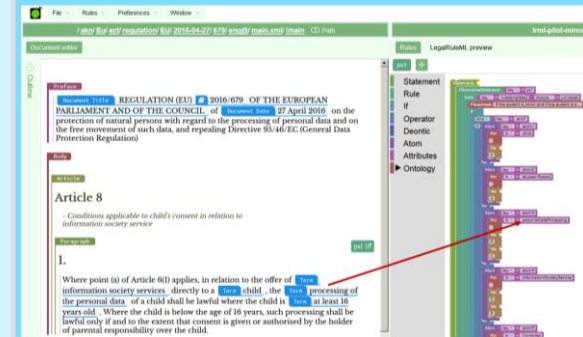
Principles

- Constitutional Law principles
- Democratic powers

2. Hybrid AI: Ecosystem



3. Hybrid AI: Explanation & Human-Computer Interaction



- Legal Design
- Explicability
- Autonomy
- Transparency

“White box” approach in AI

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I agree to these Terms of Service

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EasyChair Terms of Service

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- b) to publish papers, articles, preprints, slides, presentations, videos, teaching material, programs of events, calls for papers and volumes and collections thereof.

(the “Service”).

WE ASK THAT YOU READ THESE TERMS AND CONDITIONS OF SERVICE (THE “TERMS”) BEFORE YOU USE THE SERVICE OR OTHERWISE VISIT OR ACCESS ANY PART OF THESE TERMS WITHOUT MODIFICATION. IF YOU DO NOT AGREE TO THESE TERMS, DO NOT USE THE SERVICE.

1.2 If you use the Service on behalf of a company, organisation, or other entity, then:

- a) “you” includes you and that entity, and
- b) you represent and warrant that you are an authorized representative of the entity with the authority to bind the entity to these Terms, and that you agree to these Terms on the entity’s behalf.

1.3 We reserve the right to update the Service at any time at our discretion with or without notice to you. Such updates are designed to improve, enhance and further develop the Service and may take the form of bug fixes, enhanced functions, new modules, or other forms. You agree to review such updates and notify us to deliver these to you as part of your use of the Service.

1.4 Additional terms may apply to some of our services. For example, if you use our conference registration module, additional terms apply to your use of this module. All of these are referred to herein as the “Additional Terms”. If there is any contradiction between what the Additional Terms say and what these Terms say, then the Additional Terms shall take precedence in relation to that element of the Service.

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3.2 You agree to only use the Service for lawful purposes and as permitted by these Terms.

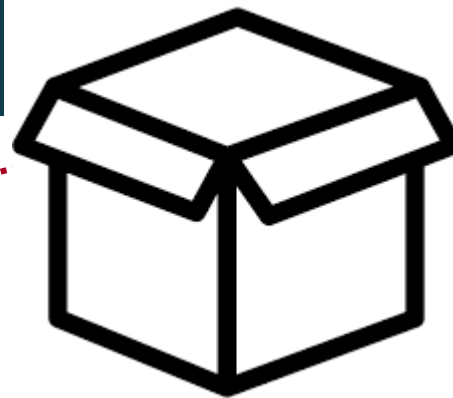


AKOMA NTOSO

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



Human-in-the-loop

Human-on-the-loop

Human-in-Command

Next Gen Data Science Experience

We are envisioning the future of how data scientists interact with AI tools and technologies covering topics such as data science automation, machine teaching, usable programming models, and visual debugging.

Human-Agent Interaction

We are exploring and studying the design of human interactions with AI assistants to support business objectives because human interactions with AI systems will be increasingly conversational in the future.

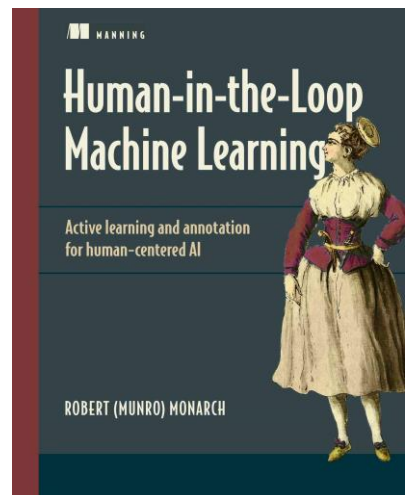
HCI⁴AI

Experiencing AI

We are creating mindshare and awareness of AI by designing public-facing AI experiments and demonstrations allowing users to gain hands-on experience, as well as studying societal & ethical aspects of AI.

Visual AI & Explainability

We are investigating how to make decision-making in AI systems more transparent in order to increase trust and acceptance through AI model visualizations and underlying research on interpretability.



https://researcher.watson.ibm.com/researcher/view_group.php?id=9529

Framework

Visualization/ Portals/LEOS (other editors)

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

Workflow management

Advanced Ontology and Rule-base system

Extraction of the Legal Knowledge using AI

ELI/ECLI



AKOMA NTOSO – XML

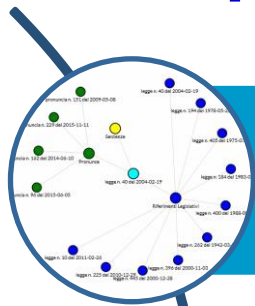
AI for Legislative drafting

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

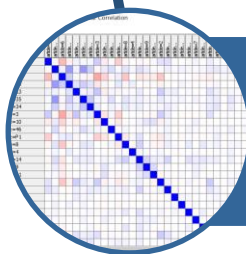


Legal Drafting in the Era of Artificial Intelligence and Digitisation

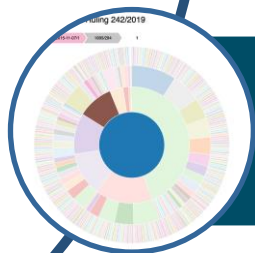
■ 4 use-cases



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 live, etc.)



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

DEROGATION

Anatomy of a derogation

$R1_{t_1}$ derogated to $R2_{t_2}$

<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

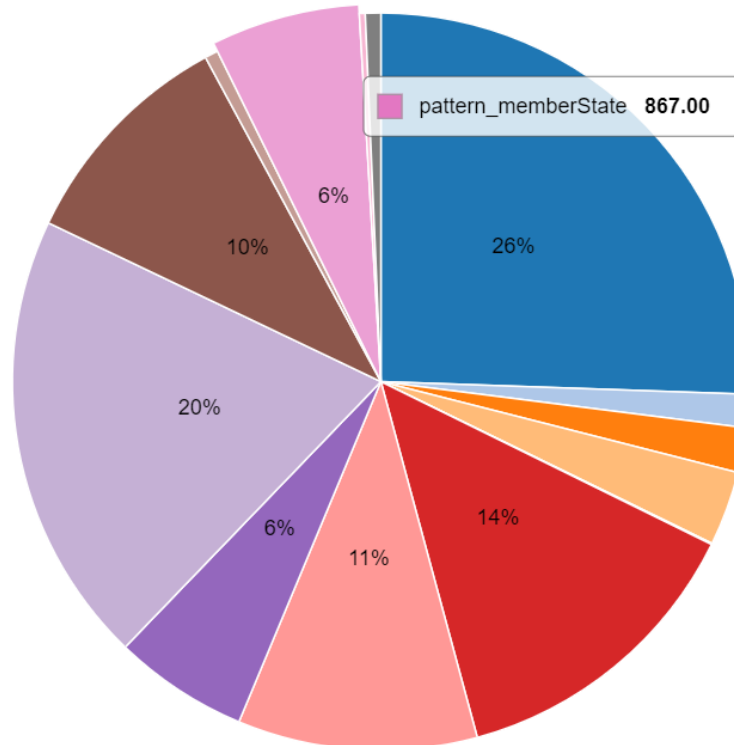
- The dataset is composed by legislative act in the span of time 2010-2020 for a total of 15.328 documents.
- Regulation, Directive, Implementation instruments
- The documents are converted in Akoma Ntoso in order to have the structure of the document and the context annotated
- We have extracted 13.587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

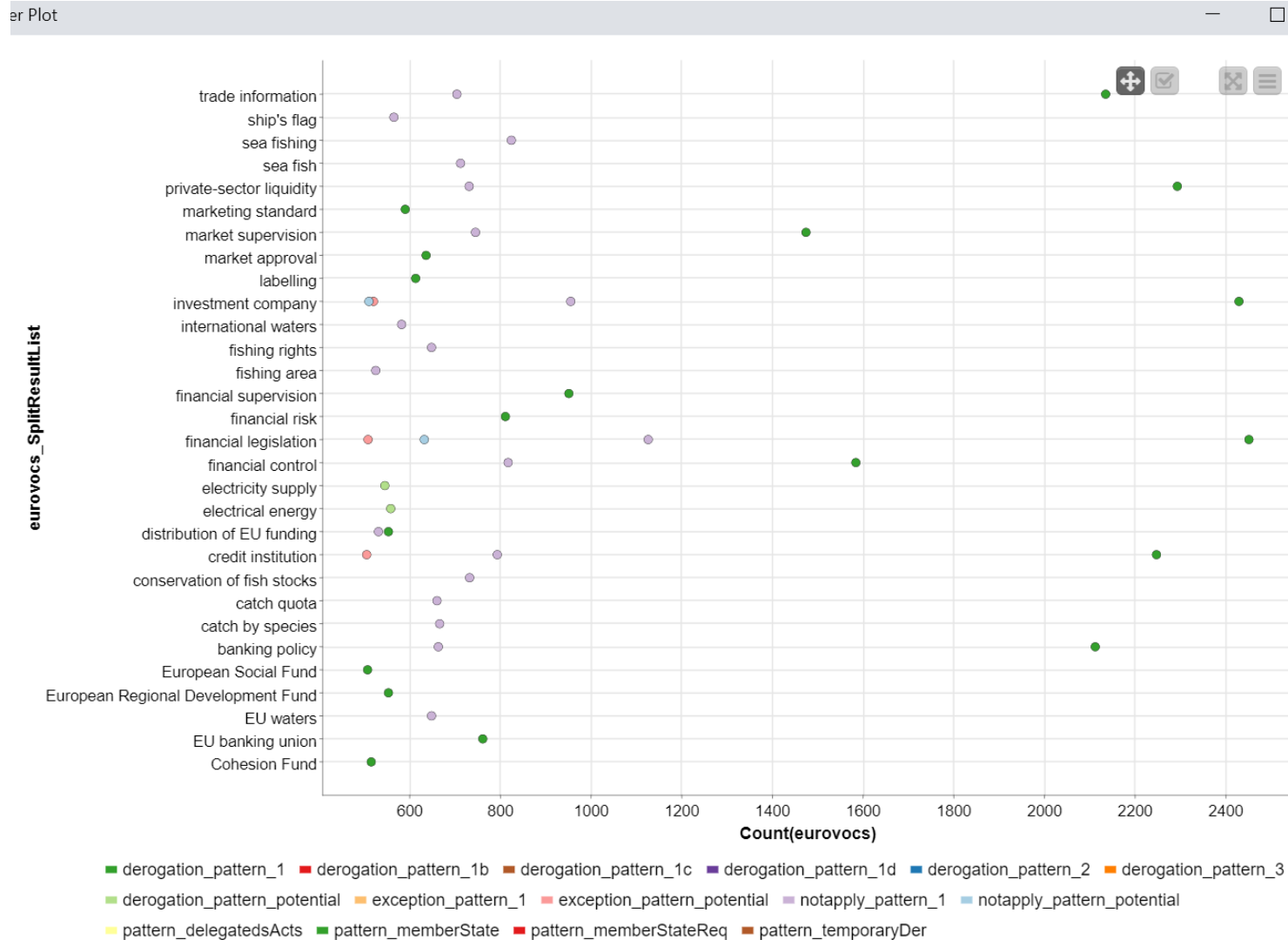
- derogation_pattern_1
- derogation_pattern_3
- notapply_pattern_potential
- derogation_pattern_1b
- derogation_pattern_potential
- pattern_delegatedsActs
- derogation_pattern_1c
- exception_pattern_1
- pattern_memberState
- derogation_pattern_1d
- exception_pattern_potential
- pattern_memberStateReq
- derogation_pattern_2
- notapply_pattern_1
- 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="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>
```

Distribution of the derogations classification for thematic topic using Eurovoc



<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:

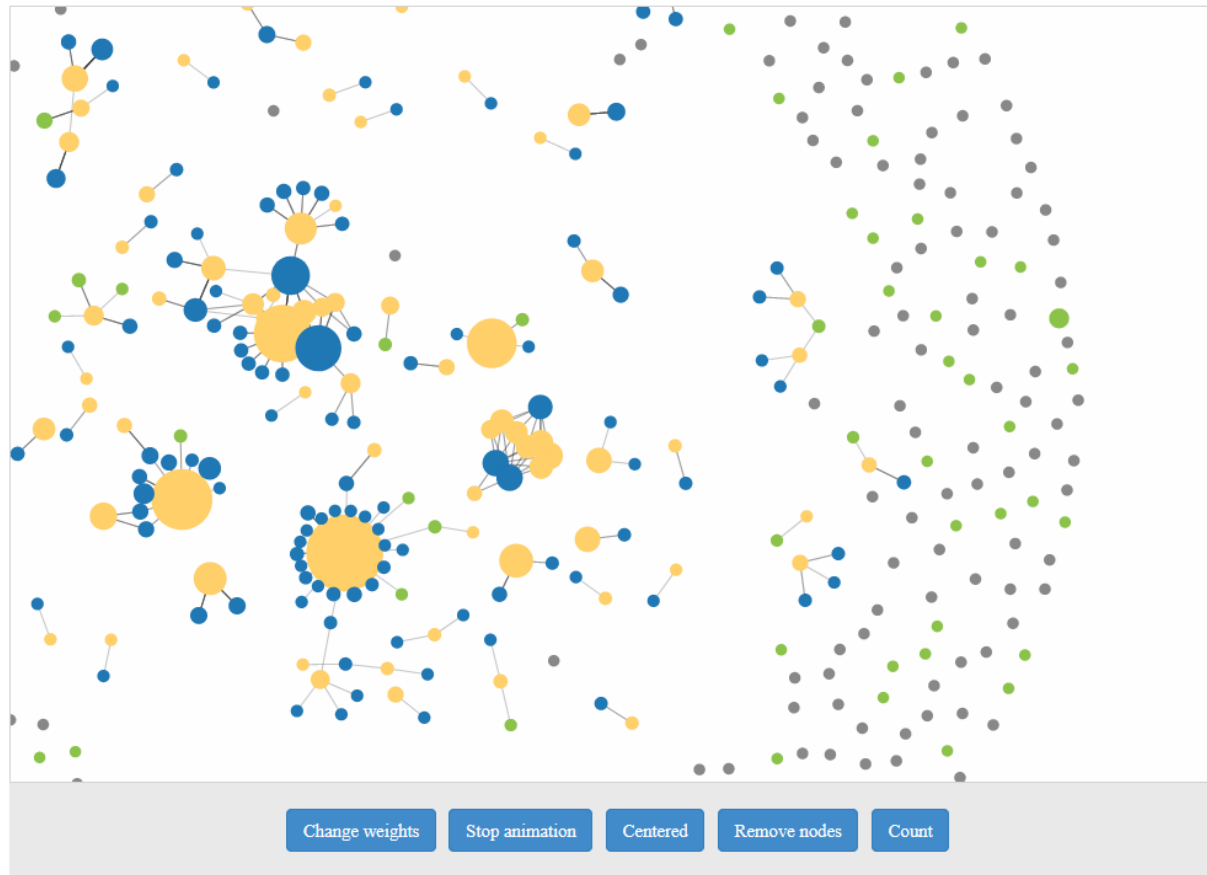
Select a Condition

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

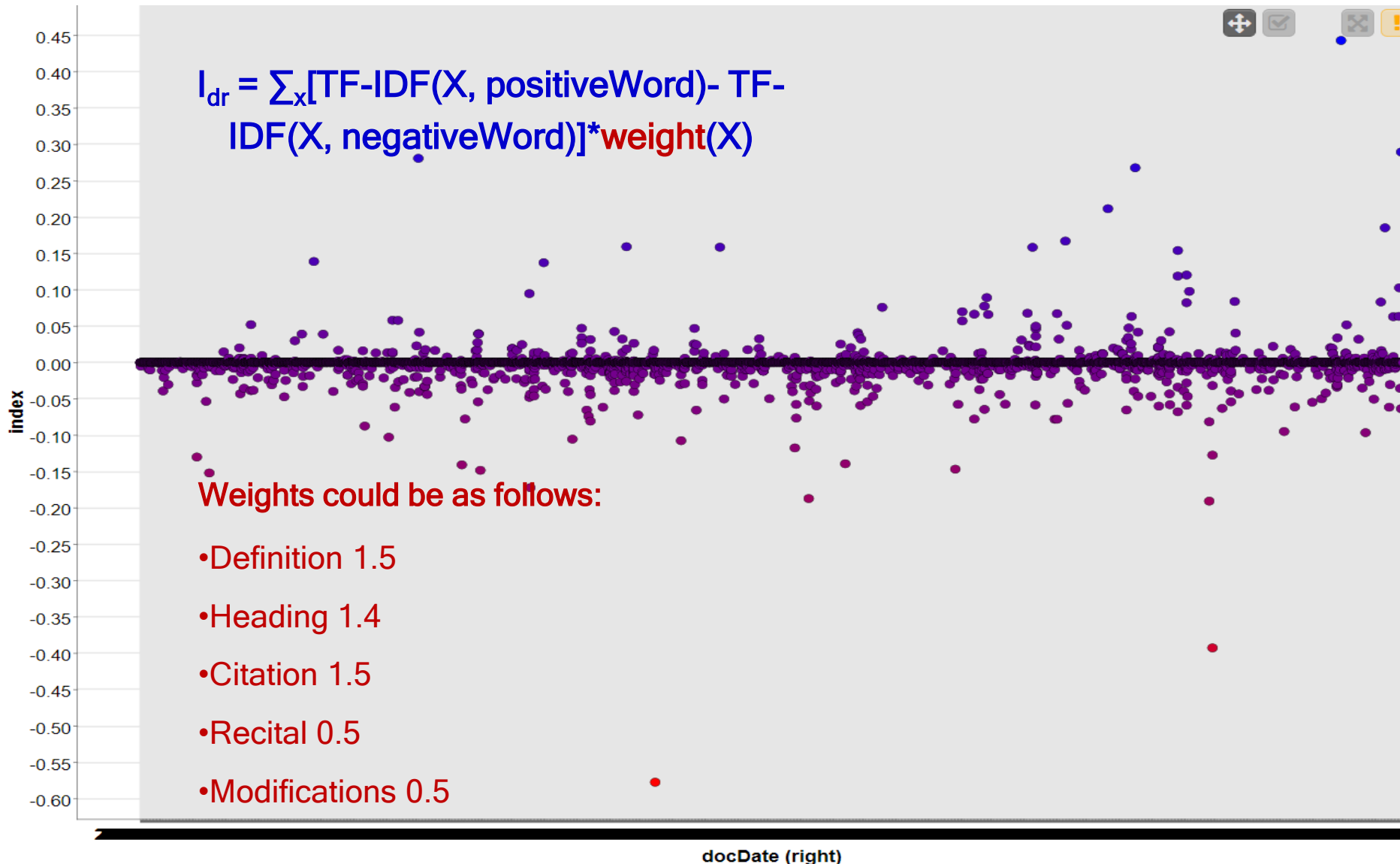
Paper tickets

cash payment

Digital service

Durable medium

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

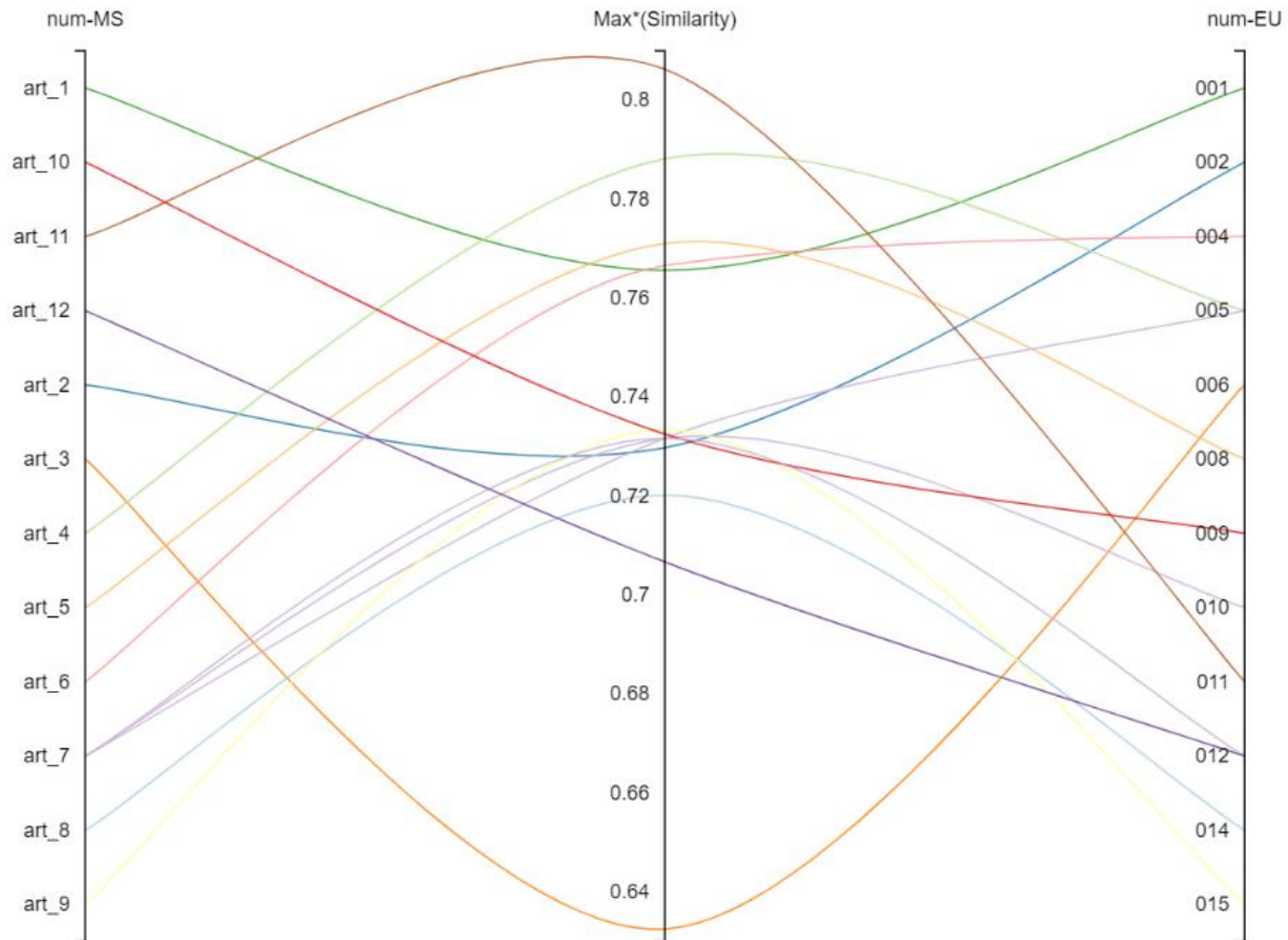


IMPLEMENTATION DIRECTIVE

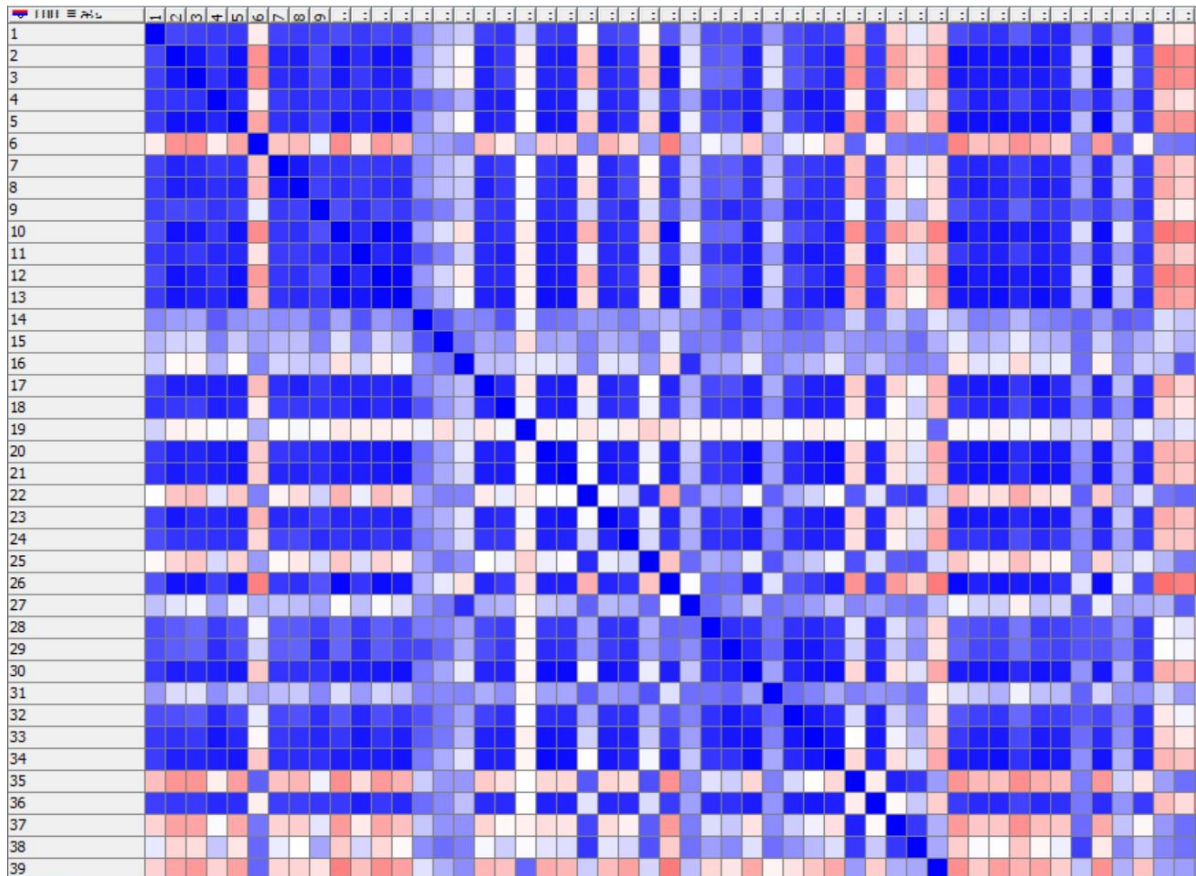
Study on "Drafting legislation in the era of AI and digitisation"

Similarity between Italian implementation of Directive and the EU Directive

2-gram distance



Similarity index and correlation with EU directive articles



Conclusions

- Standard like AKN provides a good annotated corpora for AI application
- AI without semantic and structure is problematic (e.g., hallucination)
- Transparency, explicability and accountability are crucial for Parliaments (e.g., democratic principles)
- Legitimacy and Rule of Law should be included *by-design* in the AI projects

**thank you
for your attention**

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