



Semantic annotation and classification of EU tendering data on open geospatial software, standards and data using Large Language Models

Marco Minghini, Lorenzo Gabrielli, Alexander Kotsev
European Commission, Joint Research Centre (JRC), Ispra, Italy



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Context



Tenders Electronic Daily Ted

- Portal where public tenders by EU and Member States institutions above certain economic thresholds are published
 - **520,000 public procurement notices** worth **€ 420 billion** per year
- Answering the needs of the **EU Directives on public procurement**
- Tenders published in the *Supplement to the Official Journal of the EU (OJS)*
- Database available as **open data**
 - published by the Publications Office of the EU
 - licensed under the European Commission reuse notice
 - packages of **XML bulk downloads** (daily/monthly collections)

<https://ted.europa.eu>

Objective

- Develop an automated procedure to extracts insights from TED
 - for any user-defined **topic**
 - based on user-defined **keywords**
- Use cases
 - **open source software, open source geospatial software, proprietary geospatial software**
 - **open standards, open geospatial standards**
 - **open data, open geospatial data**

Methods



Methods

1. Define one or more sets of **keywords** for the topic
 - start from user-defined sets of keywords
 - enrich keywords using SeTA (Semantic Text Analyser)
 - validate and finalise keywords with the user intervention
2. Extract **candidate outputs** from the TED database
 - search using the keywords and combining them with boolean operators
3. Validate/**refine** the search
 - use an LLM to classify the candidate outputs – with/without context
4. Extract **final outputs**

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4. Extract **final outputs**

Python code (licensed under EUPL v1.2) & data available
at <https://github.com/eurogeoss/TED-analysis>

Definition of keywords

use case:
open source geospatial software

- Definition of 3 groups of **keywords**
 1. keywords around *open source software*
 2. keywords around *geospatial*
 3. keywords around *open source geospatial software*

Definition of keywords

use case:
open source geospatial software

- Definition of 3 groups of **keywords**
 1. keywords around *open source software*
 2. keywords around *geospatial*
 3. keywords around *open source geospatial software*
- Enrichment using the JRC SeTA **text-mining tool**
 - output: list of related keywords based on **EU context**

```
29 import requests
30 session = requests.Session()
31 term='open source software'
32 payload = dict(term=term)
33 headers = {"Authorization": ("Bearer " + token['access_token'])}
34 API_URL = "https://seta.jrc.ec.europa.eu/seta-search/api/v1/"
35 api_url=API_URL
36 print(api_url)
37 #print(token['access_token'])
38 r = session.get(api_url + "ontology-list", params=payload, headers=headers)
39
40 r.json()
41
executed in 2.18s, finished 17:35:03 2024-06-24
```

<https://seta.jrc.ec.europa.eu/seta-search/api/v1/>

```
Out[2]: {'nodes': [[['open source'],
   ['free software', 'open content'],
   ['open standards',
    'ict standards',
    'industry standards',
    'interoperable solutions',
    'ict solutions'],
   ['web services',
    'middleware',
    'web applications',
    'web service',
    'apis',
    'software applications',
    'ontologies',
    'software components',
    'grid middleware',
    'architectures',
    'application software'],
```

Definition of keywords

use case:
open source geospatial software

- Manual validation/**finalisation of keywords** for each group

OPEN SOURCE SOFTWARE	GEOSPATIAL	OPEN SOURCE GEOSPATIAL SOFTWARE
open source	geospatial	QGIS
open software	spatial data	Quantum GIS
open code	geodata	GRASS GIS
free software	earth observation data	GeoServer
open architecture	geographic data	MapServer
open system	geographical data	MapBender
open license	geographic information	deegree
openly licensed	geographical information	NASA World Wind
open technology	cartographic	OpenLayers
open platform	cartography	OSGeoLive
linux	geographic information system	Cesium
open source tool	geoinformation	GeoPandas
open content	geomatics	Rasterio
opensource	geoinformatics	Shapely
GitHub	gis	PySAL
GitLab	satellite data	Fiona
European Public License	satellite imagery	gvSIG
EUPL	remote sensing data	OpenJUMP
MIT license	remote sensing product	Qfield
GNU GPL	remotely sensed data	SAGA GIS
General Public License	remotely sensed product	uDig
AGPL	space data	GeoMoose
	space-based data	GeoNode
	in-situ data	GeoStyler
	web mapping	GeoExt
	webgis	deegree
	web map	GeoNetwork

Search using keywords

use case:
open source geospatial software

- Search the TED database for each group of keywords (separately)

		open source software	geospatial	open source geospatial software	
id	text	OPEN SOURCE SOFTWARE	OPEN SOURCE SOFTWARE-terms	OPEN SOURCE GEOSPATIAL SOFTWARE	OPEN SOURCE GEOSPATIAL SOFTWARE-terms
2022/S 02: BYDGOSZCZ		TRUE	linux	FALSE	
2021/S 08: Ferrol Inte		FALSE		FALSE	
2022/S 11: U.S.A. Jan		FALSE		FALSE	
2022/S 23: University		TRUE	linux	FALSE	
2022/S 19: U.S.A. Kra		FALSE		TRUE copernicus	
2022/S 04: U.S.A. Jan		FALSE		FALSE	
2022/S 09: District Sh		FALSE		TRUE copernicus	
2021/S 12: 3 May 35]		FALSE		TRUE copernicus	
2021/S 14: Ministry o		TRUE	open source	TRUE spatial data gis	PostGIS
2021/S 03: Copernicu		FALSE		TRUE copernicus	
2022/S 12: CAP HOLD		FALSE		TRUE gis	
2022/S 22: Regional D		FALSE		TRUE cartographic	
2021/S 24: Brandenbu		FALSE		TRUE geospatial	
2022/S 05: Ministry o		FALSE		FALSE	
2022/S 23: Independen		FALSE		FALSE	
2022/S 20: 2 Regiona		FALSE		TRUE cartographic	
2021/S 24: German A		FALSE		FALSE	
2022/S 06: Koleje Wie		FALSE		FALSE	
2022/S 11: European		FALSE		TRUE earth observation data	
2022/S 15: UNIVERSIT		FALSE		TRUE copernicus	
2021/S 01: Departme		FALSE		TRUE geoinformation	
2022/S 18: Maintenan		FALSE		FALSE	
2022/S 04: Technical		FALSE		FALSE	
2021/S 13: National C		FALSE		TRUE spatial data gis spatial	
2021/S 00: Radio eve		TRUE	open source	FALSE	
2021/S 00: Framework		TRUE	linux	FALSE	
2021/S 15: 2 Regional		FALSE		FALSE	

Combine search results

use case:
open source geospatial software

- Definition of **rules** to combine the groups of keywords in the TED search
 - (*open source software AND geospatial*) **OR** *open source geospatial software*

		open source software	geospatial	open source geospatial software	candidate classification	
id	text	OPEN SOURCE SOFTWARE	OPEN SOURCE SOFTWARE-terms	OPEN SOURCE GEOSPATIAL SOFTWARE	OPEN SOURCE GEOSPATIAL SOFTWARE-terms	Open source geospatial software
2022/S 02: BYDGOSZCZ		TRUE	linux	FALSE		FALSE
2021/S 08: Ferrol Inte		FALSE		FALSE		FALSE
2022/S 11: U.S.A. Jan		FALSE		FALSE		FALSE
2022/S 23: University		TRUE	linux	FALSE		FALSE
2022/S 19: U.S.A. Kra		FALSE		TRUE copernicus		FALSE
2022/S 04: U.S.A. Jan		FALSE		FALSE		FALSE
2022/S 09: District Sh		FALSE		TRUE copernicus		FALSE
2021/S 12: 3 May 35]		FALSE		TRUE copernicus		FALSE
2021/S 14: Ministry o		TRUE	open source	TRUE spatial data gis	TRUE PostGIS	TRUE
2021/S 03: Copernicu		FALSE		TRUE copernicus		FALSE
2022/S 12: CAP HOLD		FALSE		TRUE gis		FALSE
2022/S 22: Regional D		FALSE		TRUE cartographic		FALSE
2021/S 24: Brandenbu		FALSE		TRUE geospatial		FALSE
2022/S 05: Ministry o		FALSE		FALSE		FALSE
2022/S 23: Independen		FALSE		FALSE		FALSE
2022/S 20: 2 Regiona		FALSE		TRUE cartographic		FALSE
2021/S 24: German A		FALSE		FALSE		FALSE
2022/S 06: Koleje Wie		FALSE		FALSE		FALSE
2022/S 11: European		FALSE		TRUE earth observation data		FALSE
2022/S 15: UNIVERSIT		FALSE		TRUE copernicus		FALSE
2021/S 01: Departme		FALSE		TRUE geoinformation		FALSE
2022/S 18: Maintenan		FALSE		FALSE		FALSE
2022/S 04: Technical		FALSE		FALSE		FALSE
2021/S 13: National C		FALSE		TRUE spatial data gis spatial		FALSE
2021/S 00: Radio eve		TRUE	open source	FALSE		FALSE
2021/S 00: Framework		TRUE	linux	FALSE		FALSE
2021/S 15: 2 Regional		FALSE		FALSE		FALSE

Refine search with an LLM

use case:
open source geospatial software

- Using the **GPT@JRC** platform
 - JRC internal platform supporting research around Generative AI
 - Open AI's GPT models + several open/experimental models
 - API access based on a token
- LLM model: **Nous Hermes Mixtral**
 - **open source** under Apache 2.0
 - runs **on premise**
 - **good performance**
 - extended context length (up to **32k tokens**)

Refine search with an LLM

use case:
open source geospatial software

- Define a **question** for the classification, using temperature = 0.1
 - Does the content of the following text focus on using, or providing services based on GIS or geospatial open source software? What is the probability of a 'yes' answer?
 - example of a **TRUE** answer (P=0.8)

Austrian Institute for Transport Data Infrastructure | Klagenfurt am Wörthersee | Austrian Institute for Transport Data Infrastructure – ÖVDAT | New development of GIP 2.0 client software (Open Source Web application with webGIS based on a server API) for the collection and management of transport networks, including maintenance and support – GIP 2.0 | Quality criterion No 1 Structural aspects – | 15 % (15 points) x 0.7 | Quality criterion No 2 Organisational concept, project implementation plan and timetable | 20 % (20 points) x 0.7 | Quality criterion No 3 Technical concepts & GUI @-@ Design | 35 % (35 points) x 0.7 | Quality criterion No 4 Methodology, quality assurance & documentation | Quality criterion No 5 Presentation performance | Evolit Consulting GmbH | The framework agreement will be concluded for a period of four years, with the contracting authority reserving an optional extension of the validity of the framework agreement to another two years. | The reason for determining the duration of the framework agreement is that the cooperation with one partner takes at least three to four years in order to achieve the best possible outcome of the vote. The contracting authority therefore sees the opportunity to achieve such a result within a time frame of approximately six years. As stated in Directive 2014/24/EU, the provision of services does not have to take place during the period of validity of the framework agreement. | rather, entrustment on the basis of this framework agreement. In point V.2.4., the amount of the tender is indicated as "1". This was due to the fact that various price items were offered and valued and on the basis of which future demand for services could be made. For more information, see vergabe@terzaki.at.

- example of a **FALSE** answer (P=0.1 – *The text provided does not focus on using or providing services based on open source software. It discusses a project management contract, competition results, and maintenance and remitting site for the Nice Lingostiere railway line.*)

7/9 Boulevard de Dunkerque | Urban railway, tramway, trolleybus or bus services | restricted competition for project management – Provence railway – Nice Lingostiere maintenance and milling site | contract for project management awarded by restricted competition – Development of the Provence railway line from Nice to Plan du Var | Maintenance and remitting site (SMR) of nice lingostiere | on the NICE Lingostiere line | project management contract | quality of the technical and architectural response to the programme assessed | accounting with financial envelope | contract awarded following a selection procedure following a restricted contest procedure. Competition Results Notice No 22-141358 | restricted project management competition – Provence railway Site for Maintenance and Removal of Nice Lingostiere | BLP la Associés – in ssitu Benaim – nivaggioni architectes- ingerop la Engineering – GEOS Engineers | Hangar G2-1 Armand Lalande quay | BLP and Associates | Marseille Administrative Court | 22, 24 rue de Breteuil | inter-regional Advisory Committee for Settlement of Disputes | place Felix Baret – CS 80001

Refine search with an LLM

use case:
open source geospatial software

- Define a **question** for the classification, using temperature = 0.1
 - *Does the content of the following text focus on using, or providing services based on GIS or geospatial open source software? What is the probability of a 'yes' answer?*
- Add some additional **context**
 - *Open source software is software developed and maintained through open collaboration. Its source code is made available for anyone to use, examine, modify, improve and redistribute however they like, typically at no cost. A non-exhaustive list of the most popular open source licenses includes the Apache License, the MIT License, the GNU General Public License (GPL), the BSD Licenses, the GNU Lesser General Public License (LGPL) and the Mozilla Public License (MPL). Geospatial open source software is open source software enabling the acquisition, visualisation, storage, analysis, processing and management of geospatial data. Geospatial open source software typically implements standards for geospatial data management such as encoding or sharing.*

Refine search with an LLM

use case:
open source geospatial software

- Add some additional **context**

- example of a **TRUE** answer ($P=0.8$) than becomes a **FALSE** answer ($P=0.1$ – *The text does not explicitly mention GIS or geospatial open source software.*)

Axencia para a Modernización Tecnolóxica de Galicia – Xunta de Galicia | C/Monte Gaiás, s/n, CINC building | Santiago de Compostela | AMT-2021-0004: advanced technology coordination service to monitor and promote free software in Galicia | The provision of the strategic advisory service to support the design, monitoring and promotion of free software in Galicia. | Generally speaking, this service covers both the coordination of the various actions and the various actors that make up the Galician free software ecosystem in order to define the Xunta's strategy for free software in the medium and long term. | Proposal for the provision of the service | Organisation and management of the project | Improvements in the dedication of work team profiles | Innovation, Cooperation, Cartography and Territory (Icarto), S.L. | C/Monte Gaiás, s/n, CINC building, 2º Andar | Procurement Department – Amtega | C/Monte Gaiás, s/n | Special appeal in the field of procurement. | Amtega Procurement Department

- example of a **TRUE** answer ($P=0.8$) than becomes a **FALSE** answer ($P=0.1$ – *The text focuses on a procurement process for external support services for the PEGELOWLINE technical procedure, not on using or providing services based on GIS or geospatial open source software.*)

Federal Information Technology Centre (ITZBund) | Bernkasteler Strasse 8 | Work Strand Z 42 – Formal procurement procedures | It service provider, federally non-legally authorised institution of public law (Bundesanstalt) within the remit of the Federal Ministry of Finance, Federal Upper Authority | External support for the PEGELOWLINE technical procedure | The objective of the invitation to tender is to procure external support services for the PEGELOWLINE technical procedure. These support services are to be provided by suitably qualified staff. | Details can be found in the tender specifications (attached). | A framework agreement is concluded with a company. The framework agreement will be concluded for a period of 4 years and the specific deliverables will be defined by means of individual calls. | 52° North Initiative for Geospatial Open Source Software GmbH | Federal Public Procurement Chamber | Villemomblé Straße 76

Refine search with an LLM

use case:
open source geospatial software

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- With context, the outputs show a 21% decrease.

Results



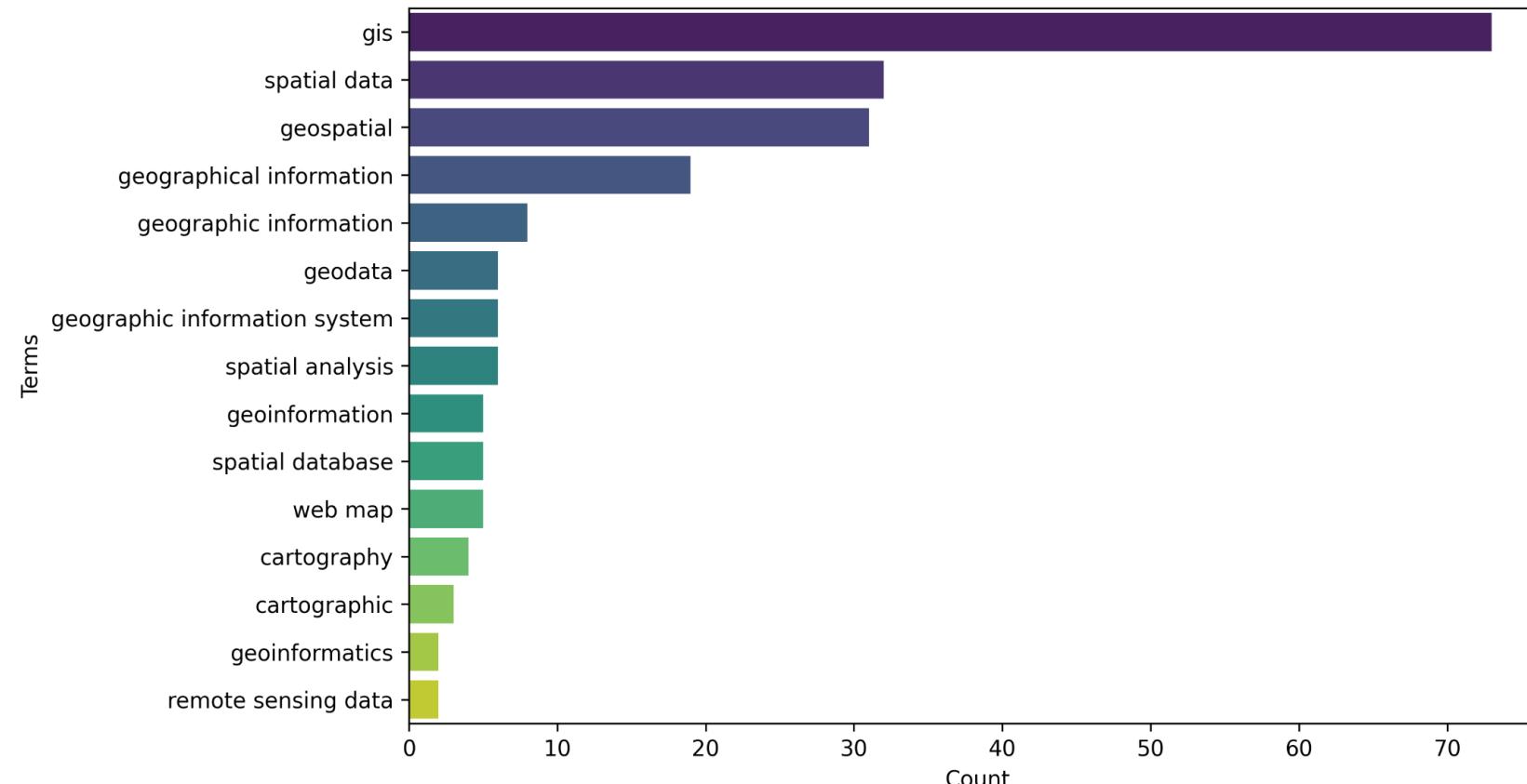
Results – Overall

- TED database for two years
 - **2021**: 249,555 records
 - **2022**: 275,394 records
- Relevant records found

TOPIC	Keyword search	LLM		LLM with context	
open source software	1347	194	-86%	182	-6%
open source geospatial software	110	24	-78%	19	-21%
proprietary geospatial software	299	133	-56%	201	+51%
open standards	1372	85	-94%	30	-65%
open geospatial standards	197	18	-91%	7	-61%
open data	461	106	-77%	91	-14%
open geospatial data	24	13	-46%	8	-38%

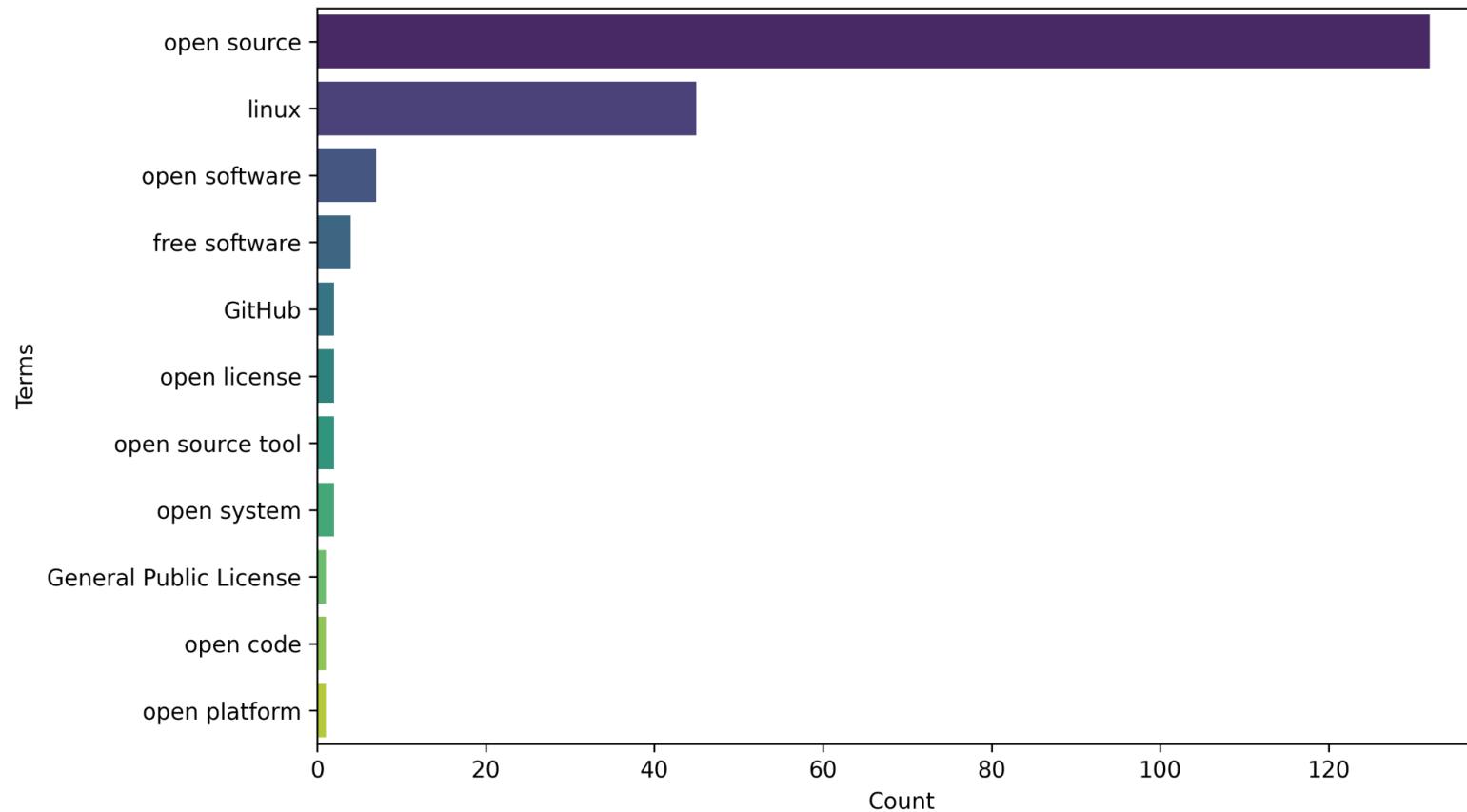
Results – Keywords

- Keywords found in TED records after using the LLM with context
 - geospatial



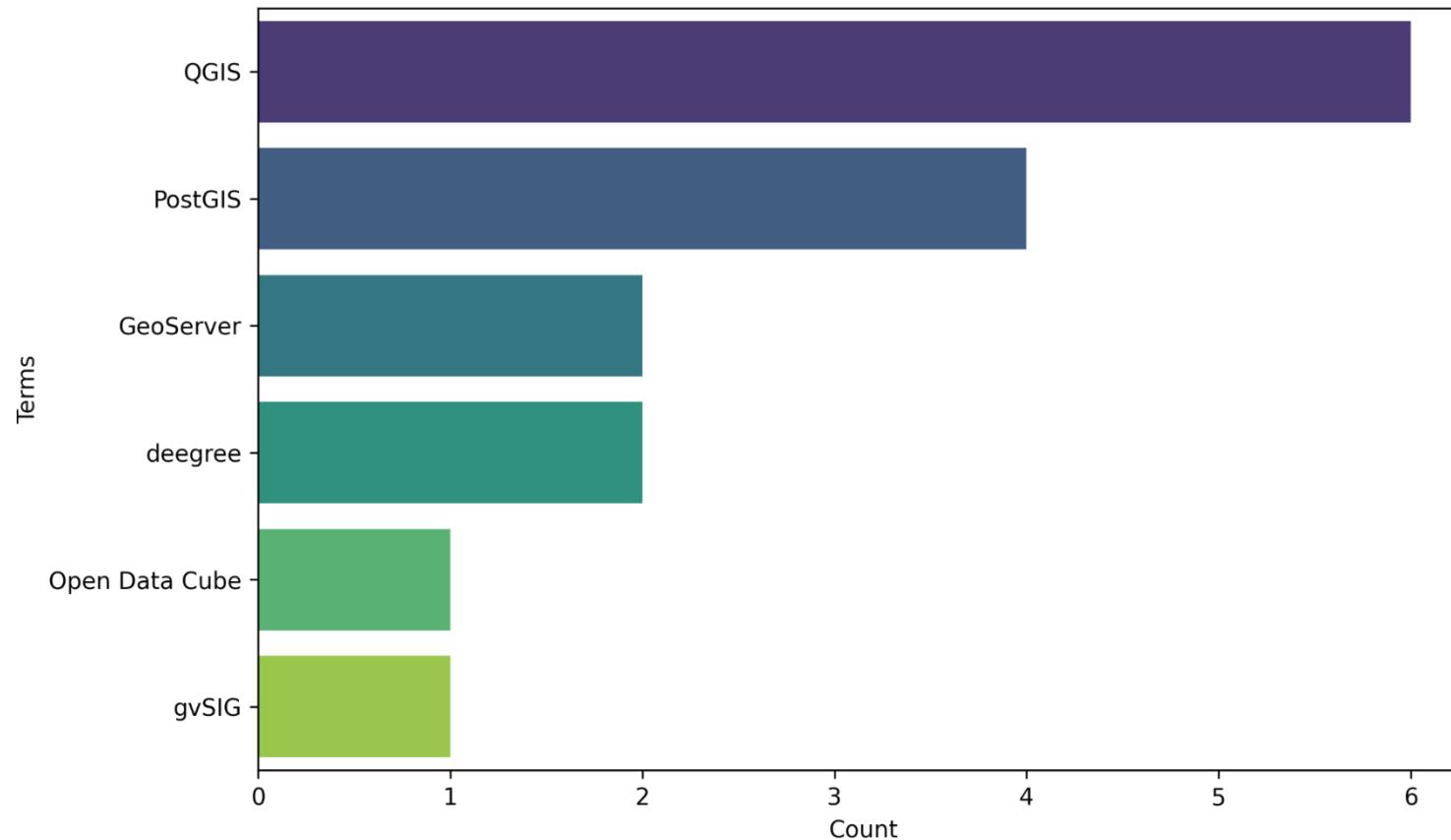
Results – Keywords

- Keywords found in TED records after using the LLM with context
 - **open source software**



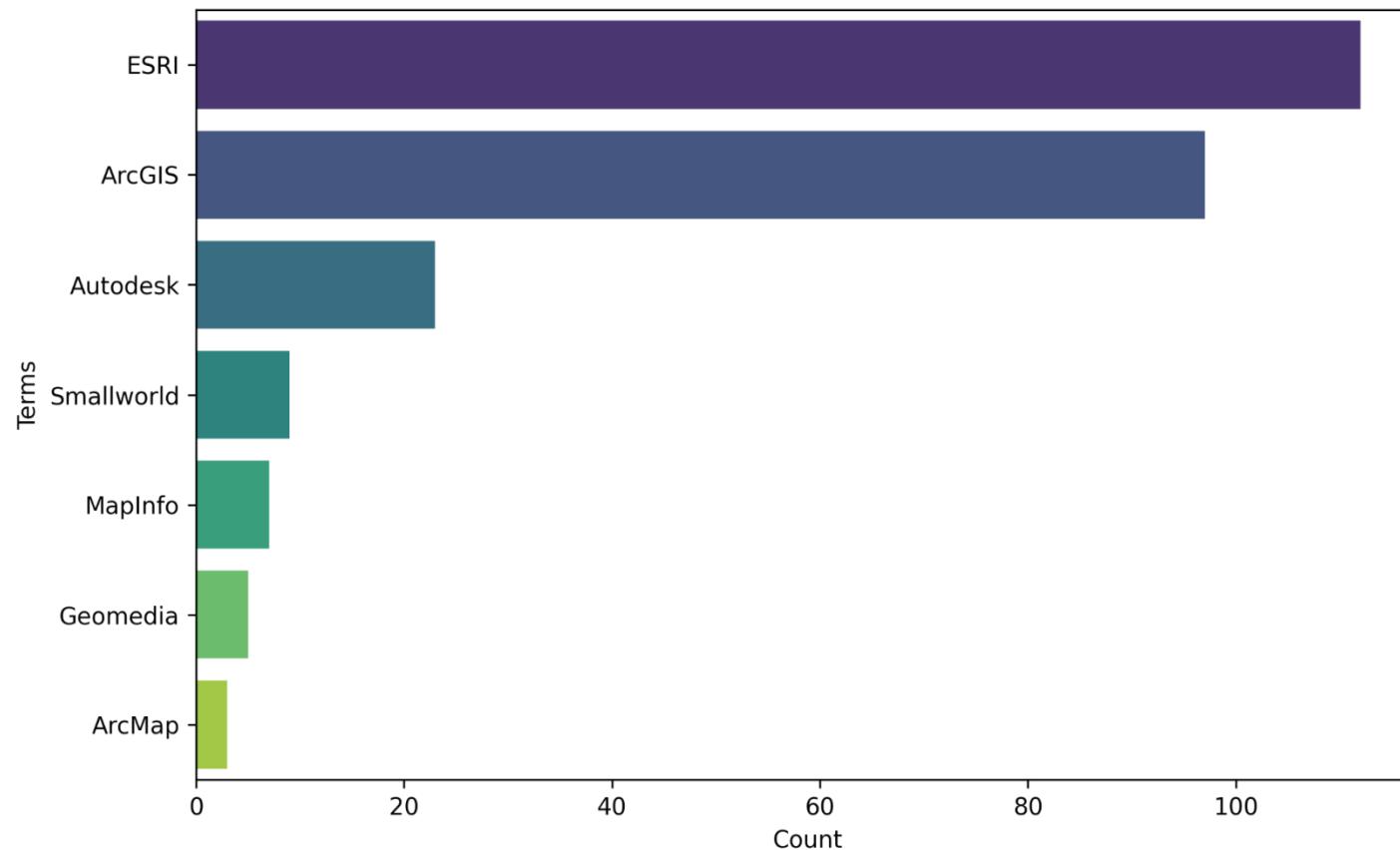
Results – Keywords

- Keywords found in TED records after using the LLM with context
 - **open source geospatial software**



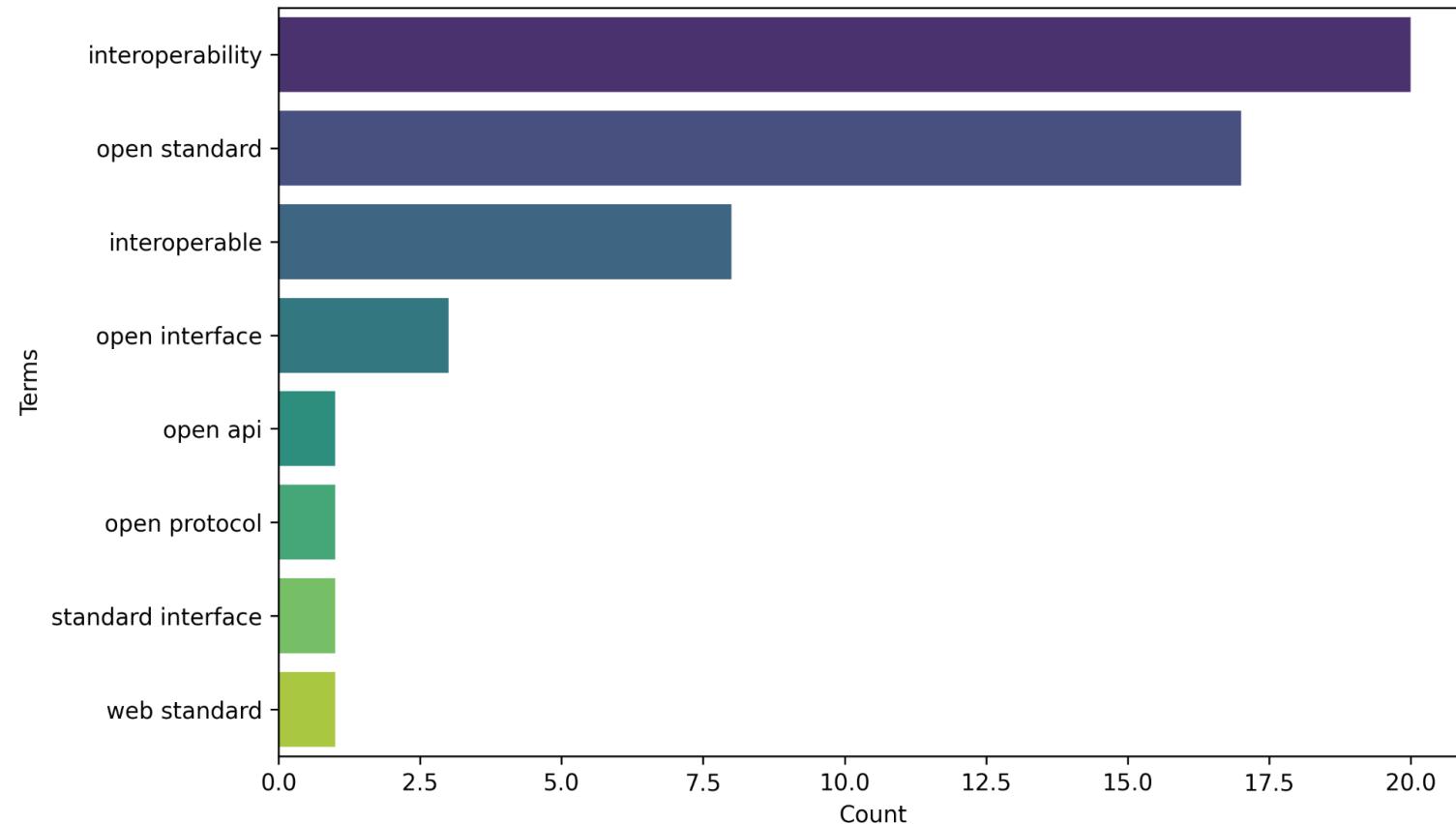
Results – Keywords

- Keywords found in TED records after using the LLM with context
 - **proprietary geospatial software**



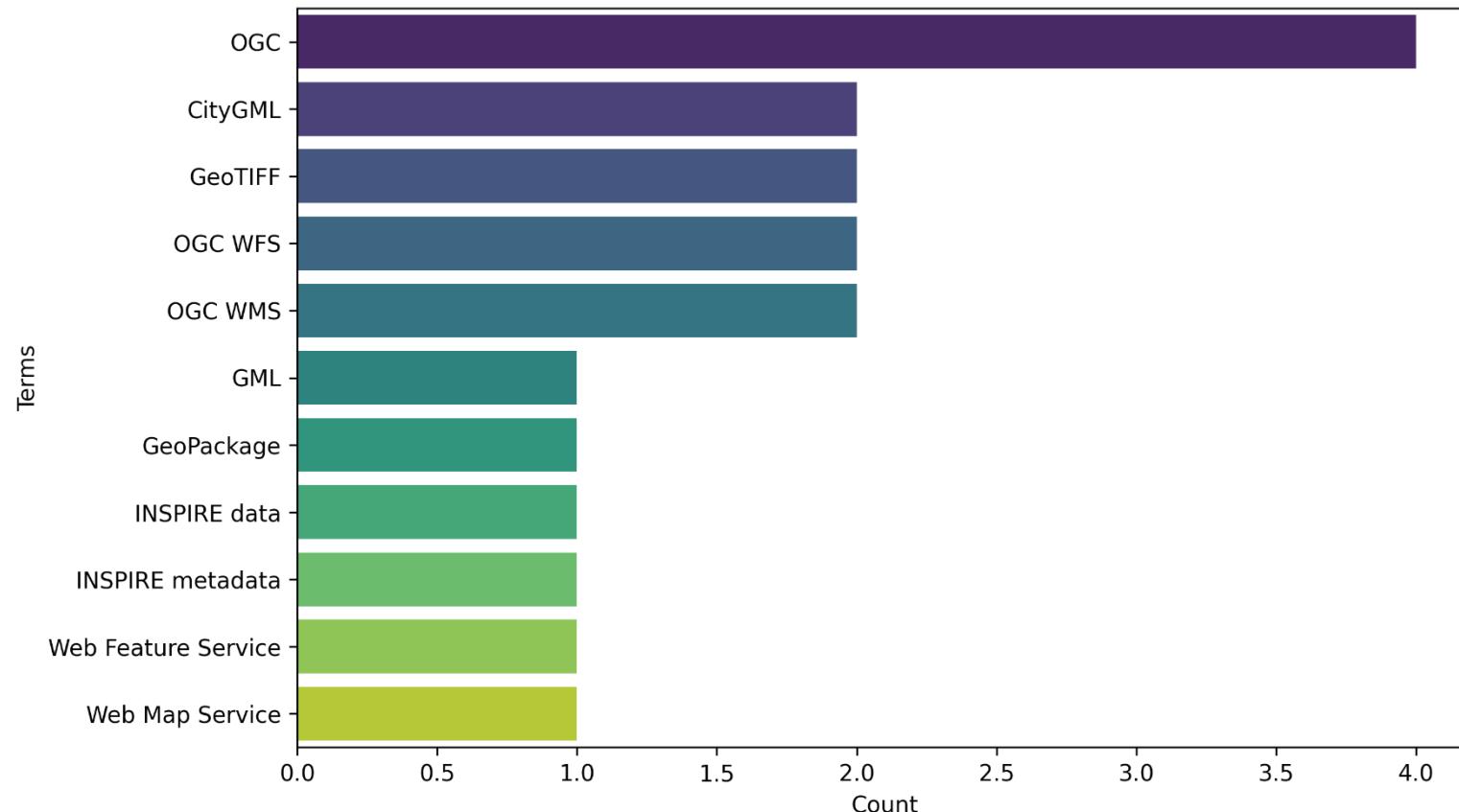
Results – Keywords

- Keywords found in TED records after using the LLM with context
 - open standards



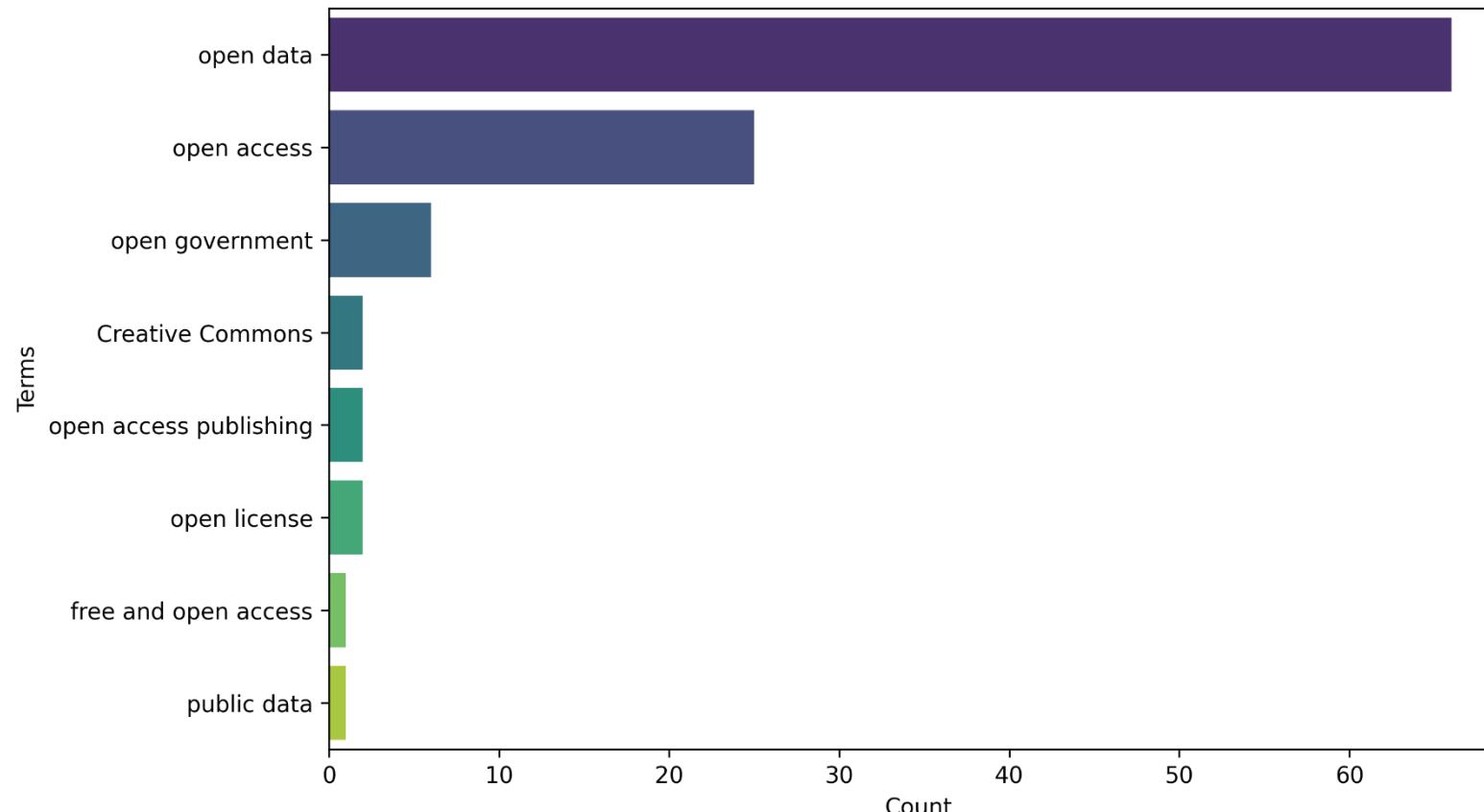
Results – Keywords

- Keywords found in TED records after using the LLM with context
 - **open geospatial standards**



Results – Keywords

- Keywords found in TED records after using the LLM with context
 - open data



Results – Keywords

- Keywords found in TED records after using the LLM with context
 - **open geospatial data** did not return significant results due to the low number of keywords

Conclusions



Conclusions

- Content-wise
 - TED records on *open geospatial* are **present**, though **limited**
 - **evolution over time** would be interesting to study
 - proprietary geospatial software is more present than open source geospatial software
 - proprietary software may be more popular than open source in the public sector
 - some procurements explicitly address the purchase of licenses
 - software type is not specified in the notice, and open source software may be eventually used

Conclusions

- Methodology
 - useful to capture the main **trends & patterns** in EU procurements
 - can be **reused**
 - to analyse **other topics**
 - to analyse **other databases**
 - LLMs are excellent tools to **automatically classify** large databases, but their 'behaviour' is yet to be **fully understood**
 - issues
 - **hallucinations** & **sensitivity** to the question/context
 - minimal changes in the question/context may change the answer
 - adding context changes the answer from **FALSE** to **TRUE** for proprietary geospatial software, for procurements focused on purchasing licenses

Conclusions

- Example of an incorrectly classified record (use case: open geospatial data)
 - **question:** *Does the content of the following text focus on the sharing or use of open geospatial data? What is the probability of a 'yes' answer?*
 - **answer:** **FALSE** ($P = 0.1$ – *The text does not focus on the sharing or use of open geospatial data. It mainly discusses the maintenance and services related to DORA server and ICS core systems, with a brief mention of using open-source map data (OpenStreetMap) in one section.*)

The Federal Motorway GmbH | Bird & Bird LLP | The motorway of the Bundes GmbH | Planning, construction, operation, maintenance, asset management and financing of motorways and other federal trunk roads in accordance with Sections 1(1) and 5(1) of the InfrGG | DORA server services (lot 1) and software implementation and operation, support, maintenance and maintenance of the ICS core (lot 2) | Lot 1: DORA Server Services for the maintenance of efficient control measures and C2X messages: The contractor's task is to monitor the technical and content of the DORA system. To this end, measures must be taken to maintain the operational readiness and quality assurance of the DORA notifications. | Lot 2: Software implementations and operation, support, maintenance and maintenance of the ICS core: In order to update and maintain the central-sided software of the C-ITS Corridor System, the so-called ICS core, in order to ensure end-to-end functionality in the ITS Vehicle Station (ITS Vehicle Station), IRS, ICS, GUI (Graphic User Interface) and MDM (Mobility Data Marketplace), services related to the updating of software and hardware and the operation, maintenance and maintenance of the ICS core shall be provided. | Lot 1 – DORA Server Services for maintaining efficient control measures and C2X messages | Germany's headquarters in Frankfurt/Main | The contractor's task is to monitor the technical and content of the DORA system. For this purpose, all the measures described below to maintain the Operational readiness and quality assurance of DORA messages: | Work package 1: Mobile shut-off panels of the Motorway GmbH: | Integration of mobile shut-off panels/BASA (safeguard trailers assembly) into DORA; | 1.1.1. Include BASA put into service in DORA; | 1.1.2. Checking the functional status of newly delivered/assembled BASAs; | Removal of BASA from DORA; | Work package 2: Mobile shut-off board of outside companies/third parties: | Integration/extraction of foreign-owned mobile shut-off panels or BASA in/out of DORA; | 2.1.1. Include BASA put into service in DORA; | 2.1.2. Check the message receipt; | 2.1.3. Decommissioned BASA from the DORA server; | Work package 3: DORA server administration: | Managing user accounts; | DATEX II Interface; | Support and maintenance; | 3.4.2. Response/restoration times (Service Desk); | 3.4.3. Map updates and exclusion geometry [Optional]; | Work package 4: Server hosting; | Work package 5: Remuneration by effort – unpredictable operating services; | Experience with Service Desk 8/5 | Concept on interference processes | The service component "Chart update and exclusion geometry [Optional]" referred to in point 3.4.3. of the tender specifications for Lot 1 is an optional service: | The Contractor shall, at the request of the Contracting Authority, carry out an update of the DORA-GUI map base and incorporate the mandant-specific map data into the server systems of the individual clients. It is necessary to use licence-free map data (preferably OpenStreetMap (OSM)). The contractor shall monitor, adapt and restore the exclusion geometries (on the basis of operating kilometres) following a map update on the existing DORA-GUI. This includes any changes to the map data necessary for the operation of the system (Mapmatching or Routing) and, where applicable, any changes. Site GUI adaptations and connection to the DORA server. The commissioning of a client card is carried out by the contracting authority. The use of the optional power element is required, for example, when new motorway sections are in operation or if there are major changes in the path when existing motorway sections are upgraded, so that the coordinates can no longer be assigned. | Lot 2: Software implementations and operation, support, maintenance and maintenance of the ICS core | The place of performance of the contractor's services is the Department of Traffic Management/Verkehrszentrale Deutschland in Frankfurt am Main and branches of the Federal Motorway GmbH. | The organisational, technical, functional and operational conditions laid down must be taken into account. The ICS core complies with ETSI technical standards. In order to continue to achieve an end-to-end functionality of the overall C-ITS corridor system for operation at the Transport Centre Germany in Hessen in Hessen and other clients (e.g. other traffic centres), and also to comply with standard changes, maintenance and maintenance services at the ICS core and its bodies and subsequent implementation services must be carried out. In order to provide the necessary services, the contracting authority shall provide the contractor with access to maintenance. The Contractor undertakes to participate in any necessary consultation, with the Contracting Authority and with

Conclusions

- Example of an incorrectly classified record (use case: open geospatial data)
 - **question:** *Does the content of the following text focus on the sharing or use of open geospatial data? What is the probability of a 'yes' answer?*
 - **answer:** **FALSE** ($P = 0.1$ – *The text does not focus on the sharing or use of open geospatial data. It mainly discusses the maintenance and services related to DORA server and ICS core systems, with a brief mention of using open-source map data (OpenStreetMap) in one section.*)
 - the **answer** becomes **TRUE** if the question is changed as follows:
 - *Does the content of the following text focus, **even partially**, on the sharing or use of open geospatial data? OR*
 - *Does the content of the following text **mention** the sharing or use of open geospatial data? What is the probability?*

Conclusions

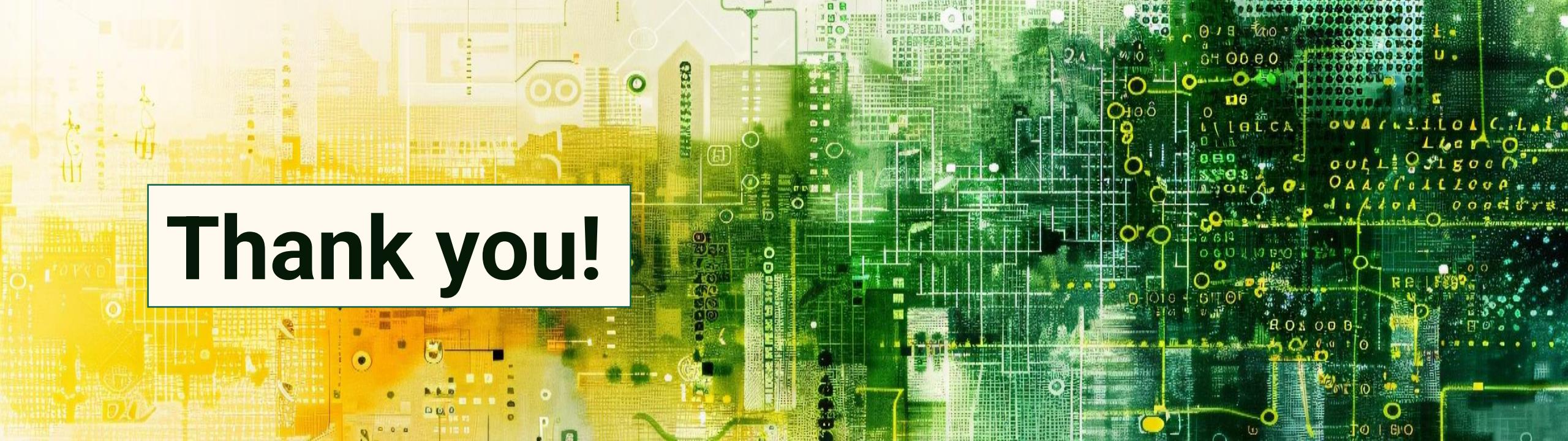
- Example of a record for the use case *proprietary geospatial software* classified as **FALSE** and then as **TRUE** after adding the context
 - **question:** *Does the content of the following text focus on using, or providing services based on GIS or geospatial proprietary software? What is the probability of a 'yes' answer?*

AJUNTAMENT DE VILADECANS | C/SITGES 6 2n | Cristina Muriel Esteban | Maintenance and updating of various hardware and software of the Viladecans City Council's Technology Systems. | ESG/Contractació/2021/41-28/2021/CSERV | Maintenance and updating of various hardware and software of the Viladecans City Council's Technology Systems. | LOT 1. LICENCES AUTODESK: AUTODESK Licence Maintenance and Update Service. | Viladecans (08840). Barcelona | AUTODESK Licence Maintenance and Update Service. | LOT 2. TELEFONIA IP CISCO: CISCO Unified Communications Management and Maintenance Service. | Viladecans (08840) Barcelona. | CISCO Unified Communications Management and Maintenance Service. | LOT 3. SAIS SALICR-: SAIS (Uninterruptible Power Systems) maintenance service | SAIS (Uninterruptible Power Systems) maintenance service | LOT 4. SAIS GEDE-IMV: SAIS maintenance service (Uninterruptible Power Systems) GEDE-IMV MARCA. | SAIS maintenance service (Uninterruptible Power Systems) GEDE-IMV MARCA. | LOT 5. SAIS SOCOME: SAIS maintenance service (Uninterruptible Power Systems) SOCOME MARCA. | SAIS maintenance service (Uninterruptible Power Systems) SOCOME MARCA. | LOT 6. SYSTEMS: Maintenance and updating of licences for various IT systems. | Maintenance and updating of licences for various IT systems. | LOT 7. MANAGE ENGINE: Maintenance and updating of MANAGE ENGINE licences | Maintenance and updating of MANAGE ENGINE licences | LOT 8. ORACLE: Service for maintenance and updating of ORACLE licences. | Maintenance and updating of ORACLE licences. | LOT 9. TRENDMICRO ANTIVIRUS: Maintenance and updating of Antivirus Trend Micro licences | Viladecans (08840) Barcelona. | Maintenance and updating of Antivirus Trend Micro licences | LOT 10. PURE STORAGE BOOTHS: Disco Pure Storage Cabins Maintenance and Update Service | Disco Pure Storage Cabins Maintenance and Update Service | LOT 11. ADOBE: Adobe Licence Maintenance and Update Service | ESG/Contractació/2021/41-28/2021/CSERV | SEMICONDUCTORS AND SYSTEMS, HS | Carrer Pere IV, No. 78-82, 2ND 2TH | IMPALA NETWORK SOLUTIONS, SL | Carrer Maresme, No. 119-121 | Av. de la Serra, No. 100 | Santa Maria de Palautordera | ASEAN BROWN BOVERI, SA | San Romualdo, No. 13 | SOCOME IBERICA, SAU | Av. del Guix, No. 31 (POL. IND. Les Guixeres) | OMEGA PERIPHERALS, SL | Trav. de les Corts, No. 55, 1º | AMBIT – BUILDING SOLUTIONS TOGETHER, SA | C. Rosselló i porcel, No. 21, 8ST | ISDS TREND, SL | Pg. de la Castellana, No. 177, 1ST | CRAYON SOFTWARE EXPERTS SPAIN, SL | Pg. de Recoletos, No. 37-41, 1º | Tribunal Català de Contractes del Sector Públic | C. of FOC, 57 | 15 working days, counted according to the contested act. | Municipality of Viladecans | C. Sitges, 6

- **answer (without context): FALSE** ($P = 0.1$ – *The text provided does not focus on using or providing services based on GIS or geospatial proprietary software. It mainly discusses maintenance and updating services for various hardware and software, including Autodesk, Cisco, SAIS, MANAGE ENGINE, ORACLE, Trend Micro, Pure Storage, Adobe, and others. However, there is no mention of GIS or geospatial software in the text.*)

Conclusions

- Example of a record for the use case *proprietary geospatial software* classified (correctly) as **FALSE** and then (wrongly) as **TRUE** after adding the context
 - **question:** *Does the content of the following text focus on using, or providing services based on GIS or geospatial proprietary software? What is the probability of a 'yes' answer?*
 - **context:** *Proprietary software is software that grants its creator, publisher, or other rightsholder or rightsholder partner a legal monopoly by modern copyright and intellectual property law to exclude the recipient from freely sharing the software or modifying it, and in some cases from making use of the software on their own, thereby restricting their freedoms. Proprietary geospatial software is proprietary software enabling the acquisition, visualisation, storage, analysis, processing and management of geospatial data. Proprietary geospatial software typically implements standards for geospatial data management such as encoding or sharing.*
 - **answer (with context):** **TRUE** ($P = 0.9$ – *The text focuses on providing services based on proprietary software, specifically mentioning licenses and maintenance services for various software, including Autodesk, Cisco, Adobe, Oracle, and Trend Micro. The text also includes information about the maintenance and updating of IT systems and hardware, which may involve geospatial proprietary software.*)



Thank you!

 marco.minghini@ec.europa.eu
 @MarcoMinghini



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