Deliverable 4.3

Final Version of the Pilot Tool

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1. Document History

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1.0	03/04/2023	Hristo Konstantinov	APIS	First draft
1.1	07/04/2023	Dilyana Bozhanova, Lilia Kachoreva	APIS	Review and minor revisions
1.2	10/04/2023	Hristo Konstantinov	APIS	Final draft
2.0	10/04/2023	Galileo Sartor	UNITO	Input related to network analysis
3.0	12/04/2023	Federico Galli, Giovanni Sartor	UNIBO	Final version

2. Contributors

Partner	Name	Role	Contribution
APIS	Hristo Hristov, Daniel Traykov, Vasil Oreshenski, Julian Lazarov	WP leader	Development of the final version of the pilot tool
UNIBO (DiSi)	Paolo Torroni, Elena Palmieri, Giulia Grundler, Andrea Galassi	WP Participant	Development of models for automated argument extraction and outcome prediction
UNITO	Galileo Sartor, Luigi Di Caro	WP Participant	Network and citation analysis
UNIBO (Cirsfid)	Piera Santin, Federico Galli, Alessia Fidelangeli, Giuseppe Contissa	WP Participant	Network and citation analysis; Corpus annotation

Disclaimer: On behalf of APIS EUROPA, the present deliverable has been drafted by Hristo Konstantinov, Dilyana Bozhanova and Lilia Kachoreva.

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6. List of Acronyms

APIS	Apis Europa, beneficiary in ADELE project
CJEU	Court of Justice of the European Union
EU	European Union
LIBRe	LIBRe Foundation, beneficiary in ADELE project
NER	Named Entity Recognition
TM&P	Trademark and patents
UNIBO	University of Bologna, coordinator of ADELE project
VAT	Value Added Tax
WP	Work package

7. Introduction

This deliverable represents the final version of the ADELE pilot tool, which was implemented as a web application freely accessible at https://adele-tool.eu. The basic features of the platform were already described in detail in Deliverable 4.2 (Demo version of the Pilot tool). Therefore, the focus of the present documents is on the developments in terms of content and functionalities updates and improvements after the launch of ADELE demonstrator.

Section 8 briefly describes the legal content of the tool with emphasis on its enrichment in comparison with the demo version. Section 9 presents the newly implemented or improved functionalities.

8. Published Legal Content

1) Legislation

In the period between the demo version and the final version of ADELE pilot tool, there were no significant changes in the legislation at both the national and EU level. The platform provides access to the main instruments of EU law and the national legislations of Italy and Bulgaria in the chosen legal domains – VAT and Trademarks and patents. Besides the consolidated texts of the acts currently in force, the tool's database includes a number of repealed legislative instruments that are often cited in judicial decisions. One of the novelties in the final version of the tool is the addition of the historic point-in-time versions of EU legislative instruments.

Table 8-1 below provides information about the number of legislative instruments included in the final version of the ADELE pilot tool per legal domain and jurisdiction. Clicking the links in the table will open a list of documents in the pilot tool for the respective legal domain and jurisdiction.

	Value Added Tax	Trademark and patents
European Union	25	20
Bulgaria	16	10
Italy	9	8

Table 8-1. Number of legislative instruments included in the demo version of ADELE pilot tool

2) Case Law

The final version of ADELE pilot tool contains all 855 annotated and anonymised decisions of Italian and Bulgarian courts delivered with Deliverable 2.3 (Final annotated corpus) as well as 336 non-annotated decisions of the CJEU in the chosen legal domains, i.e. VAT and TM&P. The afterwards anonymised and annotated with tags for argument mining 21 decisions of Italian courts were also added to the platform's database. The case summaries published on the EUR-Lex portal have been added to the decisions of the CJEU.

Table 8-2 below summarises the number of decisions included in the final version of ADELE pilot tool per legal domain and jurisdiction. Clicking the links in the table will open a list of documents in the pilot tool for the respective legal domain and jurisdiction.

	Value Added Tax	Trademark and patents
Court of Justice of the EU	309	27
Bulgarian courts	260	260
Italian courts	235	121[1]

Table 8-2. Number of court decisions included in the final version of ADELE pilot tool

In addition, 236 non-annotated anonymised decisions of Bulgarian courts in the area of VAT and 44 in the area of Trademark and patents were added to the platform.

[1] To ensure consistency of displayed information, the remaining TP Italian decisions, which only included annotation of structural elements, have not been included in the ADELE platform but have been included in the training set of the machine learning models.

9. Newly Implemented or Improved Functionalities

1) Ontology Framework

The ADELE multilingual ontology framework was elaborated as part of WP2 activities by the WP leader UNILU with the support of legal experts of the coordinator UNIBO and the partners APIS and LIBRe. It includes two domain-specific ontologies providing conceptual maps in the legal areas covered by the project, i.e. VAT and Trademarks and patents. The ontology framework will be described in detail in Deliverable 2.4 (Ontology framework + user guide). Thus, we will introduce here only its visual representation in ADELE pilot tool.

The tool provides two alternative ways for the visualisation of ontology concepts to choose from: (1) interactive network (graph) layout and (2) hierarchical tree view. The advantage of graph visualisation is that the user can proactively explore a map of interconnected concepts and their relationships. It combines the high-level overview of the ontology scheme with the zoom-in option to perceive a granular view of specific concepts.

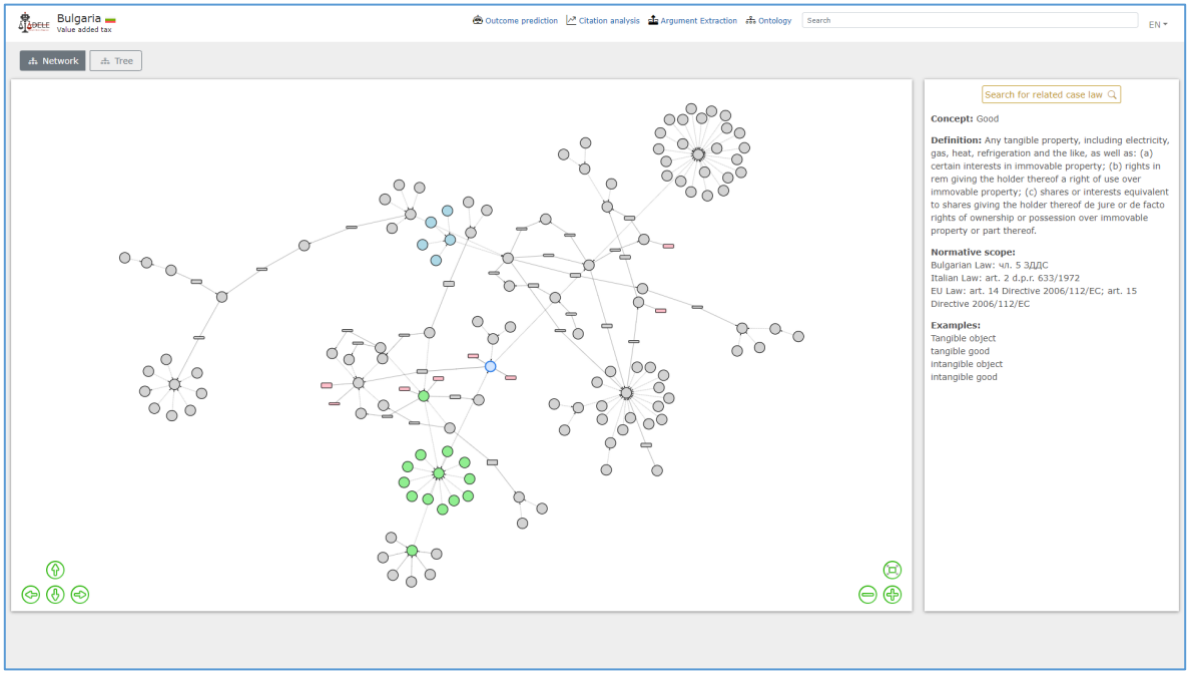

Figure 9-1. Network (graph-view) representation of ADELE VAT ontology

On the other hand, the ontology representation as a hierarchical tree offers a more simplified and understandable visualisation of the parent-child relationship between concept classes and sub-classes. Both visualisation methods allow the user to select a concept and explore its definition, legislative scope, usage examples and synonyms.

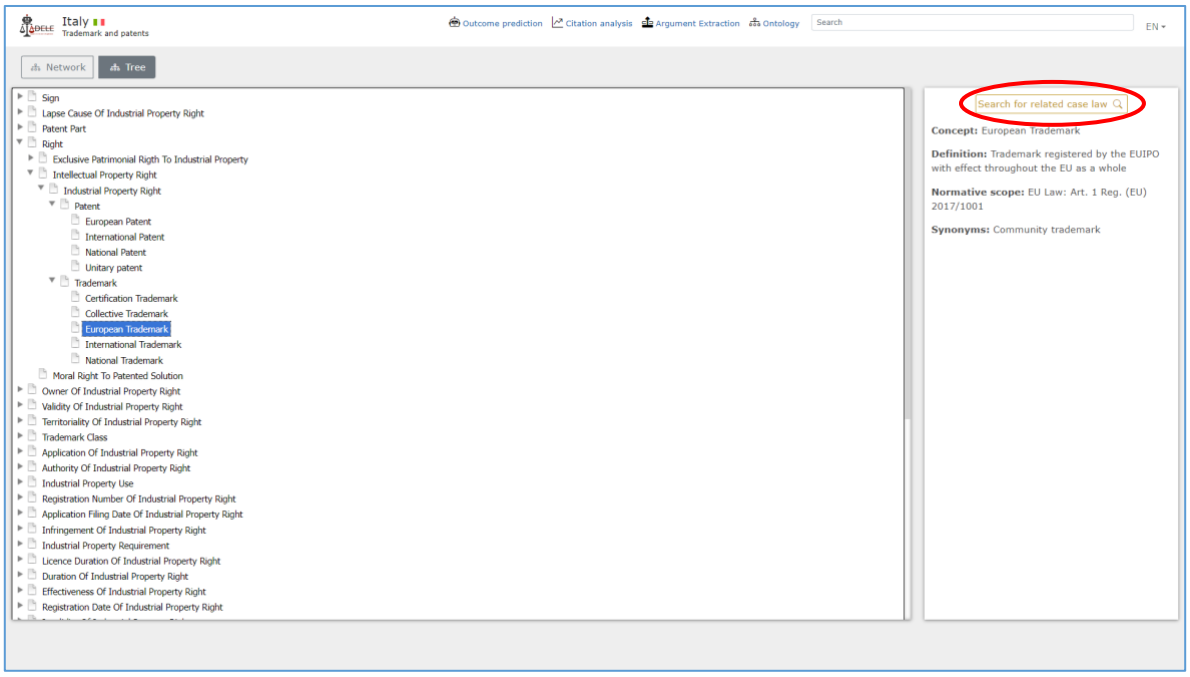

Figure 9-2. Tree-view representation of ADELE TM&P ontology

In addition, by pressing the "Search for related case law" button, the user can receive a list of court decisions containing the selected concept and/or citing a legal provision where this concept is defined. This feature is based on the applied NER techniques for mapping the ontology concepts and their legislative definitions with the judicial texts.

2) Searching Similar Cases

This functionality allows the user to get a list of court decisions dealing with legal issues similar to those discussed in the currently open judicial decision. The function is called by pressing a button above the text of an open document.

The algorithm for searching similar cases combines network and citation analysis with the cosineSimilarity function of the Elasticsearch engine integrated into the platform. Firstly, it identifies decisions citing the same combination of two or more provisions of EU and/or national legislation.

Then it performs a text similarity search to select and rank cases which are most similar to the decision opened by the user.

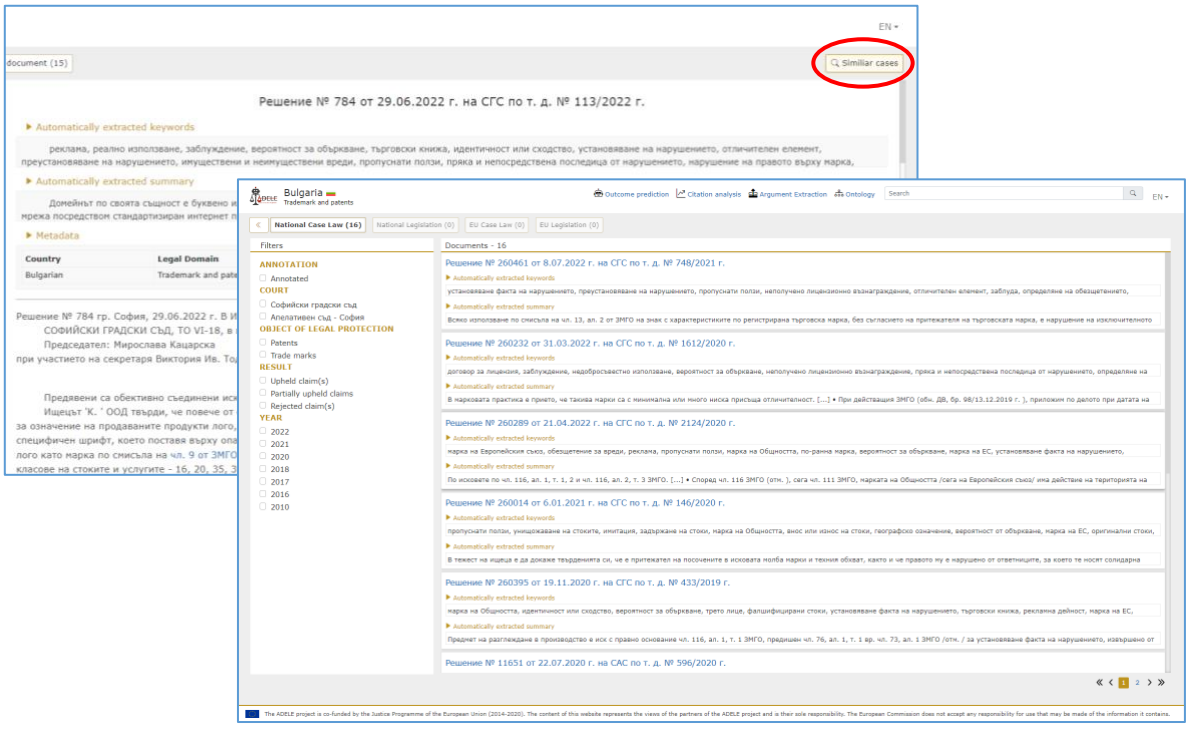

Figure 9-3. Example for using the outcome prediction functionality: input and output

3) Outcome Prediction

The “Outcome prediction” functionality was implemented in the demo version of ADELE pilot tool as a mock-up only. In the final version of the platform, it is already fully operational for texts in Italian and Bulgarian in both legal domains covered by the project, i.e. VAT and TM&P. The related machine learning models are document in Deliverable 3.2 (Machine learning models).

The goal of this functionality is to provide a prediction of the outcome (in terms of uphold or reject) related to a particular request of a party, possibly supported by claims and arguments. To use it, users have to click on the “Outcome prediction” button on the top of the screen. In the appeared “Outcome prediction” form, they have to type or copy-paste the request of a party to a particular legal case and possibly one or more claims supporting this request in the respective text boxes. In

addition, each claim may be supported by one or more arguments. Users can add/remove multiple claims and arguments to these claims by using the “Add claim/argument” and “Remove claim/argument” buttons. After they have filled out the form and clicked the "Predict" button, the platform provides the outcome prediction in a message box, as illustrated in the following figure:

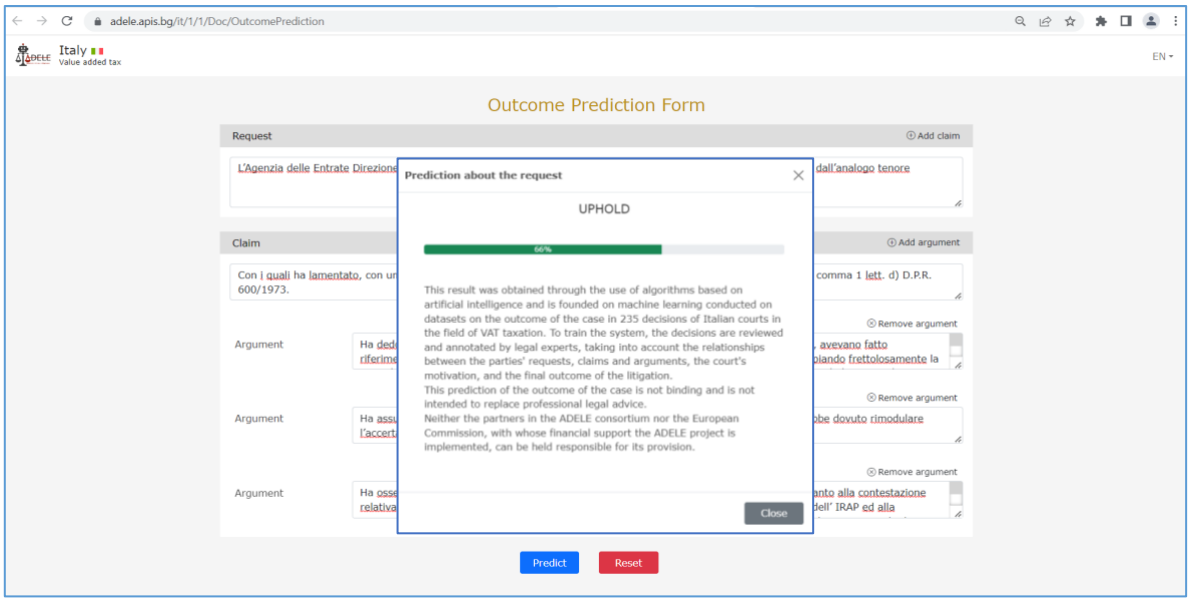

Figure 9-4. Example of using the outcome prediction functionality: input and output

4) Automated Argument Extraction

This functionality makes it possible for users to copy-paste in a specially designed form the text of a judicial decision and ask the tool to automatically identify, highlight and classify judicial arguments. In response, the machine learning model, developed within the framework of WP3 activities and documented in Deliverable 3.2 (Machine learning models), identifies and extracts the sentences that represent judicial arguments and classifies them as premise or conclusion. Then, all premises are classified by type (legal and/or factual) and argumentative scheme (argument from rule, argument from precedent, authoritative argument). The latter allows the user to find and explore similar arguments based on their classification scheme.

In ADELE pilot tool, the representation of the automated argument extraction functionality uses the same visualisation of argument classification and highlighting as already implemented for presenting the manual expert annotations of judicial decisions.

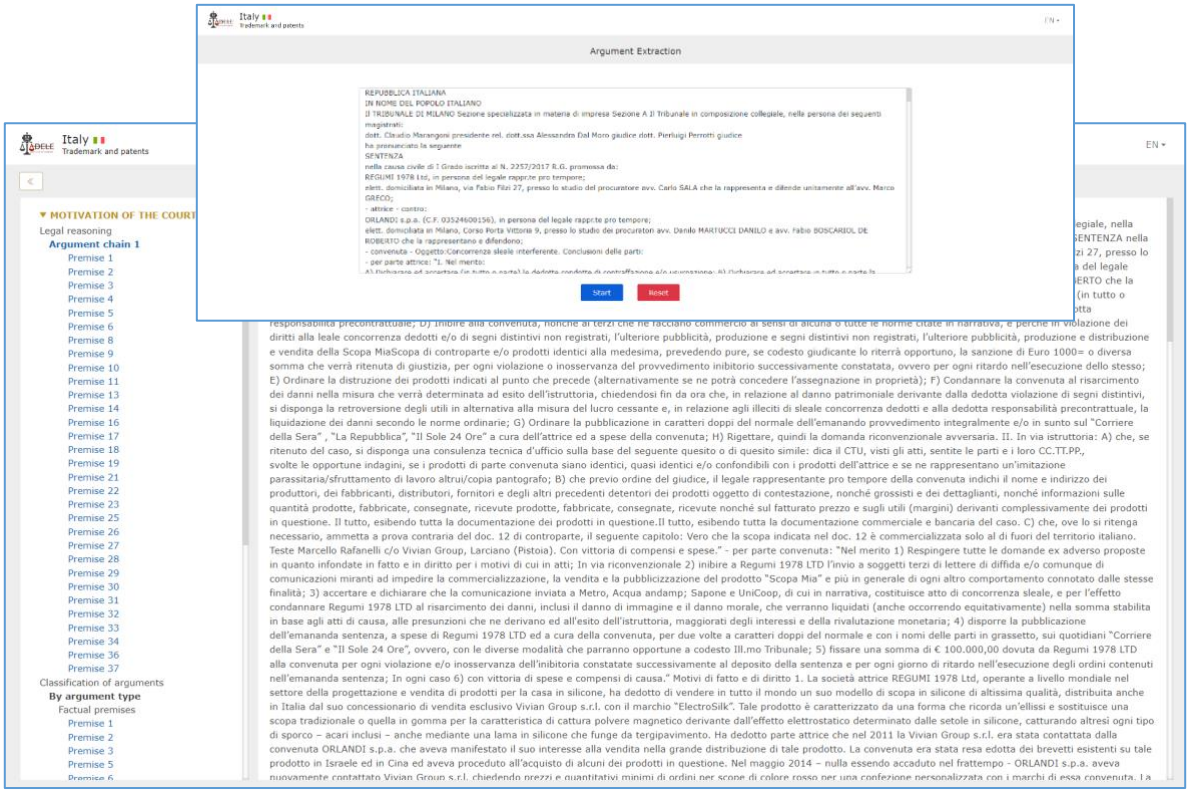

Figure 9-5. Example of using the automated argument extraction functionality: input and output

The WP3 leader UNIBO is still running some experiments on the so-called link prediction task, which aims at identifying relations between arguments (supports, attacks, etc.). The results from the implementation of this task will be integrated into the ADELE platform and presented at the final conference.

5) Automated Keywords and Summary Extraction

The aim of this functionality is to help users quickly grasp the main legal issues discussed in a particular case by extracting keywords and key arguments (compiled into an extractive summary) from the argumentative part of a decision. The visual representation of this functionality remains

unchanged in the final version of the platform. Automatically extracted keywords and summaries are displayed under the title of judicial decisions in lists of documents as well as in an open document.

Since the release of the demo version, our efforts have been mainly focused on improving the results of the machine learning models for keywords and summary extraction. In particular, we achieved the following:

- Improvement of the custom Bulgarian and Italian spaCy languages through additional tokeniser exceptions resulting in better model predictions;
- Improved document text pre-processing (normalisation);
- Improved lemmatisation resulting in better keyword predictions;
- Improved sentence splitting algorithms for both languages, resulting in increased accuracy of the summarisation models;
- Slightly modified and fine-tuned summarisation approach;
- The spaCy models have undergone additional training based on additional training data, which was annotated by Italian and Bulgarian legal experts;
- Improvement of the keyword and summary filtering algorithms;
- Memory-consumption-related optimisations.

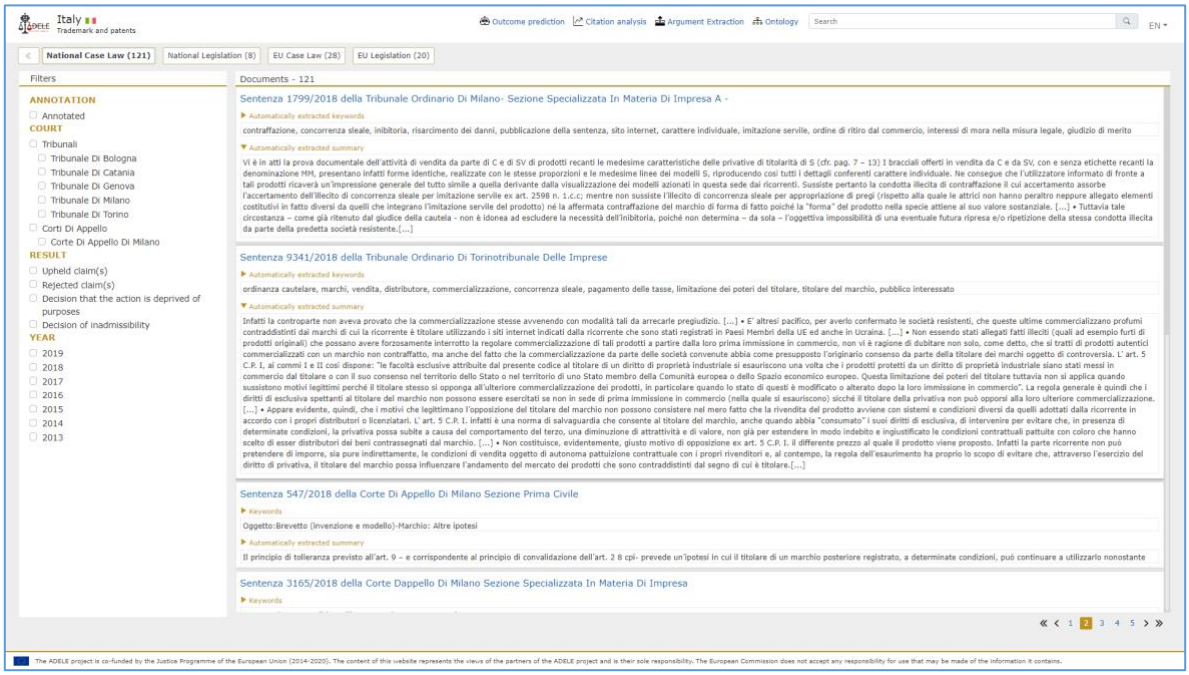

Figure 9-6. Automatically extracted keywords and summaries in a list of Italian TM&P decisions

6) Network and Citation Analysis

Network and citation analysis activities continued in several directions after the launch of the demo version. The work was carried out in cooperation with the University of Turin and the legal experts of the University of Bologna. In the present deliverable, the functionalities added to the platform will be documented, while we will describe the technical aspects of network analysis in Deliverable 2.4 together with the ontology development.

Firstly, the identified citations were incorporated as in-line links to the cited legislative provisions or judicial acts within the text of all Italian decisions. Similarly to the already applied feature in Bulgarian decisions, clicking an in-line link opens the text of the cited document in ADELE tool (if available in its database) or in another online legal resource (e.g. EUR-Lex portal). Where the citation refers to a particular provision of a national or EU legislative instrument, the platform positions the text on the cited legal norm in the open document. In addition, a small red icon is placed next to each citation. Clicking this icon opens in a new browser window a list of all documents that refer to the same judicial decision, legislative act or provision of a legislative act that is cited in the current document.

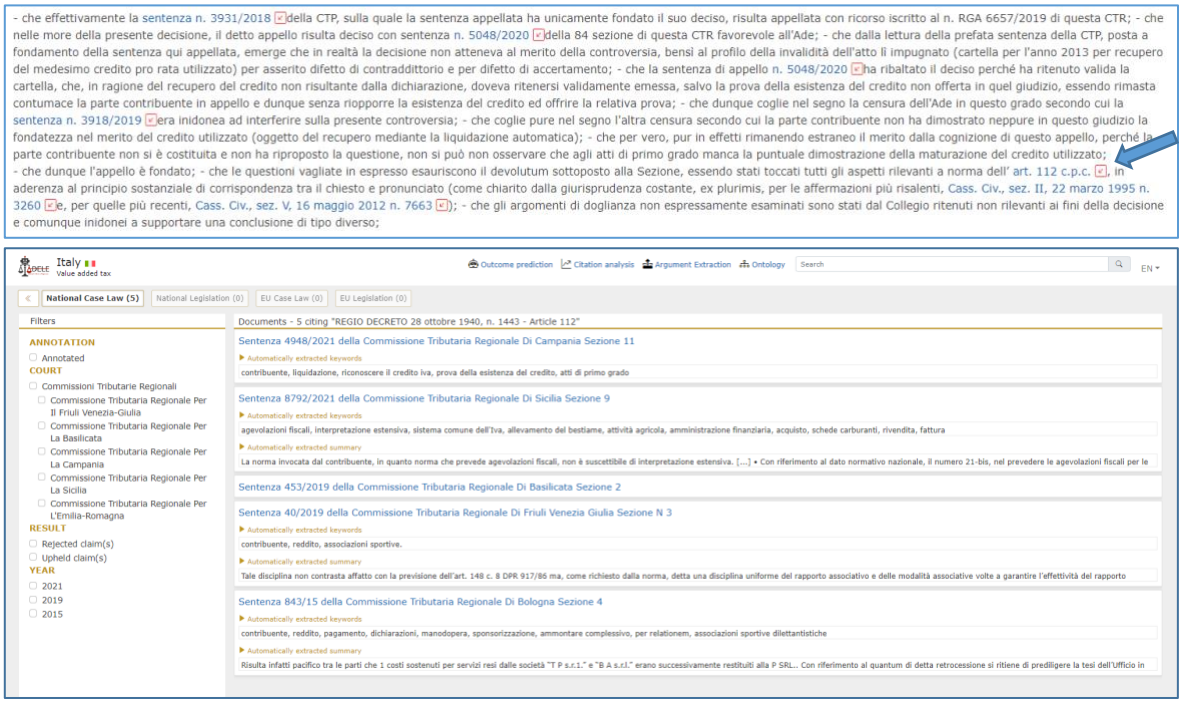

Figure 9-7. List of all decisions citing Art. 112 of REGIO DECRETO 28 ottobre 1940, n. 1443

If the user opens a document from this list, the platform highlights all the citations to the respective legal act and/or provision in the document's text.

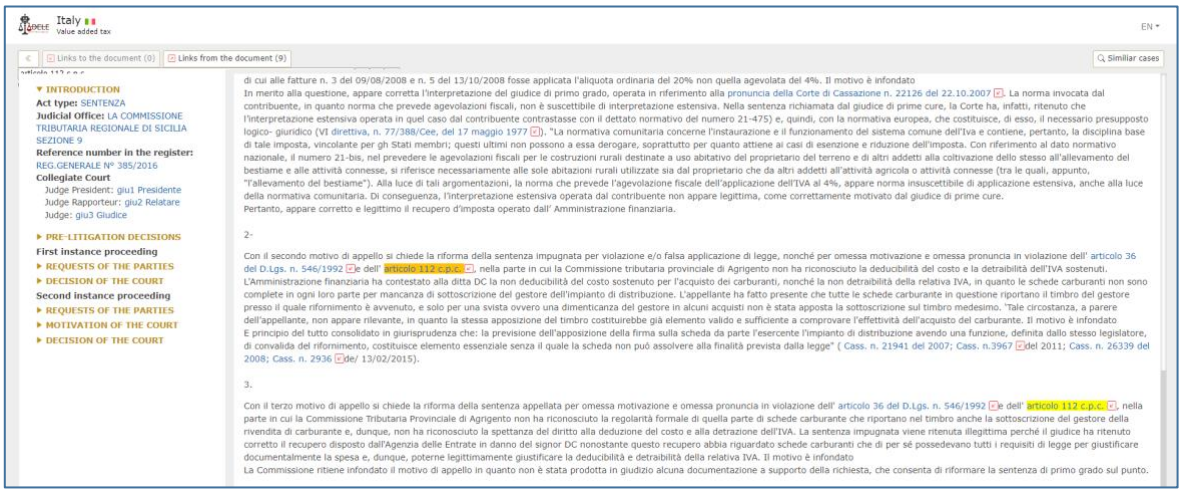

Figure 9-8. Highlighting in a decision of all citations to Art. 112 of REG. DECRETO 28.10.1940, n. 1443

Secondly, the visualisation of the citations network, which in the demo version of ADELE pilot tool included references to national and EU case law only, is now extended with references to the cited national and EU legislative instruments and their provisions. In addition to the lists of the most cited national and EU cases, the user is able to explore the most cited pieces of EU and national legislation and provisions thereof.

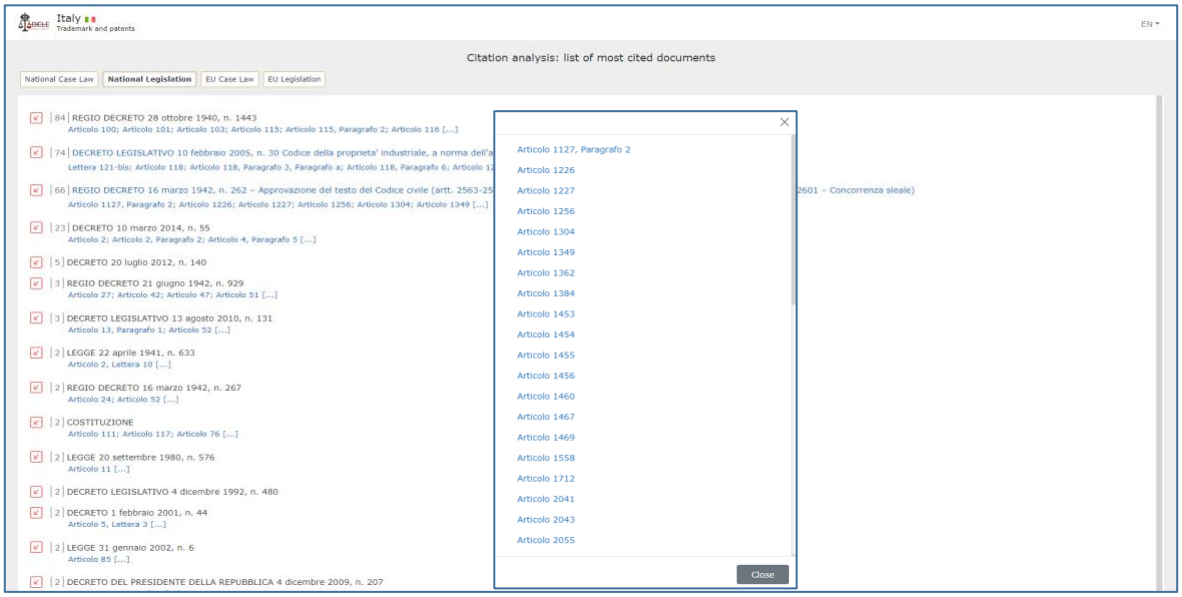

Figure 9-9. List of all citations to articles of REGIO DECRETO 16 marzo 2014, n. 262

The number in square brackets indicates the number of citations to a particular legislative instrument. Clicking on a provision's link opens a list of all decisions citing that provision. If the user opens a decision from the list, the platform highlights all the citations to the respective legal act and/or provision in the document's text.

Thirdly, the results from the citation analysis are used when searching similar cases, as already described in *Subsection 2)* above. This functionality considers the presence of two or more matching citations as an additional indication of semantic similarity between court decisions.

Finally, the network and citation analysis is also applied when searching cases related to a particular ontology concept. The function "Search for related case law" was already described in *Subsection 1)* above.