Extented Abstract - KDD 2019 Project Showcase Track

Title: enviroLENS – An innovative Earth Observation Platform for Environmental law enforcement

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About enviroLENS

Monitoring the environment to support its protection is the main "raison d'etre" of the European Commission Copernicus satellite programme. At present, satellite-derived information is not used on a regular basis as primary evidence in environmental law enforcement. This is mostly due to the fact that satellite-derived information has almost exclusively been technology-led and is quite new to the legal sector. Consequently, there is limited awareness among the legal sector about the range of applicable satellite-derived information solutions, their access and affordability for evidence gathering.

The H2020 funded project enviroLENS is bridging the gap between the utilization of European satellite capacities coming from the Copernicus Programme and environmental law enforcement and related cross-cutting sectors. The project combines components from the corporate and legal sectors with Earth Observation (EO)-based services to support evidence-based decision-making in the environmental domain. Coordinated by GeoVille – a global leader in satellite-based land monitoring - the project combines the competence and technical expertise of Sinergise, the Aristotle University of Thessaloniki and the Jožef Stefan Institute to demonstrate and validate the value of using EO in the environmental law sector. The consortium further involves DLA Piper, a well-respected global law firm and the International Union for Conservation of Nature as key users to demonstrate the power of the enviroLENS tools and services.

eLENS Portal – An advanced EO-based information platform

enviroLENS is responding to the demands of the jurisdictional sector for ready-to-access evidence and scenario information on environmental situations. The aim of the project is to deliver Earth observation-based services providing evidences on environmental incidences and legal violations to support the evidence data gathering process and to foster data-driven decision-making.

By doing so, enviroLENS is delivering three types of innovations:

- TECHNOLOGICAL INNOVATIONS: EO and semantic data mining technologies are merged to provide a joint environmental legislation discovery system.
- CONCEPTUAL INNOVATIONS: The eLENS Portal will deliver a cross-domain solution, embracing EO services and transforming them by enrichment with new legal added value.
- COMMERCIAL INNOVATIONS: The enviroLENS open value chain strategy is allowing anybody to contribute and receive a multitude of benefits in return.

The main technological delivery of enviroLENS project is the eLENS Portal, an advanced information system uniting Earth Observation with the environmental law and legal domain to create novel and unique types of services: eLENS SOCIETY SERVCIES provide public information on environmental violations for citizens and authorities. eLENS LEGAL SERVICES are used by legal-domain users for facilitating evidence collection within the legal sector. eLENS EO SERVICES provide an interface for the selection and set-up of EO-based services that allows monitoring past and current environmental incidences. Further, an alert service is offered allowing immediate information about violations.

eLENS Miner – Combining EO and semantics

There exists a vast amount of legal environmental data coming from different sources with some of them being unified sources of legislative documents like ECOLEX[1], an information service on environmental law, operated jointly by FAO, IUCN and UNEP or EUR-Lex, which provides access to European Union law. The challenge in front of the enviroLENS team is how to combine such databases of statutory documents from all over the world and put them to work. That is, to semantically analyse legal texts and use them to access, reuse, and create knowledge, which is interconnected with the available solution in the EO domain (linked with the use of general and domain specific ontologies like SWEET and InforMEA).

To tackle this issue and to enable the integration of the environmental and the legal domains eLENS MINER is developed as a specific Semantic Service. eLENS Miner enables automatized analysis of legislative text documents and extraction of EO rules, with its functionality being applied across the eLENS services. Already at this point, eLENS Miner has addressed tasks such as clustering, classification and semantic annotation via the usage of semi-supervised learning. The latter can support paragraph labelling like the detection of interesting paragraphs, related to a particular topic or interesting for rule extraction techniques). The future work of the enviroLENS team will include a development of cross-lingual core for legal documents analysis based on Word2Vec approach. This will enable to unleash the potential of the multi-national dataset. The final goal will be to upgrade the paragraph annotation methodology with rule-extraction methods based on Semantic construction grammar (SCG)[2], which will be linked to the EO ontology and map to EO information extraction services.

Conclusion and outlook:

enviroLENS project is trying to bridge a gap between current practices in environmental law enforcement and evidence, provided by Big Data satellite imagery sources, such as EU Copernicus Sentinel mission. EO technologies have achieved great potential with the massive usage of machine learning techniques in the last 3 years and are ready to be included into everyday practice. Already basic integration of text mining technologies on large legislative datasets can provide valuable benefits for stakeholders (i.e. monitoring of relevant areas of interest, monitoring of new legislative practices in the areas of interest etc.). However, automated rule extraction shows a vast potential to significantly reduce the manual work, currently being required in the legal domain.

[1] https://www.ecolex.org/

[2] D. Schneider, M. Witbrock, »Semantic Construction Grammar: Bridging the NL / Logic Divide«, WWW'15 Companion, Foorence, Italy, 2015.