A Knowledge Based System for Guidance and Training on Legal Concepts

Nicola Capuano, Saverio Salerno, Carmen De Maio

4th International Workshop on Adaptive Learning via Interactive, Collaborative and Emotional approaches (ALICE 2014)
Jointly organized with the 6th International Conference on Intelligent Networking and Collaborative Systems (INCoS 2014)
10 September 2014 – Salerno, Italy

Background

Mediation is a flexible, speedy and cost effective way to resolve disputes

It enables parties to discuss and find an agreement in the presence of a third party: the Mediator

The Italian Government introduced in 2011 mandatory pre-trial mediation of civil and commercial disputes

Mediation is helping to streamline the work of Italian courts...

but effective tools are needed to support the explosion of mediation cases
**eJRM Project**

**electronic Justice Relationship Management** is aimed at defining innovative technologies for mediation

- **On-line Mediation**: synchronous and asynchronous collaboration tools to support remote mediation
- **Self Litigation**: to support the citizen in analysing his case and to help him decide whether to sue a party, to initiate a mediation or to give up
- **Cost**: 9,3 M€ (funding of 6,6 M€)
- **Duration**: about 4 years (July 2011 - May 2015)

**Self Litigation**

The citizen introduces a legal case in **Natural Language**

The system:

- recognises involved legal concepts with respect to a defined **Legal Ontology**
- generates a **Training Path** aimed at providing the basis for understanding legal issues connected to the case
- enriches the training path with relevant **Legal Information** like legal principles, precepts and sentences
The adopted **Knowledge Model** describes legal concepts and related training and informative resources.

The **Legal Ontology** deals with the conceptual management of available resources

- it is composed of **Concepts** and **Relations**
- **Informative Relations** are purposed to define a structured dictionary of legal terms
  
  - **NT** – Narrower Term
  - **BT** – Broader Term
  - **RT** – Related Term
- **Educational Relations** are aimed at introducing useful properties for training
  
  - **HP** – Has Part
  - **IRB** – Is Required By
  - **SO** – Suggested Order

The Legal Ontology includes concepts from **EuroVoc** and **ItalGiure**

- **EuroVoc**
  
  - a multilingual thesaurus defined by the European Commission
  - used for the classification of directives, laws and treaties
  - based on SKOS includes **6,883** concepts in 23 languages
  - each concept includes a textual description

- **ItalGiure**
  
  - the repository of the Italian Court of Cassation
  - includes Italian laws and jurisprudence from any law sector
  - resources are classified on a taxonomy of **12,701** concepts (civil section)
  - same resources are also classified on EuroVoc
**Legal Ontology Population**

**Relatedness** between EuroVoc and ItalGiure concepts is calculated basing on resources indexed in ItalGiure

\[
\text{Rel}(c_i, c_E) = \frac{|\text{Res}(c_i) \cap \text{Res}(c_E)|}{|\text{Res}(c_i) \cup \text{Res}(c_E)|}
\]

**Educational Information** is manually added for available resources

---

**Legal Ontology Enrichment**

**Language Gap Problem**

- The legal ontology is created starting from juridical resources
- Common citizens do not use legal language and often use inappropriate terms to describe legal concepts
- The legal ontology can’t be used as-is to recognize legal concepts on legal cases

**The Solution**

- To enrich the legal ontology with Common Sense Knowledge obtained from external sources
We linked each **Ontology Concept** to a weighted set of **Wikipedia Topics**

- The **keyphraseness** of each *n-gram* coming from the concept description is calculated

\[
Key(n \text{-gram}) = \frac{Link(n \text{-gram})}{Count(n \text{-gram})}
\]

- Candidate topic referrals are **disambiguated** basing on **commonness** and **relatedness** of Wikipedia topics

\[
Score(t|n \text{-gram}) = \frac{\sum_{t \in \text{Ctx}} \text{Rel}(t, t')}{|\text{Ctx}|} \times \text{Com}(t|n \text{-gram})
\]

**Extraction of Legal Concepts**

- A citizen introduces a **case** in natural language

- A weighted set of **Wikipedia Topics** is extracted from the case text

- A **matching** with topics connected to Ontology Concepts is calculated

- Best matching **Legal Concepts** are found together with a matching rate
• Starting from each extracted legal concept a **Training Path** is generated

- For each concept of the training path a learning resource is retrieved from the **Educational Repository**
Information Resources Addition

- Information Resources connected with extracted Legal Concepts is found on ItalGiure

- Best matching resources are proposed to the user ordered with respect to:
  - Type i.e. legal principle, precept, sentence, doctrine
  - Relevance

Prototype
Conclusions

- The project is still on-going
- Final prototypes are expected for December 2014
- Full experimentation is planned for January-May 2015
- Preliminary experimentation results are encouraging
- Further details: www.ejrm.it

Thanks for Your Attention

Nicola Capuano, University of Salerno

Dept. of Information Engineering, Electric Engineering and Applied Mathematics
Via Giovanni Paolo II 132 - 84084 Fisciano (SA) – Italy
E-Mail: ncapuano@unisa.it - Phone: +39 089 964292

www.ejrm.it