Projects

Nomothesi@

Keywords: legislative knowledge representation, open data, e-government, RDF/OWL metadata, Spring MVC, universal resource identifiers, REST services

An important kind of government data is the data related to legislation. Legislation applies to every aspect of people's living and evolves, continuously building a huge network of interlinked legal documents. Therefore, it is important for a government to offer services which make legislation easily accessible to the public, aiming at informing them, enabling them to defend their rights, or use legislation as part of their job. Towards this direction, many European Union (EU) countries have already automated the digitalization process by developing platforms for archiving legislation documents and offering on-line access to them.

Following the successful efforts of other countries throughout Europe, Nomothesi@ project aims at modernizing the way greek legislation is made public and providing high-scale legal services. We envision a new state of affairs in which ordinary citizens have advanced search capabilities at their disposal about legislation. We also envision that legislation is published in such a way that developers can consume it, and so that it can also be combined with other open data to increase its value for interested parties or people. Currently, there is no other effort in Greece or related decisions made by government institutions and administration alike which takes this perspective on legislation into considerations.

Based on the above principles, we developed Nomothesi@, a platform which makes Greek legislation available on the Web as linked open data. Nomothesi@ provides open access in a library of more than 12,000 pieces of legislation, interlinked with approximately 124,400 connections and over 8,000 unique entities, such as geospatial entities, persons, organizations and geographical landmarks (points of interest).

Jul 2017 – Present

Airbnb-like Android application

Keywords: Android development, Java, Airbnb, Google maps

The aim of this project was to develop a fully-functional Android application like Airbnb supporting Google Maps API, different user roles, registration and room reservation, as well as hosting rooms.

2017 – 2018

Copernicus App Lab

Geospatial data manipulation and production in the topics of LAI (Leaf Area Index) of Paris (from netCDF format), NO_2, O_3, UV emissions in Europe and oil-spills in Sweeden for the Copernicus App Lab in addition to writing of scripts to automate tasks within the group and improve efficiency.

2017 – 2018

Named Entity Recognition and Linking in Greek Legislation

Keywords: named entity recognition and linking, legislative knowledge representation, entity reference representation, linked open data, deep learning, entity generation

We show how entity recognition in Greek legislation texts can be achieved by utilizing a named entity recognizer (NER). Our work is the first of its kind for the Greek language in such an extended form and one of the few that examines legal text. We apply grid search on multiple neural network architectures and combination of hyper-parameters to maximize the efficiency of our approach. We show that, utilizing a big legal corpus we built word/token-shape embeddings using Word2Vec, and finally achieve 86% accuracy on average in recognition of organizations, legal references, geographical landmarks, persons, geo-political entities (GPEs) and public documents. The evaluation of our methodology is based on the metrics of precision, recall, f_1-score per entity type for each neural network. Finally, we measure the ratio of correctly guessed links for the interlinking of RDF datasets produced by our approach with well-known public datasets and how new knowledge can be inferred indirectly by our approach from DBpedia, ELI (European Legislation Identifier) and GAG (Greek administrative geography) of Kallikratis.

2017 – 2018

Development of a lending library website with user roles and shopping cart functionalities

Keywords: web development, shopping cart, human-computer interaction

The aim of this project was to develop a fully-functional lending library website that supports multiple user roles, registration, shopping cart functionalities etc.

2015-2016

Cooperative Routing and Scheduling of an Electric Vehicle Fleet Managing Dynamic Customer Requests

Keywords: urban cooperative computing, online scheduling for electric vehicle requests, power refueling for an electric vehicle fleet, GNSS

Environmental issues and consumer concerns have paved the way for governments to legislate and help usher into operation alternative-fueled vehicles and pertinent infrastructures. In the last decade, battery-powered electric vehicles have been introduced and the service industry has followed suit and deployed such trucks in their distribution networks. However, electric vehicles do impose limitations when it comes to their traveling range. Replenishing the power to the vehicle batteries may entail lengthy charging visits at respective stations. In this paper, we examine the problem of routing and scheduling a fleet of electric vehicles that seek to satisfy dynamic pickup and delivery requests in an urban environment. We develop a web application to facilitate cooperation between organizations and individuals involved in urban freight transport. The application uses geolocation services and mobile devices to help manage the fleet and make timely decisions. Moreover, we propose three heuristic recharging strategies to ensure that electric vehicles can restore their energy levels in an effective manner. Through detailed experimentation, we show that the costs associated with the use of an electric vehicle fleet concern mainly the size of the fleet. The impact regarding the total route length traveled is less evident for all our strategies.

2016

Capacitated Vehicle Routing with Time Windows

Keywords: vehicle routing, time windows, scheduling, transportation, guided local search

Capacitated Vehicle Routing Problem with Time Windows is a problem that has troubled academics for many years due to its difficulty (it belongs to the class NP) and many approximate solutions that are fairly sufficient have been proposed. Of course, a plethora of application of those solutions exists in practical applications. The goal of the program documented in the present thesis is to initially solve the problem based on classic methods from bibliography using real geographical data in Earth coords. After that, it communicates with a relational database which contains roads of Athens and info about their direction (unidirectional or bidirectional).

Furthermore, it communicates with an in-memory key-value store which contains additional dynamic info on roads. To be more specific, it contains positive and negative percentage weights that express dynamic roads' info. Positive weights represent traffic and have a value in the range of [0.0,1.0]. Negative weights represent drivers' experience that influences them to follow specific roads because they are aware that they will reach their destination faster that way and have a value in the range of [-0.5,0.0]. Negative weights do not have the same range as positive ones due to intuition as road traffic affects the decisions made a lot more than the driver's experience since a road could have a traffic jam in an unexpected scenario.

During the program's execution messages are being printed explaining algorithmic decision-making in critical parts and saved in intermediate files in order to study the results after execution. Finally, a kml and a html file are produced so that it's possible for the final result to be shown in any application capable of handling kml files (or html if the user wishes to view the visualization on the web). Most common applications capable of handling kml files are Google Earth, Google Maps and Marble.

2015