

## Topics for Diploma and M.Sc. dissertations

### Semantic Web and Linked Data

1. Main memory RDF stores. See the paper <https://dl.acm.org/citation.cfm?doid=2588555.2610511> . If this topic is interesting for you, you will be working with our own RDF store (publication to appear).
2. Massively parallel inference for RDFS and OWL. See the paper <https://research.vu.nl/en/publications/webpie-a-web-scale-parallel-inference-engine-using-mapreduce-2>. We would like to work on similar algorithms using the system Spark <https://spark.apache.org/>.

### Earth Observation and Geospatial data

3. Discovery of Earth Observation data sets. See a previous dissertation on the topic. <https://pergamos.lib.uoa.gr/uoalib/default/data/1321036/theFile> .
4. Geospatial entity resolution. See the paper <https://lingpub.soe.ucsc.edu/basilic/web/Publications/2007/kang:iv07/> .
5. Big geospatial data query processing for relational and RDF databases. See for example the tutorial [http://www.cs.ucr.edu/~eldawy/publications/2017\\_VLDB\\_BigSpatialData\\_Tutorial.pdf](http://www.cs.ucr.edu/~eldawy/publications/2017_VLDB_BigSpatialData_Tutorial.pdf) and system <http://geospark.datasyslab.org/>. In this topic one can develop new functionalities in a geospatial extension of Spark or compare experimentally the performance of systems presented in the tutorial.
6. Applications of geospatial neural embeddings. See the paper <https://iswc2017.semanticweb.org/paper-371/> .

### Natural language processing, information extraction and knowledge graphs

7. Named entity recognition for the Greek language. See a well-known system that does the same thing for English <https://nlp.stanford.edu/software/CRF-NER.shtml> .
8. Extending the temporal tagger HeidelTime for the Greek language. See the paper <https://aclweb.org/anthology/D/D15/D15-1063.pdf> and demo <http://heidelttime.ifi.uni-heidelberg.de/heidelttime/>.
9. Extending the multilingual knowledge graph YAGO3 with knowledge from the Greek version of Wikipedia. See the paper [http://cidrdb.org/cidr2015/Papers/CIDR15\\_Paper1.pdf](http://cidrdb.org/cidr2015/Papers/CIDR15_Paper1.pdf) about YAGO3 to understand what this topic entails.

10. Question answering (especially multilingual so we can cover Greek). See for example the paper <https://pub.uni-bielefeld.de/publication/2913141>. Notice that there is currently no such system for the Greek language which is a pity!
11. Science knowledge graphs (especially for Computer Science and the science of Earth Observation). See for example the Springer Nature SciGraph <http://www.springernature.com/gp/researchers/scigraph>.
12. Information extraction from the Web. See papers <http://allenai.org/content/team/orene/etzioni-cacm08.pdf> and [http://ai2-website.s3.amazonaws.com/publications/dalvi\\_tacl\\_2017.pdf](http://ai2-website.s3.amazonaws.com/publications/dalvi_tacl_2017.pdf).
13. Enabling machines to acquire common sense knowledge. See for example <http://ai2-website.s3.amazonaws.com/publications/tandon-acl2017-demo.pdf>.
14. Extracting geospatial information from documents. See [http://www.legislation.gov.uk/ssi/2015/193/pdfs/ssi\\_20150193\\_en.pdf](http://www.legislation.gov.uk/ssi/2015/193/pdfs/ssi_20150193_en.pdf) as an example of such a document. See also the paper <https://dl.acm.org/citation.cfm?id=2983772>.

#### **Constraint satisfaction for the big data era**

15. Constraint satisfaction for very large problems (especially temporal/spatial). See the paper [http://cgi.di.uoa.gr/~koubarak/publications/2014/AAAI\\_2014\\_Reasoner.pdf](http://cgi.di.uoa.gr/~koubarak/publications/2014/AAAI_2014_Reasoner.pdf) which presents the relevant spatial reasoning algorithms and the system Spark that we would like to use <https://spark.apache.org/>.

#### **Legal informatics**

16. Extensions to our system Nomothesia. See the paper <http://cgi.di.uoa.gr/~koubarak/publications/2017/eswc17-legislation.pdf>.