
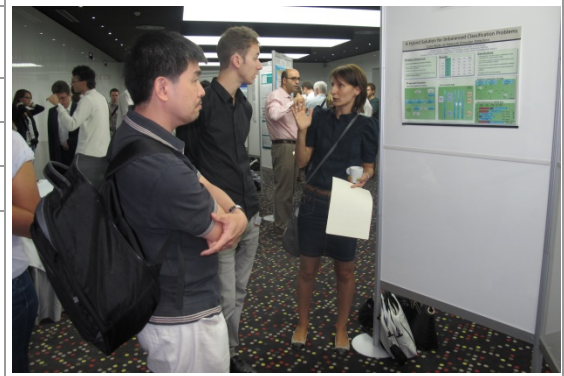
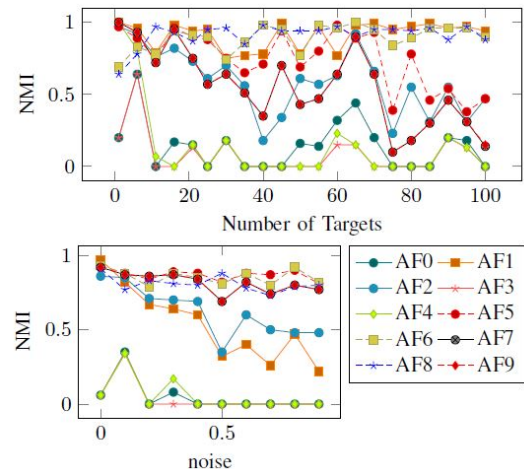


# KNOWLEDGE ENGINEERING GROUP

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## Areas of expertise

### Fundamental theoretical aspects:

- dealing with problem-specific features extraction from both structured data, pre-processing techniques for handling noisy and/or incomplete data, learning from balanced/unbalanced and structured/unstructured data

### Practical approaches:

- Data Mining application prototypes for both structured data (assisted medical diagnosis, spam detection, signature recognition) and unstructured data (topic extraction, opinion mining, community detection, semi-supervised text labelling, contradiction detection)

- Business Intelligence application prototypes dealing with heterogeneous data integration by ontology-driven, (semi-) automatic design of unified data structures and automatic design of the corresponding ETL processes

## Team

**Prof. Dr. Eng. Rodica Potolea**, Assoc. Prof. Dr. Eng. Mihaela Dinsoreanu, Assist. Prof. Dr. Eng. Camelia Lemnar, Eng. Lucian Teodosescu PhD  
PhD Students: Eng. Victor Ionescu, Eng. Ioana Barbantan, Eng. Cristian Lungu, Eng. Florin Macicasan, Eng. Octavian Hasna, Eng. Andreea Baciu

## Representative projects

“**Next generation product service**”, international project with third parties (company Electrolux Italy), (2014-2015)

**NOKIA**, “**Context-sensitive recommendation systems**”, Bilateral grant, (2011-2012)

**SEArCH**, “**Adaptive eLearning Systems using Concept Maps**”, National research grant funded by CNMP Program 4: Research partnership for priority domains, (2008-2011)

**GridMOSI**, “**Virtual Organization using Grid Technology for High Performance Modeling, Simulation and Optimization**”, National research grant funded by ANCS, CEEX program, (2005-2008)

**ArhiNet**, “**Integrated System for developing semantically-enhanced archival content**”, National research grant funded by CNMP Program 4: Research partnership for priority domains, (2007-2010)

**FOOD-TRACE**, “**Integrated IT system for assuring traceability and quality control in food industry**”, National research grant funded by ANCS, CEEX program, (2006 - 2008)

**IntelPro**, “**Intelligent system for assisting the therapeutically decision at patients with prostate cancer**”, National research grant funded by ANCS, CEEX - INFOSOC, (2005-2008)

## Significant results

### The most representative publications of the past 5 years:

1. Hasna Octavian Lucian, Macicasan Florin Cristian, Dinsoreanu Mihaela, Potolea Rodica, "Modeling Sentiment Polarity with Meta-features to Achieve Domain-Independence", *6th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management, (IC3K)*, Rome, ITALY, OCT 21-24, 2014, Vol. 553, Pp. 212-227, Published: 2015
2. Teodorescu Lucian Radu, Potolea Rodica, "Compiler design for hyper-metaprogramming", *15th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC)*, Timisoara, Romania, Sep 23-26, 2013, Pages: 201-208, Published: 2014
3. Radulescu Cristina, Dinsoreanu Mihaela, Potolea Rodica, "Identification of Spam Comments using Natural Language Processing Techniques", *IEEE 10th International Conference on Intelligent Computer Communication and Processing (ICCP)*, Cluj Napoca, ROMANIA, SEP 04-06, 2014, Pp. 29-35
4. Anisiei Ancuta-Lenuta, Lemnaru Camelia, Dinsoreanu Mihaela, Potolea Rodica, Extracting Opinion Holders and Targets in Romanian Texts, *IEEE 10th International Conference on Intelligent Computer Communication and Processing (ICCP)*, Cluj Napoca, Romania, Sep 04-06, 2014, Pages: 37-42, Published: 2014
5. M.Dinsoreanu, R. Potolea, "Towards a Unified Thematic Model for Recommending Context-Sensitive Content", in *Knowledge Discovery, Knowledge Engineering and Knowledge Management, Communications in Computer and Information Science*, vol. 415, 2013, pp. 68–83
6. M.Dinsoreanu, R.Potolea, "A scalable approach for Contradiction Detection driven by Opinion mining", *iiWAS2013*, pp. 7-15
7. C. Lemnaru, A. Bona, R. Potolea, "Distributed Methodologies for Imbalanced Classification Problems: Parameter Analysis and Tuning", *ISPDC 2013*, pp. 53-58
8. Lemnaru C., Potolea R., "Imbalanced Classification Problems: Systematic Study, Issues and Best Practices", *Lecture Notes in Business Information Processing*, vol. 102, 2012, pp 35-50
9. Potolea, R., Cacoveanu, S., Lemnaru, C., "Meta-learning Framework for Prediction Strategy Evaluation", *Lecture Notes in Business Information Processing*, vol. 73, no. 3, 2011, pp. 280-295
10. Potolea, R., Barbantan, I., Lemnaru, C., "A Hierarchical Approach for the Offline Handwritten Signature Recognition", *Lecture Notes in Business Information Processing*, vol. 73, no. 3, 2011, pp. 264-279

### Significant solutions:

Handling incomplete records and irrelevant and/or redundant pieces of information, imbalanced class distribution and error costs

Identifying the right performance metric given the context, algorithm and model selection

Schema mapping and data fusion

Context-sensitive IR from unstructured sources

Community detection and opinion mining

### Products and technologies:

1. Recommendation systems - context sensitive, semantic driven recommendation systems for online advertisement and tourism
2. Topic extraction and representation - identifying the topic polarity in a given document; projecting (very) large (un)structured data to relevant dimensions and providing representation to allow knowledge extraction
3. Community detection- identifying clusters from implicit and/or explicit connections; community detection social data; opinion driven community detection
4. User profiling - finding groups of individuals with similar features, finding/defining patterns for various profiles, predicting trends and future behaviour applied to the educational domain
5. Contradiction Detection - opinion mining driven contradiction detection
6. Medical decision support systems - assisting medical diagnosis in prostate cancer and rheumatoid diseases

## The offer addressed to the economic environment

Research & development	<p>Recommendation systems in different areas – developing prototype recommendation systems according to state of the art techniques in the field and up-to-date technologies.</p> <p>Topic extraction and representation – identifying concepts to be representative in a given context; projecting (very) large (un)structured data to relevant dimensions and providing representation to allow knowledge extraction.</p> <p>Community detection– identifying clusters from implicit and/or explicit connections.</p> <p>User profiling – finding groups of individuals with similar features, finding/defining patterns for various profiles, predicting trends and future behaviour.</p> <p>Schema mapping and data fusion – designing unified data (warehouse) structures to integrate heterogeneous data sources, designing corresponding ETL processes.</p> <p>Decision support systems – extracting knowledge from organizational data, predicting evolutions, trends, identify relationships and correlations.</p>
Consulting	<p>Consulting, design, research and prototyping towards development of data mining and machine learning based solutions for multiple industrial and scientific fields.</p>
Training	<p>Data mining (basic and advanced techniques).</p> <p>Machine learning techniques</p>