

Laboratory for Cognitive Modeling

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Research Activities

Laboratory for Cognitive Modeling (LKM) was officially founded in 2001. LKM carries out research in cognitive modeling, machine learning, neural networks, picture and data mining. Research results concern the modeling of noisy data related to cognitive, medical, biological and other processes. We are developing, testing and applying new approaches and algorithms for modeling from numeric, symbolic and pictorial data. We are developing new approaches to building, evaluating, and explaining of models, derived from data. Recent research is related to development of methods for evaluating the utility of ordinal attributes, for evaluating the reliability of single models' predictions in classification and regression, for evaluating the reliability of clustering, for explaining single predictions by arbitrary classification or regression model, and for efficient parametrization of images using a subset of possible image resolutions. LKM collaborates with psychologists, physicians, biologists, physicists and chemists. A notable aspect of much of this research is its application to problems in image analysis, medical diagnosis, ecological modeling, alternative medicine, and studies of consciousness.

Recent projects and collaboration

Knowledge synthesis from data and background knowledge: Basic research project funded by Slovenian Ministry of

Education, Science and Sports. (2003-2007)

Reliable and Comprehensible Machine Learning Approaches with Applications to Medical Diagnostics and Bioinformatics: Bilateral project funded by Slovenian and Greek Ministry of science. (2005-2007)

Machine Learning of Probabilities with Applications to Web Portals and Medical Diagnostics: Bilateral project funded by Slovenian and Portuguese Ministry of science. (2006-2007)

Laboratory guests in 2006

Prof. dr. Aristeidis Likas, University of Ioannina, Greece. 8. – 12. May 2006. Research collaboration in analysis and application of transductive methods in supervised and unsupervised learning (clustering).

Prof. dr. Joao Gama, researcher at LIACC, the Laboratory of Artificial Intelligence and Computer Science of the University of Porto. 6.-11. November 2006. Research collaboration in data stream analysis.

Rita Ribeiro, researcher at LIACC, the Laboratory of Artificial Intelligence and Computer Science of the University of Porto. 6.-11. November 2006. Research collaboration in application of machine learning on ecological problems.

Research visits in 2006

Marko Robnik Šikonja: University of Hasselt, 8. October – 22. November 2006. Research collaboration in feature evaluation on marketing problems.

Matjaž Kukar, Luka Šajin: University of Ioannina, Greece. 27 November - 2. December 2006 . Research collaboration in application of transductive methods in kernel methods.

Marko Robnik Šikonja, Matjaž Kukar: University of Porto, Portugal. 22 – 28 May 2006. Kick-off meeting for the project Machine Learning of Probabilities with Applications to Web Portals and Medical Diagnostics.

Selected Recent References (in last 5 years)

I. Kononenko, M. Kukar: Machine Learning and Data Mining: Introduction to Principles and Algorithms, Horwood publ., 2007 (454 pages).

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- M. Robnik-Šikonja, D. Cukjati, I. Kononenko. Comprehensible evaluation of prognostic factors and prediction of wound healing. *Artificial Intelligence in Medicine*, 29: 25-38, 2003.
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