

INTELLECTUAL SYSTEMS AND TECHNOLOGIES

A.V. Smirnov, A.M. Kashevnik, S.A. Mikhailov, M.D. Mironov. Multi-Level Cyber-Physical System Resources Self-Organization: Context-Oriented Approach and Implementation

The paper presents context-oriented approach for multi-lever resources self-organization of cyber-physical system. The approach is based on policy generation by upper level resources and support of taking into account this policy by lower level resources. For information sharing between cyber-physical system resources the smart space technology is used. The implementation of presented approach is shown in the example of object transportation scenario. There are three types of physical devices (robots) controlled by management resources and two types of planning resources are participated in the scenario. For the smart space organization the Smart-M3 information sharing platform is used.

Keywords: self-organization, smart spaces, Semantic Web, context, ontologies, robots.

O.P. Shesternikova, M.A. Agafonov, L.V. Vinokurova, E.S. Pankratova, V.K. Finn. Intelligent system for chronic pancreatitis patient's diabetes development prediction

The article presents the results of the application of JSM-method for automatic scientific researches support (JSM-method ASRS), which was realized in a computer intelligent system (IS), predicting chronic pancreatitis patients' diabetes development. It was the first time, when JSM-method ASRS was applied to the sequence of embedded bases of facts, which was used for discovery empirical regularities (ERs) – preserving cause of exploring effect (chronic pancreatitis patients' diabetes development). For recognition ERs in IS-JSM there was used algebraic lattice of JSM reasoning strategies (rules of inductive inference). The findings have informative clinical interpretation and they are an evidence of usefulness of intelligent data analyze by IS-JSM, which can be used as a tool for evidence based medicine.

Keywords: JSM-method, empirical regularities, computer intelligent system, evidence based medicine, pancreatitis, diabetes.

A.E. Yankovskaya, M.E. Semenov, A.V. Yamshanov, D.E. Semenov. Cognitive Tools in Learning and Testing Systems Based on Mixed Diagnostic Tests

E-learning systems and assessment of learning quality on these systems are briefly described. In order to improve the learning quality and the accuracy of his assessment is the use of different visualization tools, including cognitive. The approach based on mixed diagnostic tests and cognitive tools for creating the hybrid intelligent e-learning and testing system is given. This approach allows reducing cost and time of learning with improving of learning quality. The paper describes cognitive tools developed by us and their applying in learning systems, namely, 2- and 3-simplices, sector diagram with additional dependencies DiADep, circle diagram Target. Applying of these tools allows increasing assessment accuracy of learning quality, revealing new dependencies at learning process, investigating dynamic of learning, modeling influence of different factors on effectively of learning process, assessing of learning results of students. Future investigations are discussed.

Keywords: E-learning systems, learning and testing systems, mixed diagnostic tests, cognitive tools, DiADep diagram, Target diagram, estimation of learning quality.

MODELLING AND CONTROL

V.E. Pavlovsky, V.V. Pavlovsky. Mathematical model of two-dimensional homogeneous swarm of robots

The paper deals with simulation of behaviour of homogeneous robotic group in the environment with obstacles. Within this frame simulation of the problem of investigating the 2D-flight of robots to the different target objects is considered. Such problems as problem of interdependence between local control

rules and global adaptive behaviour of a group, synthesis of group control, analysis of controllability of the whole group in an environment with obstacles, are under investigation. Simulation results are presented, examples of simulation program functioning are demonstrated as well.

Keywords: swarm of robots, collective, group, modeling of robots.

A.G. Zhiharev, S.I. Matorin, N.O. Zaitseva. System-object tools for simulation of technological processes and transport streams

In this paper we consider a new method of simulation modeling that uses "Unit-Function-Object" approach, system-object representation method of knowledge, mathematical theory of objects, and the language to describe the functional units "UFO script". Test examples of simulation of technological process and transport streams were performed by a new version of the tool for system-object modeling.

Keywords: "Unit-Function-Object" approach, system-object representation method of knowledge, calculus of objects, language "UFO-script", technological process, transport stream.

NATURAL LANGUAGE POCESSING

A.V. Zaboleeva-Zotova, Y.A. Orlova, V.L. Rozaliev. Comprehensive semantic analysis flow of news texts

This work is devoted to the question of adaptation of text information to persons with disabilities. Deals with the extraction of key entities from the text of the news article and their visualization. Briefly reviewed and analyzed existing methods and algorithms for determining near-duplicate texts, such as TF-IDF and its modifications, Long Sent, Shingles, Lex Rand. To solve the problem of separation of the news topic the algorithm including a method of shingles. Presented several options for its parallel implementation: using technologies like CUDA, Open CL and Google App Engine, the estimated parameters of the algorithm (time, speedup compared to sequential processing), applied to the problem of analysis of news texts. Presents the example of software implementation of complex analysis of news text, based on a combination of semantic analysis and subsequent annotation of the text view in its compressed form in the format of so-called mind map.

Keywords: news text, fuzzy duplicates, shingles, TF-IDF, annotation, mind map, CUDA, Open CL, Google App Engine.

A.V. Shvets, D.A. Devyatkin, D.V. Zubarev, I.A. Tikhomirov, O.G. Grigoriev. Analysis of qualitative and quantitative characteristics of the journal «ARTIFICIAL INTELLIGENCE AND DECISION MAKING»

The paper presents a study of the journal «Artificial Intelligence and Decision Making». Various qualitative and quantitative characteristics of the journal prepared using standard tools of eLibrary and modern means of text mining are provided. Quantitative characteristics allow finding out which research areas are formed by journal papers, which part of papers belongs to the research collectives and their leaders, who funds research projects with results presented in papers of the journal, and much more. Analysis of texts of the papers was carried out using the system Exactus Expert.

Keywords: analysis of scientific journals, research directions detection, full-text clustering of scientific papers, Exactus Expert.