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Adaptive Algorithm of Global Optimization on the Base of the Coordinates Averaging and Fuzzy-Neural Networks

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Abstract. Problem of a search for global extremum of non-differentiable multi-extremal functions is not investigated enough until now. The new modification of adaptive fuzzy-neural global optimization algorithm is presented. The idea is based on application of fuzzy-neural networks technology for estimation of inverse characteristics.

Fast Algorithm of Content-based Image Retrieval for JPEG-Patterns

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Abstract. Algorithm of content-based image retrieval for JPEG-patterns and results of its modeling by means of MATHLAB program are discussed in the article. In the algorithm the three main ideas are used. 1) The spectral indication space formed with standard JPEG procedure is used for image classification. It permits to make classification without full image restoration. 2) The semantic of a total image is carried out from image segment semantics that permits to realize the economic hierarchical classification procedure. 3) Any a priory suppositions about point locations of a semantic class are excluded. Classification is carried out on reliable precedents of data base. Within the bounds of content-based image retrieval there were developed the algorithms of adaptive image segmentation, the algorithms of informative estimation of primary indications and the algorithms of forming complex second indications, the algorithms of fuzzy metric classification for image segments, the algorithms fuzzy image hierarchical classification on base of the image segment classification.

Correct Selection of Classifying Algorithms

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Abstract. The problem of determining confidential intervals of reliability for classifying algorithms is considered. Necessity to take into account the number of tested algorithms is demonstrated. It is proposed to use restriction on parameters number in algorithms. The new method of searching for algorithms, which does not increase confidential intervals length and does not shift reliability estimations, is proposed.

Self-Organization in the Space of Verbs

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Abstract. Collective properties of the manifold of English verbs had been analyzed. Each pair of verbs was specified by the "proximity measure" that is equal to the number of common translations into 13 other Indo-European languages. The objective

was to look for possible clusters in the space of verbs and emerging it's structure. The Hopfield neural network was constructed with individual verbs as neurons with the links between them deduced from the number of common translations. The evident group, including a dozen of the most polysemantic verbs is observed, while the rest do not form clear clusters in the verb space. Since the multi-language procedure had been used, there is possibility that this holds for other languages as well. The foreign verbs cover the space in homogeneous manner.

Toward Physics of the Mind: Concepts, Emotions, Consciousness, and Symbols

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Abstract. Mathematical approaches to modeling the mind since the 1950s are reviewed, including artificial intelligence, pattern recognition, and neural networks. A mathematical formulation, unifying the mind mechanisms in a psychologically and neuro-biologically plausible system is proposed and analyzed. A mechanism of the knowledge instinct that drives our understanding of the world and serves as a foundation for higher cognitive functions is underlined.

Ionotropic and Metabotropic Neuron Reactions are Tools of Neural Memories

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Abstract. Neuron reactions produced by neurotransmitters propagated in neuron-glial clefts and resulted conformation transitions of receptors are analyzed. In plasmatic membrane, receptors and integrated channels form the separate mosaics of iono- and metabotropic receptive clusters (IRC and MRC). They realize transmembrane signaling that depends on conformation mobility and separate (sub- or perisynaptic) localization of IRC and MRC. Depending on membrane potential, MRC acts as bistable (W) or monostable (R) molecular trigger allowing to write down or to read the information respectively. The conformation changes were researched under electrical and chemical stimuli. It is shown that dual action of the stimuli transfers a receptive cluster in the third condition, where adhesion immobilizes receptors in cluster. This decreases their conformation mobility and inactivates channel conductivity in IRC. The same converts MRC into engram element. Conformation properties of MRC elucidate mechanisms of short-term and long-term memory and clarify engram stratification on age. Together with synaptic environment, the set of MRCs forms an addressed memory media, where recording and reproducing of neural pulse trains are alternated due to variability of the ERP and slow potentials resulting in space mobility of R/W modes.