

LABORATORY 13

Laboratory of Systems for Behavior Organizing

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The leading researchers of the laboratory include:

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DIRECTIONS OF ACTIVITY:

- associative memory;
- behavior planning;
- computer vision;
- images recognition;
- asymptotic estimates;
- Kolmogorov complexity;
- parallel computations and networks.

MAIN RESULTS

The organization of the purposeful behavioral reactions conceptual model was defined more precisely. The model is intended for the work in real time and for the using of the associative memory based on neural networks architecture. At the frame of this model the algorithms of preliminary vision information processing were constructed together with the programs that implement it such as de) compressing algorithms, structural representation algorithms of 2-D patterns and also the correspondence algorithm between two 2-D patterns for using in the stereo synthesis problems and calculations of the optical stream.

The uniform scheme of automatic binocular correspondence between the contrast elements of 3D-object observed in two central projections based on affine and projective invariants is developed so as numerical model of its 3D reconstruction. The scheme and the model admit parallel implementation and can be generalized for using at the correspondence problem in conditions of monocular dynamics to restore the form of solid nontransparent 3-D object by motion parallax.

The relations between Shannon and kolmogorof complexity and entropy were investigated:

- Kolmogorof variant of "conditional independencitivity" method is developed. Early it used only for Shannon entropy;
- Generalization of the information Jang–Young inequality for the Shannon and kolmogorof complexity and entropy is obtained.

The problem of sufficient statistics searching for kolmogorof complexity of words was studied (by two given words A and B find a word B' with little complexity relative

B for which information $I(A, B')$ not strongly less than mutual information between A and B). It was shown that at the general case the sufficient conditions of this problem solution are also necessary.

Also it was shown that the problem of interpolation by random choice of the interpolation points belongs to class pac-learning. Numerical experiments that affirm the efficiency of Rissanen heuristics for this problem solution were carried out.

The signal estimations at the strongly ill posed inverse problems with adaptive property in the asymptotically exact sense (i.e. achieving the optimal constants at the risks expression) were constructed.

The nonparametric procedure of the independent components problem solution was suggested (the generalization of the main components method at the case when basic directions may be non orthogonal). The procedure is based on evaluation of the matrix density functionals and allows enhance the order of convergence rate for the final density valuation.

A survey of neural network applications in telecommunications is made up further research the problem of neural networks application cellular network control systems substantiated. An example of control system based on fuzzy logic and neural networks for the two-level cellular network presented.

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