Pattern processing of information systems using prospects for compound objects recognition and dynamic model of robots environment creation.

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Modern intellectual systems successfully solve robotic systems control and pattern recognition problems. In general these systems are highly tailored and concrete problem developed. Moreover in the image sensing and primary processing of visual information stage these systems are exceeds the human vision. However in the next stages of visual information processing they are inferior to human vision [1].

One might pattern processing of information presence in living organisms is fundamental feature for solving problems effectiveness and universality.

Natural intelligence operates with two information types – verbal and pattern. Thus artificial intelligence should be possible to use both of these information types in the pattern recognition systems, models of robots environment etc (fig. 1).

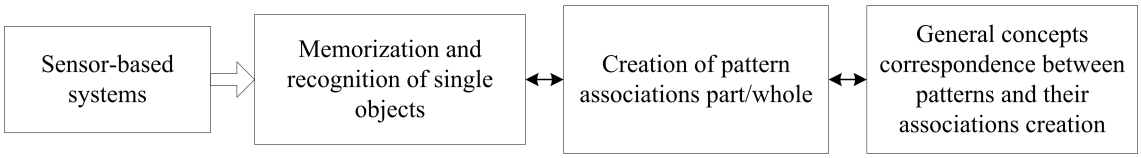

Fig. 1. Functional scheme of memory systems basic modules

Sensory data enters to memorization and recognition of single objects module where taking place the information processing and multisensor integration. This stage includes sequential generalized accumulation of input patterns information.

General accumulation of environment information taking place in the creation of pattern associations part/whole module. These associations are simple relations between whole pattern, its constituents and spatial relations between objects, temporal relations (causal effects) and all there combinations. Thus in general case dynamic 3D environment model creating in this module.

In general concepts creation module (in verbal memory) transfer from patterns to abstract concepts and their generalization is taking place.

All these modules are representing multilevel systems with sequential generalizing of stored data both up and down connection.

Each module of this system general functional scheme is present on fig. 2.

Output level for previous module is input level for current module. Next M levels integrate information. Each memory level is organized by a quantity of neurons [2]. These neurons form K_i ensembles $A^{j,i}$, the ensembles each have pattern.

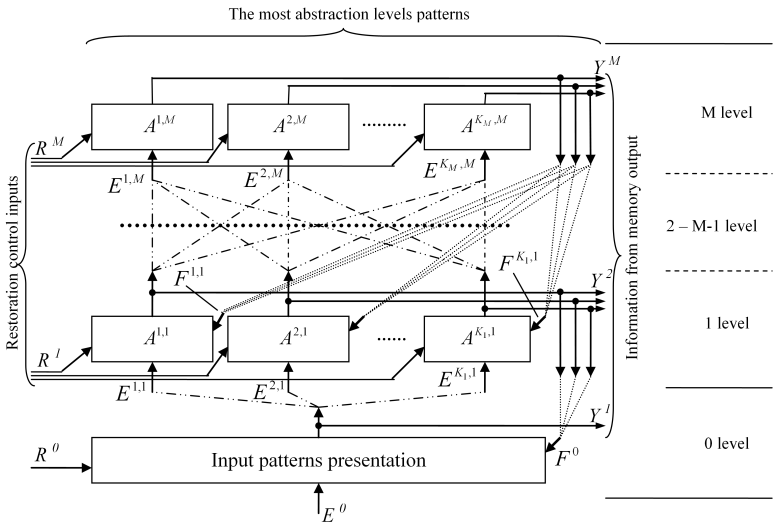

Fig. 2. Multilevel architecture of memory model

Set of integrating associating connections (associations from below) $E^{j,i}$ between ensembles creating by low levels neurons with high levels neurons connections. The connections $F^{j,i}$ from high levels neurons with low levels neurons organizing for specified information restore possibility.

For pattern information restore its necessary stimulate this patterns ensemble by control inputs R^i. The information reading realized from all levels active ensembles.

Suggested pattern information processing model have following preferences:

Information sequential multilevel generalizing that permit in corpore storing and using of memorized patterns information.

Up and down connection presence that permits both generalized and specified pattern information restoring.

Adding of new levels (contexts) of information processing possibility without system change-over.

The dynamic model of neuron using permits real time sensor systems data stream processing.

Considered structure can be effective in dynamic model of robots environment creation, compound objects recognition and human/robot intelligent interface creation. Moreover these systems can be using for generalized video information receiving.

[1] E. Yurevich, A. Bakhshiev. New point of view in computer vision creation // Proceedings of the First All-Russia Scientific and Technical Conference. – Moscow: New Technology, 2004. – p.268-271.

[2] S. Romanov, A. Bakhshiev. Biological neuron simulator // Proceeding of the seminar “Nonequilibrium systems simulation – 2000” (20-22 october 2000 Krasnoyarsk).