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**The cognitive cylinder and the cognitive sphere for the tasks of the system and financial analysis based on the cognitive modeling technology**

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The globalization in the difficult areas and environments directly causes the globalization of the stochastic distributed information environment at the creation, distribution and use of the information products, and also the global economic integration of diverse economy subjects of the economic system of the modern country in the post-industrial society.

The genesis of the cognitive approach is caused by the potential possibility of the system analysis of the difficult objects, processes and phenomena (in technics), and also the vertical, horizontal and trend financial analysis based on the analytical coefficients by means of the cognitive models (in economics).

“Cognitive informatics” acts as the new scientific direction, which directly determines the priority directions of development of the modern of the theory of information in technics, economics, biology and other sciences, and its genesis is caused by the modern achievements in the related areas: the theory of automatic control – the system and model approaches, the management in the social systems – the social-economic approach, the theory of information – the information approach, law – the legal approach, the financial analysis and audit of organization – the financial-economic approach, the accounting, analysis and audit -- the analytic-numerical approach, the economic cybernetics – the mathematical approach and the economic approach, cognitive physiology – the physiology of sensory systems and analyzers, cognitive psychology – the psychology of perception and psychology of “image” and cognitive linguistics – the information interaction of communicators.

For the realization of the system analysis and financial analysis of the “difficult” objects, processes and phenomena it is proposed to consider the cognitive sphere and cylinder, at the same time their central section includes the regularities of Euclid and Pythagoras, and also directly subordinate to the axial and central symmetry in the context of the spatial configuration of points and geometric interpretation.

The cognitive sphere of the difficult object, process or phenomenon acts as the (re)constructed in volume (in width and depth) repertoire of parameters, which directly includes a spherical set of portraits ( $PR_v^l$ ) with a certain scientific justification and mutually embedded simple spheres on two spherical levels: a set of the kinds of properties ( $KP_v^j$ ) and properties ( $Pr_v^k$ ), a set of the vectors of parameters ( $VP_v^l$ ) and elementary parameters ( $P_v^m$ ).

The cognitive cylinder of the difficult object, process or phenomenon acts as the (re)constructed in volume (in width and depth) repertoire of parameters, which directly includes a cylindrical set of portraits ( $PR_v^l$ ) with a certain scientific justification and mutually embedded simple cylinders at two cylindrical levels: a sets of the kinds of properties ( $BC_v^j$ ) and properties ( $Pr_v^k$ ), a sets of the vectors of parameters ( $VP_v^l$ ) and elementary parameters ( $P_v^m$ ).

At the considering of the object, process and phenomenon the system of designations is introduced:  
*i* and *I* – the index of a set of portraits and the actual power of a set of portraits;  
*j* and *J* – the index of a set of the kinds of properties and the power of a set of the kinds of properties;  
*k* and *K* – the index of a set of properties and the power of a set of elementary properties;  
*l* and *L* – the index of a set of the vectors of parameters and the power of a set of the vectors of parameters;  
*m* and *M* – the index of a set of parameters and the power of a set of parameters;  
*v* and *V* – the index of a set of points and the power of a set of points of the plane.

At the spatial rotation a significant value is directly represented by the statics and dynamics of movement of the existing material points on the surface of the cognitive spheres and cylinders with the elements of various sets.

The mathematical model of the cognitive sphere and the cognitive cylinder is characterized by a set of the arithmetic and geometric dimensions.

The geometric measurements of the cognitive sphere and the cognitive cylinder:

$$\left\{ \begin{array}{ll} \text{CR}_1 = x - a; & a - \text{the distance from the origin of coordinates to the center by } x; \\ \text{CR}_2 = \sqrt{r^2 - (x - a)^2}; & b - \text{the distance from the origin of coordinates to the center by } y; \\ \text{CR}_3 = \sqrt{r^2 - (y - b)^2}; & c - \text{the distance from the origin of coordinates to the center by } z; \\ \text{CR}_4 = y - b. & x - \text{the change of coordinate along the axis of abscissa;} \\ & y - \text{the change of coordinate along the axis of ordinate;} \\ & z - \text{the change of coordinate along the axis of applicate.} \end{array} \right.$$

The calculation of radius of the cognitive sphere and the cognitive cylinder for the analysis:

$$r = \sqrt{(x - a)^2 + (y - b)^2 + (z - c)^2}.$$

The coordinates of material points of the cognitive sphere and cylinder in static:

$$\left\{ \begin{array}{ll} x_1 = x = a + \text{CR}_1; & x_2 = x - a = a + \text{CR}_1; \\ y_1 = y = b + \text{CR}_4. & y_2 = y - (\text{CR}_2 + \text{CR}_4) = b - \text{CR}_2. \end{array} \right.$$

$$\left\{ \begin{array}{ll} x_3 = a - \text{CR}_3; & x_4 = a - \text{CR}_3; \\ y_3 = b - \text{CR}_2. & y_4 = b - \text{CR}_4. \end{array} \right.$$

The movement of material points and distances of the cognitive sphere and cylinder:

$$\left\{ \begin{array}{ll} \text{R}_1\text{M}_1 = \sqrt{r^2 - \text{CR}_1^2} = \sqrt{r^2 - (x - a)^2}; & \text{R}_2\text{M}_2 = \sqrt{r^2 - \text{CR}_2^2} = x - a; \\ \text{R}_1\text{M}_2 = \sqrt{r^2 - \text{CR}_1^2} = \sqrt{r^2 - (x - a)^2}. & \text{R}_2\text{M}_3 = \sqrt{r^2 - \text{CR}_2^2} = x - a. \end{array} \right.$$

$$\left\{ \begin{array}{ll} \text{R}_3\text{M}_3 = \sqrt{r^2 - \text{CR}_3^2} = y - b; & \text{R}_4\text{M}_4 = \sqrt{r^2 - \text{CR}_3^2} = \sqrt{r^2 - (y - b)^2}; \\ \text{R}_3\text{M}_4 = \sqrt{r^2 - \text{CR}_3^2} = y - b. & \text{R}_4\text{M}_1 = \sqrt{r^2 - \text{CR}_3^2} = \sqrt{r^2 - (y - b)^2}. \end{array} \right.$$

The fundamental bases have an impact on the development of modern science.

The author prepared two dissertations on the competition of scientific degree of the doctor of science “The environment of automated training with the properties of adaptation based on the cognitive models” in the specialties 05.13.01 – “The system analysis, control and information processing” and 19.00.03 – “Psychology of labor, engineering psychology and ergonomics”, “The cognitive modeling technology for the financial analysis and audit of the organization” in the specialty 08.00.10 – “Finance, monetary circulation and credit”.