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2-simplex prism as a cognitive graphic tool for decision-making and its justification in intelligent dynamic and geoinformation systems

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The idea of n-simplex application, and the theorem for decision-making, and its justification for intelligent systems were proposed by author in 1990. The mathematical visualization of the object under investigation mapping in n-simplex is given. For the first time 2-simplex prism was proposed by author and Yamshanov for decision-making and its justification within intelligent dynamic diagnostic systems in 2015 and within intelligent dynamic predictive systems in 2016. 2-simplex prism is a triangular prism which has identical equilateral triangles (2-simplices) in its bases. The height of the 2-simplex prism in intelligent dynamic systems corresponds to the dynamic process time interval under consideration. The results of each of the diagnostic, predictive decisions are shown in the form of points in 2-simplices disposed on cross-sections of 2-simplex prism. The height of 2-simplex prism is divided into several time intervals. The number of time intervals corresponds to the number of diagnostic or predictive decisions. The distance between two adjacent 2-simpleces is directly proportional to the time interval between adjacent 2-simpleces. For intelligent geoinformation systems the height corresponds to the distance from initial point to destination. In this case the distance between two adjacent 2-simpleces corresponds to the distance between two points on a map. In this paper, the application of 2-simplex prism cognitive graphic tool for a variety of problem areas for intelligent dynamic diagnostic and predictive systems. The problem areas are as follows: medicine, Eco biomedicine, ecology, geology, geoecology, emergency medicine and education. For the first time, the use of 2-simplex prism is proposed for intelligent geoinformation systems. In this paper the mathematical basics of intelligent systems construction and the results of decision-making and its justification in intelligent system for organizational stress, depression diagnostic, intelligent learning and testing systems in the field of discrete mathematics and power electronics are presented.

Biography

Anna Yankovskaya obtained her DSc in Computer Science from Tomsk State University in Russia. She is currently a Head of Intelligent Systems Laboratory and a Professor of the following Universities: Tomsk State University of Architecture and Building, National Research Tomsk State University, Tomsk State University of Control Systems and Radioelectronics, National Research Tomsk Polytechnic University. She is an author of more than 650 publications and 7 monographies. Her scientific interests include mathematical foundations for test pattern recognition, theory of digital devices, artificial intelligence, intelligent systems, learning and testing systems, blended education and learning, logical tests, mixed diagnostic tests, cognitive graphics and advanced technology in education.

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