

Pareto-Nash-Stackelberg game and control theory: present state of things and trends of development

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Abstract

Pareto-Nash-Stackelberg game theory is treated as an integration, abstraction, and development of three distinct branches of classical game theory and the optimal control theory. The current state of things in Pareto-Nash-Stackelberg game and control theory is presented by referring mathematical models of various dynamic processes with concrete characteristics and parameters. Among different examples, we present analyses and investigation for the problem of linear discrete-time Pareto-Nash-Stackelberg control of decision processes that evolve as Pareto-Nash-Stackelberg games with constraints (a mixture of hierarchical and simultaneous games) under the influence of echoes and Ψ phenomena. We present mathematical models, solution notions, conditions for Pareto-Nash-Stackelberg control existence and method for Pareto-Nash-Stackelberg control computing. We expose, too, Wolfram Mathematica applications, demonstrations, benchmarks, and trend of theory development.



Short Bio

Valeriu Ungureanu is currently the dean of the Faculty of Mathematics and Computer Science of Moldova State University, being also an associate professor of the Department of Computer Science, which he has managed in the past.

He has received his doctor degree mathematical cybernetics in 1992 in the Institute of Mathematics of Byelorussian Academy of Sciences. He was the recipient of the Constantin Sibirschi Award of the Moldova Academy of Sciences in 2019. He has more than 125 scientific publications. He has published three textbooks and one monograph in which he established foundation of the Pareto-Nash-Stackelberg game and control theory. Under his guidance, 2 disciples defended their doctoral theses. His current research interests are in domains of Pareto-Nash-Stackelberg game and control theory, optimization methods, computer algebra systems, game design, modeling and 3D animation.