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Noosphere Ventures Corporation
Brno Local Chapter of Union of Czech Mathematicians and Physicists

XXIV International Conference
PROBLEMS OF DECISION MAKING UNDER UNCERTAINTIES (PDMU-2014)

ABSTRACTS

September 1-5, 2014
Cesky Rudolec, Czech Republic

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CONTENT[1]

ЗМІСТ

[1] *The abstracts are publishing in authors edition*
Тези друкуються в авторській редакції

$$\Delta(f,g)=\Delta(h(f,g);f,g)=\langle a,Wa\rangle+\langle d,Ud\rangle.$$

In the case of spectral uncertainty the minimax-robust approach to estimation problem is used. That is we find estimate that minimizes the mean square error for all spectral densities from a given class simultaneously.

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APPLICATION OF STOCHASTIC OPTIMIZATION PROCEDURE TO INVESTMENT PORTFOLIO PROBLEM

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Optimal portfolio of Markowitz model [1] has the following simplified form [2]:

$$\begin{cases} r(u)=\sum_{i=1}^{d} r_i u_i \to \max, \\ \widetilde{C}(u;x)=\sum_{i=1}^{d}\sum_{j=1}^{d} S_{ij}(x) u_i u_j \to \min,\ S_{ij}(x)=c_{ij}x_i x_j, \end{cases}$$

where $r_i=r_i(t)$ – return on i- asset, $x_i=x_i(t)$ – the risk of adverse changes in market quotations for i- asset, $c_{ij}=c_{ij}(t)$, $j=1,..,n$ – correlation coefficients of random variables of return on assets (risk of adding to the portfolio of i- and j-type of asset).

And stochastic optimization procedure (SOP) with Markov switching in series scheme is given by formula (let $\sum_{k=0}^{-1} a_k^{\varepsilon} C(u_k^{\varepsilon},x_k^{\varepsilon})=0$) [3]

$$u^{\varepsilon}(t)=u_0+\varepsilon\sum_{k=0}^{\nu(t/\varepsilon)-1} a_k^{\varepsilon}\nabla_b C(u_k^{\varepsilon},x_k^{\varepsilon}), t\ge 0,\ u^{\varepsilon}(0)=u_0,\ u\in R^d,$$

where $u\in R^d$, and $\nu(t)=\max\{n:\tau_n\le t\}$ – counting process of restoring $\tau_n, n\ge 0$ embedded Markov chain $x_n=x(\tau_n), n\ge 0$ in uniformly ergodic Markov process $x(t)$ in dimensional space $(X,\mathbf{X})$ with generator Q and potential R_0 [4, Subsection 1.6]. Pseudo gradient ∇_b is according to the rule

$$\nabla_b C(u,\cdot)=\left((C(u_i^{+},\cdot)-C(u_i^{-},))/2b(t),\ i=\overline{1,d}\right),$$

$$u_i^{\pm}=u_i\pm b(t)e_i,\ e_i=\{0,...,1,0,...,0\}.$$

Sufficient conditions for convergence of this procedure is in [4]. Described SOP was applied to the search problem of optimal investment portfolio. Simulation results confirm the good convergence of procedure. So, even with partial data on selected assets and their behavior, the use of SOP enables to find the point of extremum for chosen regression function.

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