

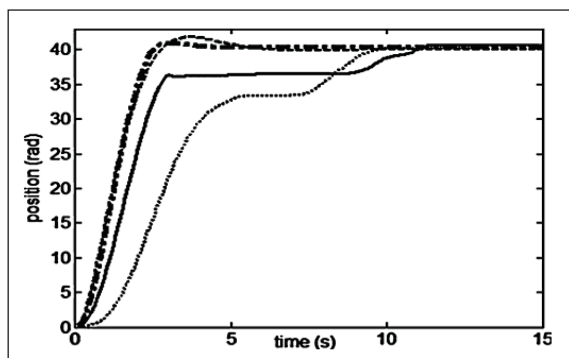
Goal of the project:

Enhance the existing techniques and develop new techniques dedicated to the improvement of control system performance using experimental data.

Short description of the project:

The project aims to:

- Enhance and develop data-based (data-driven) techniques and algorithms for improving control system performances using experimental data.
- Enhance and develop nature-inspired algorithms in optimization of control system performance.
- Develop optical character recognition (OCR) applications.
- Develop new fuzzy control solutions for a wide range of industrial processes.



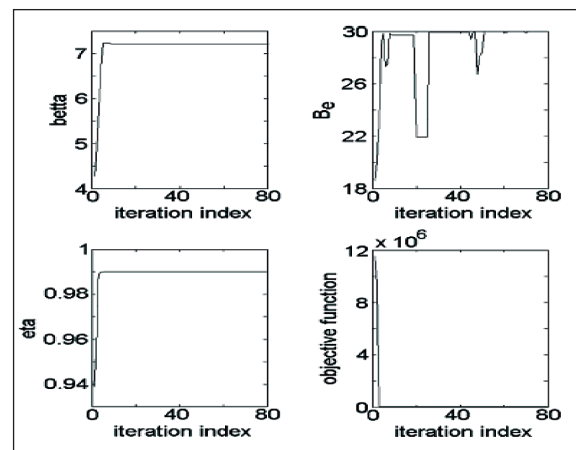
Application of stable Iterative Correlation-based Tuning (ICbT) to servo systems.

An experiment-based approach to Reference Trajectory Tracking optimal control problem.

Validation of iterative techniques on laboratory equipment such as: liquid level control, motion control systems with motor actuation (speed and position control, inverted pendulum).

Enhancement of control systems performance by fuzzy control and IFT.

Enhancement of existing nature-inspired algorithms such as Gravitational Search Algorithm (GSA) and Charged System Search (CSS).



Project implemented by: Department of Automation and Applied Informatics.

<http://www.aut.upt.ro/~rprecupgrant2011.html>

Implementation period: 2011-2014.

Main activities: Application of Iterative Feedback Tuning (IFT) and Simultaneous Perturbation Stochastic Approximation (SPSA) to state-feedback optimal control with Kalman filter state observers.

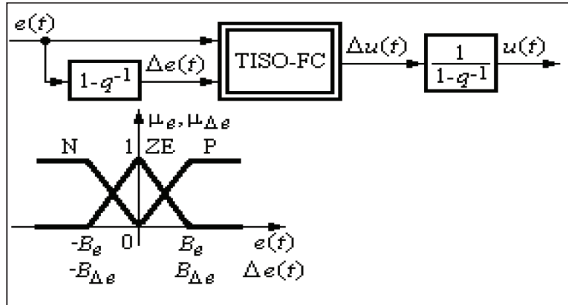
PI and fuzzy controller tuning to ensure a reduced sensitivity with respect to the parametric variations of processes.

Enhancement of the training algorithm of Convolutional Neural Networks using a mixed approach of Back-Propagation and Gravitational Search Algorithm.

Development of telesurgical applications and control of telerobots in space medicine, Control of nonlinear discrete-time MIMO systems.

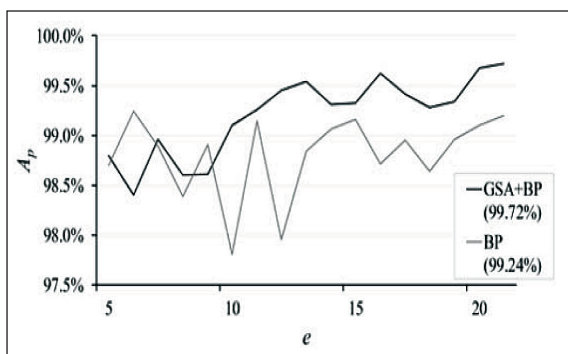
"What we find changes who we become."

Peter Morville



Results:

- 5 papers (ISI) published in journals with impact factors in 2012 (out of 15 reported for the research contract in 2012).
- 2 papers published in conference proceedings (ISI Proceedings).
- 2 book chapters published in Springer-Verlag volumes.
- 4 papers published in conference proceedings indexed by international databases.
- 17 independent citations received in 2012 for the papers reported in the research contract in 2011 and 2012.



Fields of interest: control systems, optimization, motion control, robotics, nature-inspired algorithms, optical character recognition, fuzzy control.

Financed through/by:

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Research team:

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Research centre: Research Centre for Automatic Systems Engineering (CCISA).

Applicability and transferability of the results:

Control systems with a reduced parametric sensitivity, tools for the computer-aided design of controllers, computer-aided techniques in iterative data-based control, nature-inspired optimization algorithms in control design and image processing, tools for the systematic development of fuzzy control systems.

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