"Branding OR"

a Contribution by

EUROPT
EURO Working Group on Continuous Optimization

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Five Real Achievements

(a) Our capacity to solve very large scale optimization problems grows dramatically:
10^3 factor due to computer - 10^3 due to theory.

(b) Novel conic linear and robust optimization methodologies to structural and shape design problems.

(c) Optimization of mobile telecommunication systems,
or:
support vector machines / data mining, for cancer diagnostic, etc..

(d) *MDO* - multidisciplinary design optimization for automobile or aerospace industries.
Breakthrough - the ability to solve realistic complex systems.

(e) *NEOS* - network enabled optimization technology became an standard tool in education and research.

Five Challenging Applications in Future

(a) VLSI and circuit design; very very large scale complex systems as sub-micron technologies emerge
$\rightarrow$ huge MI-LP and -NLP.

(b) Optimal integrated structural and shape design (mechanical and aerospace engineering):

- very large scale PDE based on optimization with integer (choice) variables, etc..

(c) Optimization of biosystems:

  - computational biology (genetics, metabolism; bioinformatics),
  - diagnostics, medicine $\rightarrow$ data mining,
  - treatment and dug design $\rightarrow$ MIP and MI-NLP,
  - medical imaging $\rightarrow$ NLP,
  - brain and heart research $\rightarrow$ inverse problems,
  - ecology, control of earth warming and sustainable development,
  - anticipatory and dynamical (bio-) systems optimized.

(d) Optimization of service and transportation systems:

  - optimal health service delivery,
  - transportation systems,   etc..

(e) Optimization and control of industrial processes:

  - chemical processes / industry
    $\rightarrow$ large scale MIP-NLP with complementarity,   etc..

European Research Projects

(a) Transportation research network (P. Toint).

(b) Network on financial mathematics and optimization (risk management).

(c) Joint international emissions trading, analysis, forecast, and optimal strategies in sustainable low carbon energy management
(B. Karasözen, U. Leopold-Wildburger, S.W. Pickl, M. Türkay, G.-W. Weber).

(d) Many workshops, conferences, a summer institute, various sessions, streams and mini-symposia, publications, special issues of EJOR and continuous learning organized by EUROPT and supported by EURO.

Personal OR Experiences and Stories

(a) Please cf. the "Branding OR" report by J. Gebert and N. Radde about *EURO Summer Summer Institute "Optimization and Data Mining"*, Ankara 2004.

(b) As a further outcome of this ESI 2004, the initiative and group *"Young People for OR in Developing Countries"* was founded (hosted by EUROPT; an Advisory Board is established).

(c) For closer information please visit our homepage
http://www.iam.metu.edu.tr/EUROPT/ with its interesting reports and
links!

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