

P T I M A

Mathematical Programming Society Newsletter

APRIL 2002

$$\omega = -\frac{1}{2} \int_{\tau_i}^{\tau_j} \frac{a^{\tau^b} d \log_e \tau}{\varepsilon^2}$$

$$\tau = \frac{a^{\tau^b} d \log_e \tau}{\varepsilon^2}$$

```

template<class T> class Vector
{
public:
    // Get const access to the data value at the given index.
    const T& operator[] (unsigned int index) const;

    // Get non-const access to the data value at the given index.
    T& operator[] (unsigned int index);
};

void someFunction (const Vector<int>& vector)
{
    int value = vector[0]; // okay (takes const version)
    vector[0] = 0; // error (vector is const)
}

void someFunction (Vector<int>& vector)
{
    int value = vector[0]; // okay (takes non-const version)
    vector[0] = 0; // okay (vector is non-const)
}
    
```

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Report from the outgoing President

Jean-Philippe Vial

December 12, 2001

The Mathematical Programming Society is very special. Its few members are professionally well established and representative of the international community. Its objectives are limited to publishing a scientific journal and to holding a triennial general symposium and two conferences on integer and combinatorial optimization. The journal is top in the field and the meetings are major events with huge attendance. Finally, the organization is informal and rather light, but it proved to be highly efficient and low cost.

My election as chair of MPS has certainly been my greatest professional honor. Before my election, I used to enjoy the facilities the Society offers, as many members do, but I was not aware of the involvement in terms of managing the Society. An informal organization is nice because it avoids bureaucracy, but one has to make sure that the information on past decisions and duties is maintained and transmitted. In that respect, the overlap in the presidential terms is very useful. Our new service provider is also a great help in the management. A new president has nonetheless much to discover, however strong is the support he gets from the outgoing team. I want to share with you some of what I learned and accomplished during my period.

The highlight in the presidential term is the Symposium. Atlanta was a big success, attracting over a thousand participants. It was praised for the high quality of the plenary lectures, the level of the presentations by the participants and the moving ceremony in honor of founders of our discipline. Two IPCO meetings were held during my term, one in Gr az (1999) and the other in Utrecht (2001). The Society was also asked to sponsor scientific meetings in optimization, especially one in honor of Caratheodory (Samos, 2000) and also the first sino-japanese meeting in optimization (Hong Kong, 2000).

The second most important purpose of the Society is the journal. Mathematical Programming A and B is now published by Springer. L. Wolsey and W. Cook replaced D. Goldfarb and J. Birge, as Editors-in-Chief. The past and the new teams maintain the high quality of the journal and strive to achieve proper balance between the different fields that compose Mathematical Programming. In addition to these publications, MPS, jointly with SIAM, launched in the year 2000 a new book series in optimization, named Mathematical Programming C. The series aims to promote books that are likely to become future references in the field of optimization. J. Dennis is the first Editor-in-Chief. Finally, our newsletter OPTIMA has become through the years a very attractive journal with high quality featured articles. We are grateful to K. Aardal for having made this newsletter so lively. J. Clausen in collaboration with A. Caprara and R. A. Bosch has taken over recently the editorship and they will certainly succeed in making the newsletter an entertaining publication.

It is worth mentioning that the joint venture with SIAM on MPC has an interesting side value for MPS members. SIAM extends to all MPS members the discount on books it offers to its members. Even though MPS has no tie with Kluwer, this publishing company will also offer to MPS members a 30% discount on all books and journals.

Journals and books are no longer the only media for communicating scientific contributions. Fast circulation of preprints is a necessity. On the initiative of S. Wright, a new informal electronic distribution of papers has been launched. It is named Optimization on Line (<http://www.optimization-online.org>) and it is jointly managed by MPS and OTC (Optimization Technology Center). Please, visit the site, submit your paper and retrieve material!

The third area of concern is the management

of the prizes. Over the years, those prizes have been attributed to outstanding scholars. They contribute to highlight key contributions in optimization. It is the explicit responsibility of the MPS president to appoint committees to propose prize winners, and we can thank those committees for the excellent 2000 vintage. However modest in monetary terms, the prizes need funding. A fund raising campaign for the Fulkerson prize was lead by B. Bixby and J.-K. Lenstra. They managed to collect over \$35000. The revenues of the endowment will finance the prize in the long term. A similar situation holds for the Dantzig prize. Aside from those two prizes and from the Beale-Orchard-Hayes and the Tucker prizes, MPS is currently investigating the possibility of adding a fifth prize to this collection, in the area of continuous optimization.

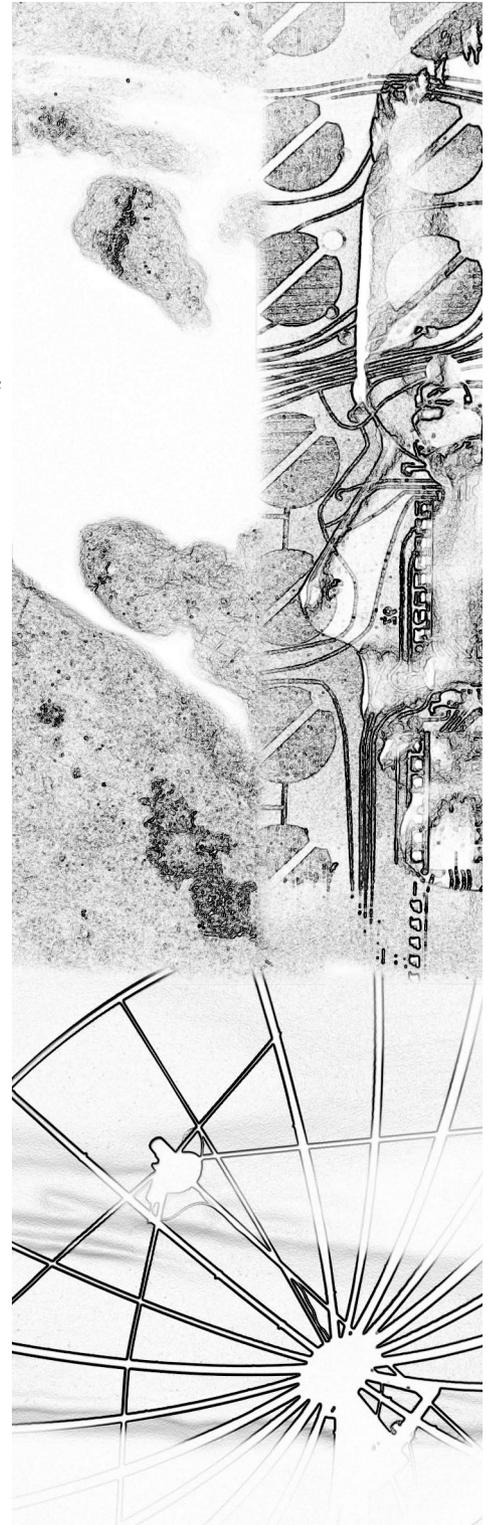
Finally, I wish to let our members know that MPS is alive thanks to the active support of many volunteers. One of the most demanding positions for these volunteers is the one of chair of the executive committee. This position is not an elective one, and many may not know of its existence. The chair of the executive committee is the main coordinator, and often the one who makes things work. I want to express deep thanks to S. Wright, whose competence and willingness to help have been my best support during my presidency. F. Rendl has taken over the job near the end of my term. The other contributors to the Society are the Council members that are elected, they help deciding by their advice and their vote on all important issues. Lastly, the Society works with several committees, statutory ones like the publication committee (T. Liebling, chair) and the symposium advisory committee (T. Liebling and then G. Nemhauser, chairs) and ad hoc committees; the

web site committee (C. Monma, chair), the prize rules committee (K. Anstreicher, chair) and the new prize committee (S. Robinson, chair). They, and the committees they chaired, deserve our thanks for their dedication.

Financially the Society is sound. Springer, the new publisher of MPA&B pays royalties on the library subscriptions. We also benefit from much better services for the MPS administration from SIAM organization, and the managing cost are well covered by our revenues.

In leaving the presidency, I have one regret, that the membership has not increased during my term. Despite several promotional campaigns, the membership is slightly above 800. I feel that we should be more numerous to preserve this exceptional blend of high scientific, international and friendly participation. We need to better advertise the Society. Two initiatives may help. K. Aardal has prepared a nice brochure that is available as a hand-out at conferences. We also decided on a drastic overhaul of the MPS web site. A. Martin is in charge of the work. We hope that the new site will soon be accessible. However, it is our common duty to attract new members, especially young people, who will soon become those who keep Mathematical Programming alive and flourishing.

NOTE from the editor: In the next issue of OPTIMA, the new president of MPS, Robert E. Bixby, will give his view of the status and future of the Mathematical Programming Society.

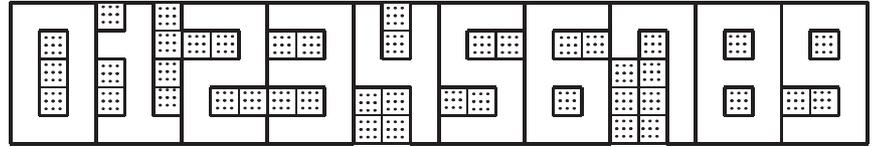


mind sharpener

We invite OPTIMA readers to submit solutions to the problems to Robert Bosch (bobb@cs.oberlin.edu). The most attractive solutions will be presented in a forthcoming issue.

Digit Tiles

Robert A. Bosch
December 17, 2001



$$0 \cdot 2 + 1 \cdot 3 + 2 \cdot 4 + 3 \cdot 6 + 4 \cdot 7 + 5 \cdot 8 + 6 \cdot 5 + 7 \cdot 6 + 8 \cdot 9 + 9 \cdot 4 = 277$$

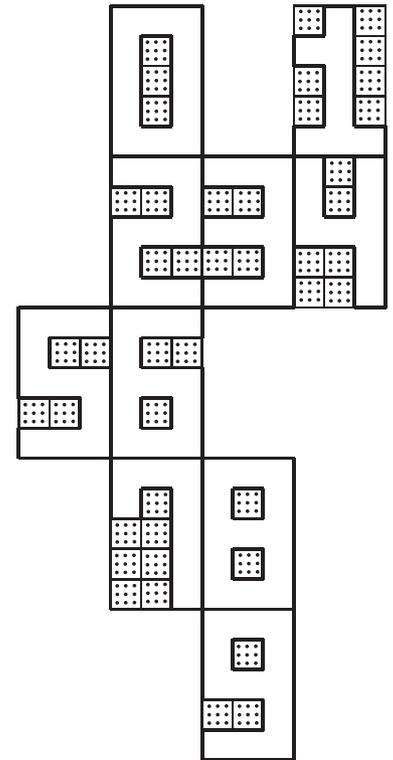
Figure 1

Figure 1 displays one way to arrange the ten *digit tiles* on a 5 x 30 board. Each tile is made up of white squares (foreground) and gray squares (back-ground), and each arrangement can be given a point value. To compute the point value of an arrangement, we will add up, over all digits d , d times the number of white squares touched by the white squares of digit d . The Figure 1 arrangement, for example, has point value 277.

Problems

Interested readers may enjoy trying to solve the following problems. The first two were devised by Cihan Altay, an engineering student who runs the Turkish puzzle site www.otuzoyun.com. The first was one of the "puzzles of the week" on Ed Pegg's site www.mathpuzzle.com last year.

1. Arrange the digit tiles on a 5 x 30 board (as in Figure 1) in such a way that the maximum possible point value is obtained.
2. Arrange the digit tiles on a 5 x 30 board in such a way that the point value is minimized.
3. Arrange the digit tiles in an edge-to-edge fashion (as in Figure 2) in such a way that the maximum possible point value is obtained.
4. Arrange the digit tiles in an edge-to-edge fashion in such a way that the point value is minimized. (Note: The arrangement must be connected.)



$$\begin{aligned} &0 \cdot 3 + 1 \cdot 2 \\ &+ 2 \cdot 9 + 3 \cdot 6 + 4 \cdot 5 \\ &+ 5 \cdot 4 + 6 \cdot 10 \\ &+ 7 \cdot 8 + 8 \cdot 8 \\ &+ 9 \cdot 3 = 285 \end{aligned}$$

Figure 2

Two Domino Problems Revisited

Robert A. Bosch

The previous installment of *Mindsharpeners* was concerned with the construction of pictures with dominoes. The first problem was to construct a replica of an abstract picture using one complete set of double nine dominoes. The solution is displayed in Figure 3. The second problem was to use three complete sets to construct the “best possible approximation” of Leonardo DaVinci’s Mona Lisa. The author’s best solution is displayed in Figure 4. Both of the solutions were obtained using the same integer programming formulation.

Variables

Each double domino has two orientations: h (horizontal) and v (vertical). Each non-double domino has four orientations: h_1 (horizontal with the lower-numbered square on the left), h_2 (horizontal with the lower-numbered square on the right), v_1 (vertical with the lower-numbered square on top), and v_2 (vertical with the lower-numbered square on the bottom). Let $x_{m,n,o,i,j}$ equal 1 if domino (m, n) is placed in orientation o with its top left square in the row- i -column- j square of the board and 0 if not.

Objective Function

Let $c_{m,n,o,i,j}$ equal the number of “mismatching pixels” obtained if domino (m, n) is placed in orientation o with its top left square in the row- i -column- j square of the board. (For the Figure 3 problem, the cost of placing domino $(4, 9)$ horizontally with the 4 in the top left square of the board is $1 + 2 = 3$.) The objective is to minimize

$$\sum_{m,n,o,i,j} c_{m,n,o,i,j} x_{m,n,o,i,j}.$$

Constraints

Let s equal the number of sets of dominoes. The constraint

$$\sum_{o,i,j} x_{m,n,o,i,j} = s$$

stipulates that domino (m, n) is to be used s times. The constraint

$$\begin{aligned} & \sum_m x_{m,m,h,i,j} \\ & + \sum_m x_{m,m,h,i,j-1} \\ & + \sum_m x_{m,m,v,i,j} \\ & + \sum_m x_{m,m,v,i-1,j} \\ & + \sum_{m<n} x_{m,n,h_1,i,j} + \sum_{m<n} x_{m,n,h_2,i,j} \\ & + \sum_{m<n} x_{m,n,h_1,i,j-1} + \sum_{m<n} x_{m,n,h_2,i,j-1} \\ & + \sum_{m<n} x_{m,n,v_1,i,j} + \sum_{m<n} x_{m,n,v_2,i,j} \\ & + \sum_{m<n} x_{m,m,v_1,i-1,j} + \sum_{m<n} x_{m,m,v_2,i-1,j} = 1 \end{aligned}$$

states that the row- i -column- j square of the board must be covered by exactly one domino.

Results

The Figure 3 (abstract) problem had 20,000 variables and 165 constraints. CPLEX Linear Optimizer 6.6.0 required 1.6 seconds and 0 branch-and-bound nodes to find the optimal solution. The Figure 4 (Mona Lisa) problem had 62,300 variables and 385 constraints. On this problem, CPLEX required 44.3 seconds and 0 branch-and-bound nodes. All computations were performed on a 800 Mz Pentium III PC with 384 MB RAM.

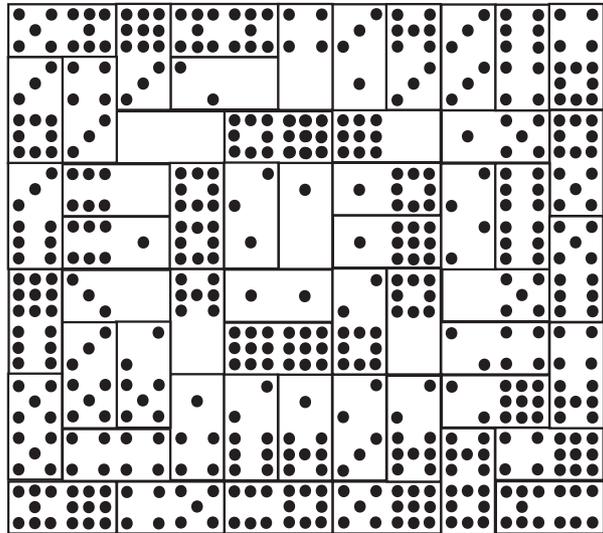


Figure 3

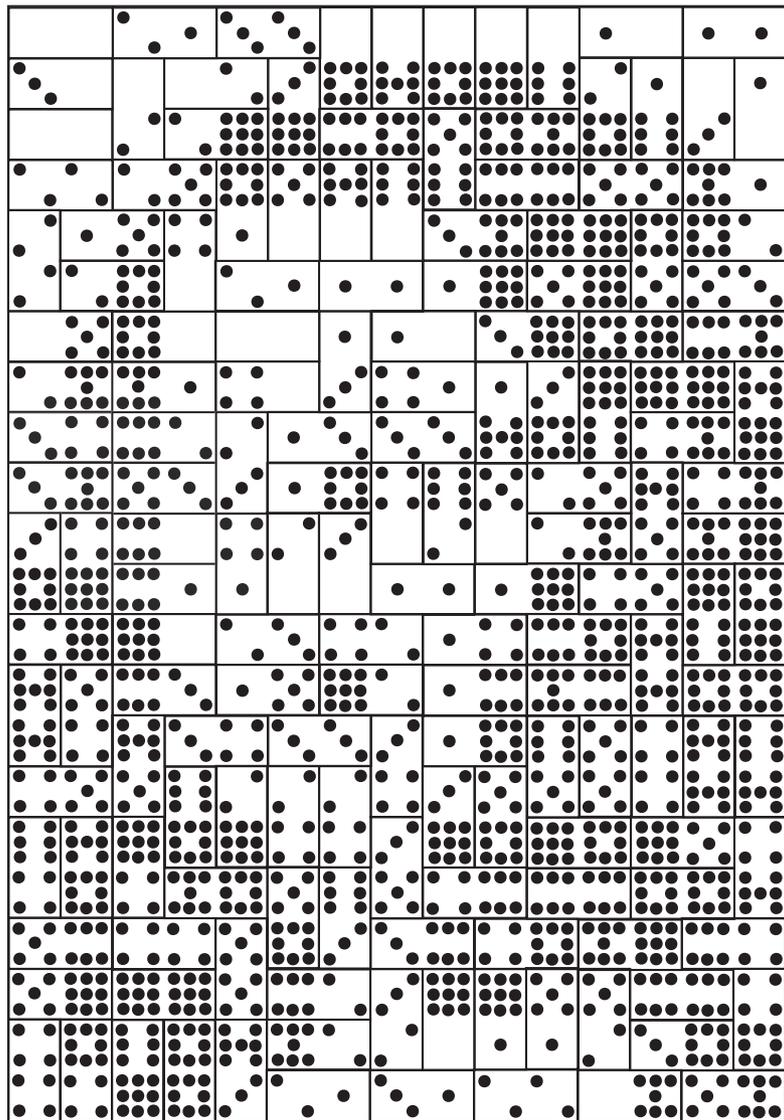


Figure 4

MATHEMATICAL DIAGNOSTICS

Workshop

June 17 - June 25 , 2002

Ettore Majorana Centre for Scientific Culture
International School of Mathematics "G.
Stampacchia"
Erice - Sicily, Italy

PURPOSE OF THE WORKSHOP

Stating a diagnosis is a decision making process that takes place in many different fields of the human activities. It is, of course, a crucial step in medicine, but also in a wide range of practical activities, such as finance, pattern recognition, study of experimental data, astronomy, engineering diagnostics, data mining etc. Quite often the diagnostic process reduces to a classification process, i.e. to select exactly one set from among several sets an individual can belong to. This is the typical case of medical diagnosis, where for a given patient it has to be decided whether or not he is affected by a specific pathology. In recent years effective mathematical tools have been designed to support diagnostics. Optimization methods as well as neural networks and decision trees have been successfully adopted. From the mathematical point of view, diagnostics is strictly connected to Hahn-Banach type theorems (separation properties of sometimes inseparable sets in finite dimensional spaces). Many new and sophisticated mathematical models are of a nonsmooth nature, in the sense that they require to solve nonlinear optimization problems that involve nondifferentiable functions. The workshop is intended for both people interested in research and in applications; it is primarily aimed at assessing the state-of-the-art of the subject, giving to the scientific community the opportunity of comparing diverse approaches exposed by experts coming from different fields. Additional objectives are to present the new results that many scientists in several countries are obtaining by using mathematical programming tools and to describe significant applications of mathematical diagnostics. Participation of experts from application areas as well as that of young scientists will be strongly encouraged.

TOPICS

Medical Diagnostics
Kernel Methods for Pattern Recognition
Support Vector Machines
Neural Networks
Inductive Inference
Foundations of Computer Learning
Bayesian Classification
Diagnostics of Dynamic Processes
Massive Data Sets
Clustering

INVITED LECTURERS

F. Archetti,
University of Milano, Italy
K. Bennett,
Rensselaer Polytechnic Institute, NY, USA
V. Boltyansky,
CIMAT, Guanajuato, Mexico
S. Bombardieri,
Facoltà di Medicina, Università di Pisa, Italy
N. Cristianini,
Royal Holloway University of London, UK
R. De Leone,
University of Camerino, Italy
A. B. Kurzhanski,
Moscow State University, Russia
V. N. Malozemov,
St. Petersburg State University, Russia
L. Murri,
Facoltà di Medicina, Università di Pisa, Italy
D. Pallaschke,
University of Karlsruhe, Denmark
P. Pardalos,
University of Florida, Gainesville, USA
E. Polak,
University of California at Berkeley, USA
A. Rubinov,
University of Ballarat, AUS
N. Shor,
Glushkov Institute of Cybernetics, Kiev, UKR
V. Vapnik,
AT&T Labs-Research, Middletown, NJ, USA
R. Zoppoli,
University of Genova, Italy

APPLICATIONS

Persons wishing to attend the workshop should write to:

Professor Manlio Gaudioso
D.E.I.S. - Università della Calabria
e-mail: erice2002@deis.unical.it

Closing date for application: April 30, 2002

V. F. Demyanov and M. Gaudioso,
Directors of the Workshop
F. Giannessi, *Director of the School*
A. Zichichi, *Director of the Centre*

APMOD 2002

Call for papers

Applied Mathematical Programming and Modelling

University of Milano-Bicocca

June 17-19, 2002

Villa Monastero, VARENNA (Como), ITALY

THEME

APMOD, is a traditional opportunity to foster professional contacts and conduct fruitful scientific discussions for all those involved in the industrial application of mathematical modelling and software systems. The symposium is set out to attract specialists with different background including academic and industrial researchers. The theme is open, but contributions on Mathematical Programming models to solve large, practical and difficult problems and on the integration of Mathematical Programming with Decision Theory and Information Technology are particularly appreciated.

HISTORY

APMOD2002 is the sixth in the series of successful events. APMOD91, the first in the series took place at Brunel University, UK, 1991, as well as the third and the fifth events, 1995 and 2000, respectively. The second took place in Budapest, Hungary, 1993 and the fourth in Limassol, Cyprus, 1998. This series of events compliments the triennial Mathematical Programming Symposia and has established a good tradition for disseminating research results of this community. In particular each event is followed by a refereed publication which is well regarded by the participating scientists.

SITE AND LOCATION

APMOD2002, will be held at Villa Monastero in Varenna, a picturesque medieval village, rich in artistic monuments on the east coast of Lake Como. The location is a tourist destination traditionally appreciated for its stupendous nature and landscape.

TOPICS INCLUDE

Large Scale Linear Programming
 Integer Programming
 Non Linear Programming
 Modelling Systems
 Stochastic Programming
 Financial Investment Models and
 Risk Management
 Data Mining and Computational Networks
 Combinatorial Optimization
 Telecommunication Problems
 Energy Planning Models
 Environmental Management
 Supply Chain Management

CALL FOR PAPERS

Those wishing to present papers should send an abstract of maximum 300 words by February 1, 2002. The abstract, written in a text or word format file should contain: title, authors, affiliations (phone, email), three key words and at most five references. The file should be sent to: apmod2002@disco.unimib.it or to the following address:

APMOD2002
 Dipartimento di Informatica,
 Sistemistica e Comunicazione
 Università degli Studi di Milano - Bicocca
 Via Bicocca degli Arcimboldi 8
 20126 Milano - Italy

Upon notification of acceptance, an extended abstract is required by May 31, 2002.

PUBLICATIONS

APMOD has developed a tradition of publication with Baltzer Press and, as before, a refereed publication within ANNALS of OR with P. Hammer as series editor is planned.

DATES

| | |
|-------------------------------|-------------------|
| Submission of short abstracts | February 1, 2002 |
| Acceptance notice | February 15, 2002 |
| Preliminary Programme | March 15, 2002 |
| Extended Abstracts | May 31, 2002 |
| Full Programme | June 15, 2002 |

CONTACT

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 Fax: +39 02 64487839
 e-mail: apmod2002@disco.unimib.it
 URL: <http://www.disco.unimib.it/apmod2002>

ADDRESS

Dipartimento di Informatica Sistemistica e Comunicazione
 Università degli Studi di Milano-Bicocca
 Via Bicocca degli Arcimboldi, 8
 20126 Milano, Italy

ISMP 2003 in Copenhagen

Progress Report
Jens Clausen

As described in the last issue of OPTIMA, the next symposium of MPS is to be held in Copenhagen in August 2003. The planning is progressing, and right now the program committee is finalizing the list of speakers invited for plenary and semi-plenary talks. The following speakers have already accepted the invitation from the program committee. The titles are tentative and may in the final program change slightly.

Kurt Anstreicher,
University of Iowa:
"Quadratic Assignment"

William J. Cook,
Princeton University:
"Traveling Salesman"

Sanjeev Arora,
Princeton University:
"Approximation of NP-hard
Problems"

Daniel A. Spielman,
MIT:
"Smoothed Analysis"

Francis Clarke,
University of Lyon-1:
"Control Theory to those with a
mathematical programming culture"

Susanne Albers,
University of Freiburg:
"On-line algorithms"

Siemion Fajtlowicz,
University of Houston:
"Mathematical Problems of
Automated Conjectures"

Adrian Lewis,
Simon Fraser University:
"Eigenvalue Optimization"

Stephen M. Robinson,
University of Wisconsin:
"Variational Analysis" or
"Dynamic Stochastic Optimization"

Laurence A. Wolsey,
Universite Catholique de Louvain:
Topic yet to be decided.

Arie Tamir,
Tel Aviv University:
"Facility Location on Networks: Models
and Algorithms"

Renato Monteiro,
Georgia Institute of Technology:
"Interior Point Methods/Semidefinite
Programming"

Robin Thomas,
Georgia Institute of Technology:
"Perfect Graphs"

Tom Luo,
McMaster University:
"Optimization and Engineering, Signal
Processing"

Miklós Simonovits,
Alfréd Rényi Institute of Mathematics,
Hungarian Academy of Sciences:
"Volume Computation"

Mikael Rönnqvist,
Linköping University:
"Optimization in Forestry"

We expect one additional speaker in the final program.

On the social side, the conference dinner is planned to be held on Tuesday August 19 at a location in the part of Copenhagen, which until 10 years ago housed a Danish Navy base (Holmen). A boat trip through the channels of the inner Copenhagen will precede the dinner. On Wednesday August 20, the City of Copenhagen will receive the conference participants for a reception.

CALL FOR NOMINATIONS

Optimization Prize for Young Researchers

PRINCIPAL GUIDELINE. The Optimization Prize for Young Researchers, established in 1998 and administered by the Optimization Section (OS) within the Institute for Operations Research and Management Science (INFORMS), is awarded annually at the INFORMS Fall National Meeting to one (or more) young researchers for the most outstanding paper in optimization that is submitted to or published in a refereed professional journal. The prize serves as an esteemed recognition of promising colleagues who are at the beginning of their academic or industrial career.

DESCRIPTION OF THE AWARD. The optimization award includes a cash amount of US\$1,000 and a citation certificate. The award winners will be invited to give a fifteen minute presentation of the winning paper at the Optimization Section Business Meeting held during the INFORMS Fall National Meeting in the year the award is made. It is expected that the winners will be responsible for the travel expenses to present the paper at the INFORMS meeting.

ELIGIBILITY. The authors and paper must satisfy the following three conditions to be eligible for the prize:

- (a) the paper must either be published in a refereed professional journal no more than three years before the closing date of nomination, or be submitted to and received by a refereed professional journal no more than three years before the closing date of nomination;
- (b) all authors must have been awarded their terminal degree within five years of the closing date of nomination;
- (c) the topic of the paper must belong to the field of optimization in its broadest sense.

NOMINATION. A letter of nomination should be sent (preferably by email) on or before this year's closing date of July 1, 2002, to:

Renato D. C. Monteiro
monteiro@isye.gatech.edu
Georgia Tech
School of ISyE
Atlanta GA 30332-0205

PAST AWARDEES. The past winners of the Optimization Prize for Young Researchers are:

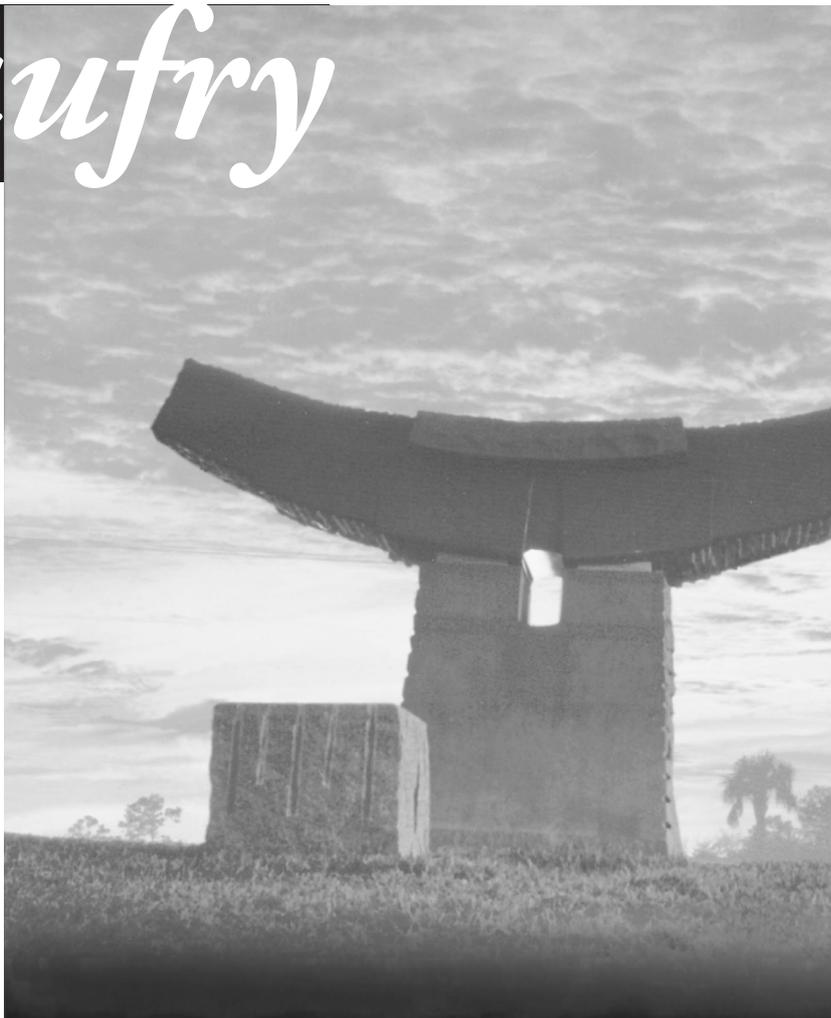
| Year | Prize Winner |
|------|-----------------|
| 1999 | Francois Oustry |
| 2000 | Kevin Wayne |
| 2001 | Kamal Jain |

gallimaufry

Short news on persons?

The space is HERE

- just contact the editor.



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- 0-387-98705-3** Bonnans, Shapiro, Perturbation Analysis of Optimization Problems. US ~~\$79.95~~ \$59.96
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- 0-387-98512-3** Crauel, Gundlach (Eds.), Stochastic Dynamics. US ~~\$64.95~~ \$48.71
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- 3-540-41554-8** Marks (Ed.), Graph Drawing. US ~~\$59.00~~ \$44.25
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- 3-540-66061-5** Michalewicz, Fogel, How to Solve It: Modern Heuristics. US ~~\$49.95~~ \$37.46
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DESIGNER:
Christina Loosli
PUBLISHED BY THE
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GATOREngineering® PUBLICATION SERVICES
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