



**EURO SUMMER INSTITUTE
ESI XXII
Optimization and Data Mining**

Ankara, Turkey, July 9-25, 2004

<http://www.iam.metu.edu.tr/esi04/index.html>

FINAL REPORT

Summary

This is the final report of XXII EURO Summer Institute which took place at Middle East Technical University (METU) in Ankara, Turkey, from July 9-25, 2004, on the subject “*Optimization and Data Mining*”. ESI XXII has been sponsored by

- *Association of European Operational Research Societies (EURO)*,
- *Turkish Scientific and Technological Research Council (TUBITAK)*

And supported by

- *Institute of Applied Mathematics (IAM)* , METU
- *Operational Research Society of Turkey (ORST)*

The idea of ESI XXII was born and developed during *EURO/INFORMS Joint International Meeting* (Istanbul, July 6-10, 2003) and, together with that conference, ESI XXII has become a key events in the course of European collaboration in the field of Operations Research (OR), supported and surrounded by Turkish hospitality, rich old culture and enthusiasm of its young scientific generation. Herewith, we tried to justify the great confidence and sympathy which have been given to us by EURO, by the OR societies.

The scientific atmosphere and challenge which could be felt and celebrated by our ESI XXII community during the 2-3 weeks in Ankara, based on the combination of its two parts, of two scientific research fields and traditions within of OR and EURO:

- ***data mining***, being widely accepted and appreciated today as a key application field in management sciences, natural sciences and engineering,
- ***optimization***, being a modern key technology prepared and offered by

mathematics and related sciences.

The computer revolution has paved the way to a search for techniques capable of dealing with the huge amount of data information around us in all branches of sciences, bringing new theoretical and computational challenges to exciting research areas ranging from web page clustering, to computer vision, financial mathematics and bioinformatics, etc., to mention just a few. The perceptron algorithm, support vector machines, margin classifiers, k-means clustering, EM-algorithm, are just few examples of the terminologies we often encounter in classification, clustering and machine learning problems. Optimization algorithms and techniques are often at the heart of such methodologies, and a variety of other properties leading to interpretation and computation of solutions relies on optimization techniques as well.

The scientific aim of this summer institute consisted of seeking solutions to challenging data mining problems within the use and development of advanced / modern mathematical optimization and statistics tools. The special structures often encountered in data mining systems also provide motivation for further investigations on new optimization methods and algorithms capable of handling very large scale data, and hence this summer meeting will advance both areas.

As Prof. Dr. Jakob Krarup (University of Copenhagen, Denmark) is his lecture during the ESI opening pointed out, our ESI XXII in Ankara, on the Anatolian part of Turkey, has the first EURO Summer Institute outside of Europe which implies a bridge function. The news about ESI XXII spread into all over Turkey; many scientists in the field were attracted and made a short visit of ESI 2004. Herewith, our summer institute in Turkey gave a strong impulse of science and friendship to Europe and the world. Furthermore, ESI XXII is embedded into a line of scientific events organized by EURO Working Group on Continuous Optimization (EUROPT) and EURO in these years 2003-2005, taking place in the South East and East of Europe, inviting and supporting the colleagues and youth there, and always having the European and OR perspective of well understanding, participation and collaboration in mind.

This report consists of the following sections:

- ***Organisation***
- ***Before ESI 2004***
- ***ESI 2004 Itself***
- ***Feedback and Conclusion***
- ***Appendices***
 - ***Appendix A: Financial report***
 - ***Appendix B: Program***
 - ***Appendix C: Abstracts of Talks***
 - ***Appendix D: Pictures of ESI***

Organization

ESI XXII has been governed by two structures: the *Organizing Committee* being in the charge of logistics and the practical running of ESI XXII and various scientific decisions, and *Scientific (Programme) Committee* aimed at constituting the entire scientific direction and framework, to give advice on invitation of ESI teachers and final deciding about the ESI students' participation.

These two councils of colleagues were:

Organising Committee:

- Bülent Karasözen, METU (Ankara, Turkey), *Chairman of ESI 2004*
- Mirjam Dür, TU Darmstadt (Darmstadt, Germany)
- Tibor Illes, Eötvös Lorand University of Sciences (Budapest, Hungary)
- Sinan Kayaligil, METU (Ankara, Turkey)
- Stefan W. Pickl, University of Cologne (Cologne, Germany)
- Mustafa Pınar, Bilkent University (Ankara, Turkey)
- Leonidas Sakalauskas, Institute of Mathematics and Informatics (Vilnius, Lithuania)
- Gerhard-Wilhelm Weber, METU (Ankara, Turkey), *Co-Chairman of ESI 2004* ,

Scientific Programme Committee:

- Aydın Aytuna, METU (Ankara, Turkey)
- Miguel Goberna, University of Alicante (Alicante, Spain)
- Refik Güllü, METU (Ankara, Turkey)
- Florian Jarre, University of Düsseldorf (Düsseldorf, Germany)
- Tamas Terlaky, McMaster University (Hamilton, Canada)
- Hayri Körezlioglu, METU (Ankara, Turkey)
- Katya Scheinberg, IBM (New York, USA)
- Marc Teboulle, Tel-Aviv University (Tel Aviv, Israel), *Chairman*
- Theodore Trafalis, University of Oklahoma (Norman, USA).

Chairman of the Scientific Committee has been Marc Teboulle; chairman of the Organizing Committee and ESI Chairman has been Bülent Karasözen, the co-chairman has been Gerhard-Wilhelm Weber.

Before ESI 2004

The project idea of our ESI 2004 arose during *EURO/IFORS Joint International Meeting* (Istanbul, July 6-10, 2003). In those days, having just finished *EUROPT Workshop on Advances in Continuous Optimization* (Istanbul, July 4-5, 2003) with its likewise exciting atmosphere and dynamics guaranteed, last but not least, by the enthusiasm of young Turkish participants, some active members of EUROPT and also EURO Working Group on Complex Societal Problems, especially, Dr. Dorien De-Tombe, became in favour, active in supporting our ESI application. Despite the fact, that the deadline for ESI submission had passed already, doors opened and we were still allowed to prepare and to submit our application. The authors are very grateful to

Prof. Dr. Zilla Sinuany-Stern and to the other members of EURO Executive Council. In the following weeks, we prepared our application for ESI XXII in 2004 with a lot of energy and care. It became a common project of EUROPT, ORST (Operational Research Society of Turkey) and IAM (Institute of Applied Mathematics) of METU. Our application was accepted during the meeting of EURO Executive Meeting in 2003.

We proceeded with our preparations and announcements of ESI XXII in Ankara, Turkey. In autumn 2003, we send an invitation and, later on, in April 2004, a reminding invitation to our ESI 2004 via EURO, where ESI 2004 became announced by e-mails to national OR societies, to IFORS and related continental OR societies, and by registration of ESI 2004 in the *Calendar of the Association of European Operational Research Societies* (<http://www.euro-online.org>). Furthermore, advertising and information about our ESI was since the end of since April 2004 done by the *EURO (Online) Bulletin* under <http://www.euro-online.org/onlineBulletin.php>. Finally, we gave detailed information and made further announcements about ESI 2004 by ESI homepage <http://www.iam.metu.edu.tr/esi04/index.html>, by EUROPT working group homepage under <http://www.iam.metu.edu.tr/EUROPT/> and by the EUROPT link at http://www.euro-online.org/display.php?page=working_groups& on EURO home-page. By all these treatments, by many special e-mails and a number of mailing lists used, many interested people got aware and attracted by our initiative of ESI XXII in Turkey project.

By the end of April 2004, 26 applications by young people reached us via national OR societies, via *IFORS*, *ALIO*, and also via professors from the countries Russia and Ukraine, which are not in EURO, or, by exception, via direct e-mails sent to us if the deadline of application via the national OR society had passed or no local contact person was known. Among these submitted applications, there has been one student sent to us via *ALIO*, namely, Kelly Cristina Poldi (Brasil) and two students sent to us via *IFORS*, namely, Fernando Alexis Crespo Romero (Chile) and Sethuraman J (India). Based on the recommendation of their societies and teachers, we from ESI XXII Organizing and Scientific Committee finally accepted all our applicants and their requested draft papers.

The tentative ESI programme became published in June 2004, the final program became completed at the beginning of July 2004 and distributed to all participants of our ESI.

The total number of young participants turned out be **23**, and the number of invited lecturers was **9**, thus the total number of all our guests became **32**. Our ESI 2004 participants travelled to us from **20** different countries: Australia, Brazil, Chile, Denmark, France, India, Italy, Germany, Hungary, Lithuania, The Netherlands, Norway, Poland, Portugal, Russia, Spain, Switzerland, Turkey, United Kingdom and USA.

C. ESI 2004 Itself

In order to give to all our ESI participants the opportunity to make new scientific and social experiences, to learn and to develop their skills in the fields of optimization and data mining, to explore a country which is new for most of them, ESI XXII was organized on the wide and green *campus of Middle East Technical University*. The METU combines the advantages of fresh air and calmness with modern facilities and with the dynamical and vivid young atmosphere of student life.

ESI XXII took place in *Exhibition Hall of University Library of METU*. Teachers and young participants were accommodated in *Guesthouse and Students Guest House of METU*. The session program including a break at midday of three hours, the accommodation and feeding of the participants were organized in the neighbourhood of a 10 minutes walking distance.

The final programme can be found in *Appendix C*. It consists of the enclosed document <http://www.iam.metu.edu.tr/esi04/esiprogram.pdf>. There were only a few “last-minute changes”.

All invited speakers of ESI XXII remained for 6-16 days to share common time with our young people: at the lecture time, at the meals and social events, or just in between. Their didactically well prepared and presented talks covered a wide range in the fields of optimization and data mining. By us organizers, copies of the teacher’s lectures were distributed in the lecture room and will hopefully become helpful for further reading and learning by the participants. All the talks can be found at ESI WEB page.

At the last day of scientific program, July 23, *ESI Diplomas (certificates)* are handed out to all our ESI students.

Among the social events and activities which have been organized, we would like to mention:

- ❖ *welcome party given by Institute of Applied Mathematics*
(Friday, July 9)
- ❖ *trip by bus to Beypazari, a small Anatolian town on the silk road*
(Sunday, July 11)
- ❖ *visit of old city of Old City of Ankara and of famous Museum of Anatolian Civilizations*
(Wednesday, July 13)
- ❖ *reception by Operational Research Society of Turkey*
(Friday, July 16)
- ❖ *trip to Cappadocia with sightseeing of spectacular nature and heritages of early Christianity*
(Saturday - Sunday, July 17-18)
- ❖ *Turkish night in Cappadocia*
(Saturday, July 17)
- ❖ *going into the mountains of METU and watching the sunset*
(Monday, July 19)
- ❖ *volleyball and football tournaments*
(Wednesday, July 21)
- ❖ *ESI 2004 dinner and farewell-party*
(Friday, July 23).

The participants spent their further free time for sport activities, especially, swimming and walking, for shopping, dancing, for visiting Atatürk's Mausoleum and, organized by themselves, for a "European Song Contest", or just for discussing or resting.

D. Feedback and Conclusions

By intensive sharing of common time, we also intended to have some continuous feedback from all participants, to hold on being sensitive about their questions (e.g., on computers with internet access which were well provided, on transportation or additional trips), their wishes (e.g., of dancing) and their problems (e.g., in case of illness). Based on this continuous attention and *online* exchange, we tried to serve our guests and new friends best possible. According to the response given to us, the 23 students from Europe and all over the world, and the 9 experienced invited ESI teachers really enjoyed our summer institute, its scientific and its social parts and events likewise.

The young participants appreciated the high quality of invited lectures, the handouts of their talks prepared, and they accepted their offer of scientific advice and personal exchange with pleasure. From our invited speakers we heard how much they are in favour of the young people's well behaviour and scientific level. All of the participants seemed to be satisfied with the balance between organized time and free time. The personal exchange we had, the collaboration and friendship founded and the e-mails we later on received show us that your guests enjoyed our ESI in Turkey very much.

We have invited the ESI participants to write us more about their *further impressions* about our Summer Institute and also by writing short reports and stories in the EURO initiative **Branding OR** of EURO. Some ESI students will prepare short reports or stories.

There have been two more and special ways how the participants' satisfaction, closeness and identification with ESI XXII and its community manifested itself. On the one hand, many participants became member of our EURO working group **EUROPT**. Today we may state that about 50-60% of our ESI participants will collaborate within of EUROPT in future.

Based on a friendly and warm atmosphere, the entire group became some kind of a family, and various rich plans for future works and meetings became prepared.

Finally, an **EJOR special issue Optimization in Data Mining** has been announced during ESI XXII. The three guest editors will be Prof. Dr. Alexander Rubinov (University of Ballarat, Australia) and we, chairman and co-chairman. Corresponding editor-in-chief will be Prof. Dr. Jacques Teghem (Université Libre de Bruxelles, Belgium). This special issue should be published at the end of 2005. Please find closer information about our call for papers and about EJOR's instructions for authors in

<http://www.iam.metu.edu.tr/EUROPT/ESI%202004-EJOR%20special%20issue.doc>
and in
<http://www.iam.metu.edu.tr/EUROPT/European%20Journal%20of%20Operational%20Research.htm>, respectively.

Once again we would like to express our gratitude to all people and organizations, especially EURO, who by their hard work and great sympathy, by strong devotion, confidence and financial support helped ESI XXII in Turkey to become a great success and service for scientific progress, a better understanding and heartfelt friendship in Europe and the world.

With best wishes and warm regards,

Yours sincerely

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Appendix A: Finance Report

Following exact amounts have been received: 14000 € from Association of European Operational Research Societies (EURO), 2071 € from TUBITAK(Turkish Scientific and Technical Research Council). Besides, IAM(Institute of Applied Mathematics) of METU sponsored for organisation (phone, fax, web-site creation and maintaining, e-mail service, transportation, post) by amount of 980 €.

INCOME		EXPENDITURES	
EURO	14000 €	Travel of invited speakers	5464 €
TUBITAK	2071 €	Invited speakers accommodation	918 €
IAM	980 €	Accommodation of participants	3530 €
		Feeding	6159 €
		Organisation	980 €
TOTAL	17051 €	TOTAL	17051 €