MATCOS-16

Middle-European Conference on Applied Theoretical Computer Science

October 12th and 13th 2016

part of Information Society multiconference

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Dear participants of MATCOS-16.

We are pleased to welcome you at the University of Primorska – the Faculty of Mathematics, Natural Sciences and Information Technologies (UP FAMNIT) and the Institute Andrej Marušič (UP IAM).

Although our institutions are young, we are very proud of numerous academic and research achievements of our students and professors. 2016 has thus brought us some fantastic news; (1) the AMC journal we are publishing was placed in the first quarter of scientific journals in its discipline, making it the only Slovene journal to reach such success; (2) our Math department was placed in the top 10 % in Europe (and the world), according to Multirank; and (3) UP FAMNIT was trusted to host the second largest scientific gathering of Mathematicians in the world – European Congress of Mathematics in 2020.

Our colleagues at both institutions carry a fundamental and applied research in mathematics, natural sciences and technology – foundation fields for the industry. Simultaneously, close cooperation between the faculty and the institute brings a successful spill of research results into teaching. Both institutions are continuously committing their efforts to achieve excellent results and are persistently moving closer to the top of the scientific world.

Everyone can experience the enthusiasm in young institutions like ours. It gives us proper mixture of motivation and energy needed to initiate and develop projects in various areas. Being a Faculty and Institute of science, we believe that our goals can be reached only if we open ourselves toward the future and the international community. Therefore, international cooperation and mobility has been one of our basic policies since the very beginning.

The Faculty and the Institute organise and co-organise conferences and other scientific meetings, and encourage the active participation of students at international conferences, summer schools and competitions. We encourage research collaborations with foreign experts, short and long visits from abroad and to prestigious foreign universities, placing young colleagues at the forefront of this effort. Doing this, our professors have already established a dense network of connections with professors and researchers who visit us regularly (more than 50 annually), while a few hundreds also visit our events.

We are particularly proud of the fact that 15 % of our students are from abroad and this year the number of the freshmen in the undergraduate study programme Computer Science has increased to 21 %. This clearly confirms that we are becoming an institution which attracts prospective IT experts from the wider area and therefore is our obligation/commitment to provide them a qualitative modern programme.

Researchers at the Department of Information Science and Technology are active in several research areas including data structures, database, data mining, language technology, computer vision, augmented reality, personal information management and human-computer interaction. Since we are aware that innovations can be developed only in cooperation with different subjects, our research team has established numerous contacts with many European and other international institutions. For example, our research partners in the field of programming languages are Waterloo University (Canada) and the University of Luleå (Sweden). CHI – Computer-Human Interaction is an area we explore with the University of Lancaster (UK), while machine translation of natural languages and language technologies is a field we actively study with the University of Prague. Our partners are also the University of Freiburg (Germany) and Rutgers University (USA) – with whom we are working on graph theory and theoretical computer science – and the Royal Melbourne Institute of Technology, our partner in the research of databases and data models.

Due to our international evolvement in the research and academic field, we believe that UP FAMNIT and UP IAM are the ideal environment for a vibrant meeting like MATCOS and we hope that the programme will exceed your expectations. We are convinced you will establish new connections and renew old ones with the participants and that you will continue to cooperate with us and them in the future.

Klavdija Kutnar
Dean
Faculty of Mathematics, Natural Science and Information Technology

Vito Vitrih,
Director,
Institute Andrej Marušič

Dear colleagues, dear guests.

It is our great pleasure and honour to welcome you at the Middle-European Conference on Applied Theoretical Computer Science (MATCOS 2016) and the Student Computer Science Research Conference (StuCosRec 2016)! After three years we meet again in Koper for the fifth time at MATCOS and this time in a much bigger, to say so, edition. Traditionally MATCOS represents besides a forum for researchers to present their results, also the forum for younger researchers and students to meet and discuss their line of researcher with senior researchers. Moreover, this year the student part of our conference is collocated with the international student conference StuCosRes which brings together undergraduate and graduate students of Computer Science. The StuCosRec conference consists of a national part, which is run in Slovene and welcomes undergraduate and master degree students, and of an international part, that offers contributions of students predominantly in a PhD programmes.

The schedule of the MATCOS conference consists of a Wednesday student morning, followed by the invited talk and regular paper presentation in the afternoon. The paper presentation continues on Thursday. This year we have in a schedule of both conferences 14 student papers and 26 regular papers. The invited talk will be given by Sandor Fekete from TU Braunschweig, Germany. The title of the talk is Algorithms for robot navigation: From optimizing individual robots to particle swarms.

The talks of both conferences are published in proceedings, while the best talks of the MATCOS will also appear in a special issue of journal Informatica.

At last but not least we want to thank the members of the organization committee and staff at UP IAM and UP FAMNIT that made this even possible to happen by their devoted work and help.

Koper, October 11th, 2016

Rok Požar, chair of organizing committee
Andrej Brodnik

Organizing committee:
Marko Grgurovič
Marko Palangetić
Rok Požar, chair of organizing committee
Tine Šukljan

Keynote speaker

Sándor Fekete

Algorithms for robot navigation: From optimizing individual robots to particle swarms

Planning and optimizing the motion of one or several robots poses a wide range of problems. What positions should one powerful robot pick to scan a given area with obstacles? How can we coordinate a group of weaker robots to explore an unknown environment? How can we ensure that a swarm of very simple robots with local capabilities can deal with conflicting global requirements? And how can a particle swarm perform complex operations? We will demonstrate how an appropriate spectrum of algorithmic methods in combination with geometry can be used to achieve progress on all of these challenges.

Abstracts

On Linear Grammars with Exact Control

Dávid Angyal and Benedek Nagy

Grammars with exact control are controlled grammars with the condition that every word of the control language results at least one word of the derived language. In this paper, an infinite family of semi-linear languages is presented where the base grammar is a linear grammar and the control language is a linear language or a language class obtained in this manner. Already the class of languages generated by linear grammars with exact linear control contains some non context-free languages. Normal form result for these systems and pumping lemmas are shown to help to prove the infinite hierarchy.

Tight Online Bin Packing Algorithm with Buffer and Parametric Item Sizes

József Békési and Gábor Galambos

In this paper we investigate the online bin packing problem with constant buffer size, where the item sizes are in the interval (0, 1 r],where r ≥ 2 is an integer. The problem was originally given by Zheng et al [13]. They gave a lower bound and an algorithm, which were later improved by Zhang et al[12]. We close the gap on the competitive ratio and give a First Fit based optimal solution for the parametric version for arbitrary r.

Packing tree degree sequences

Kristof Berczi, Zoltan Kiraly, Changshuo Liu and István Miklós

A degree sequence D = d1, d2, . . . dn is a series on nonnegative integers. A degree sequence is graphical if there is a vertex labeled graph G in which the degrees of the vertices are exactly D. Such graph G is called a realization of D. The color degree matrix problem also known as edge disjoint realization, edge packing or graph factorization problem is the following: given a c × n degree matrix D = {{d1,1, d1,2, . . . d1,n}, {d2,1, d2,2, d2,n}, . . . {dc,1, dc,2, dc,}}, in which each row of the matrix is a degree sequence, decide if there is an ensemble of edge disjoint realizations of the degree sequences. Such set of edge disjoint graphs is called a realization of the degree matrix. A realization can also be presented as an edge colored simple graph, in which the edges with a given color form a realization of the degree sequence in a given row of the color degree matrix. It is known that the color degree sequence problem is NPcomplete even if the number of colors is 3. Here we consider a special case when two of the degree sequences are degree sequences of trees. We show that this special case is easy. We also show that the problem is still NP-complete if only one of the degree sequences is a degree sequence of a tree. We also consider counting the number of solutions. We show that efficient approximations for the number of solutions exists as well as an almost uniform sampler exists if two degree ∗ Secondary affiliation: SZTAKI, 1111 Budapest, L´agym´anyosi u. 11, Hungary sequences are degree sequences of trees and they do not share common leaves.

Construction of orthogonal CC-set

Andrej Brodnik, Vladan Jovičić, Marko Palangetić and Daniel Silađi

In this paper we present a graph-theoretical method for calculating the maximum orthogonal subset of a set of coiledcoil peptides. In chemistry, an orthogonal set of peptides is defined as a set of pairs of peptides, where the paired peptides interact only mutually, and not with any other peptide from any other pair. The main method used is a reduction to the maximum independent set problem. Then we use a relatively well-known maximum independent set solving algorithm which turned out to be the best suited for our problem. We obtained an orthogonal set consisting of 29 peptides (homodimeric and heterodimeric) from initial 5-heptade set. If we allow only heterodimeric interactions we obtain an orthogonal set of 26 peptides.

On embedding degree sequences

Bela Csaba and Balint Vasarhelyi

Assume that we are given two graphic sequences, π1 and π2. We consider conditions for π1 and π2 which guarantee that there exists a simple graph G2 realizing π2 such that G2 is the subgraph of any simple graph G1 that realizes π1.

A self-bounding Branch & Bound procedure for truck routing and scheduling

Csongor Gy. Csehi, Márk Farkas and Ádám Tóth

In this talk we will study a part of the core algorithm of a complex software solution for truck itinerary construction for one of the largest public road transportation companies in the EU. The problem is to construct a cost optimal itinerary, given an initial location with an asset state, the place and other properties of tasks to be performed. Such an itinerary specifies the location and activity of the truck and the driver until the finish of the last routing task. The calculation of possible itineraries is a branch and bound algorithm. The nodes of the search tree have the following arguments: position, time, driver-state and truck-state. For each node we calculate the cumulated cost for the road reaching that state, and a heuristically lower bound for the cost of the remaining road. In each step the procedure expands the next unexpanded node with the best sum for cumulated and heuristically cost. To make a sharp heuristic we run the same branch and bound algorithm (from each node) but with hypothetical positions (with coarser data and simplified activities: no refuelling, no road costs, etc.). We anticipate significant gains in performance and quality compared to the previous approach.

Schedule assignment for vehicles in inter-city bus transportation over a planning period

Balázs Dávid

In this paper, we examine the problem of assigning vehicles to each day of a planning period based on existing theoretical schedules in public transportation. The assignment of a vehicle to daily tasks has to satisfy certain requirements. If the problem addresses long-distance bus transportation, vehicles returning to their starting depots would usually result in a high additional cost. Because of this, we also have to assign a garage to each vehicle where they spend the night and from where they start their next daily schedule. We also want to minimize the arising traveling and operational costs. We give a network-based mathematical model for the problem. We examine solutions both of the model and of heuristic methods, and present their results.

Usage of hereditary colorings of product graphs in clique search programs

Matjaz Depolli, Janez Konc, Sandor Szabo and Bogdan Zavalnij

There are computationally demanding problems that can be solved by k-clique search algorithms in auxiliary product graphs. The best clique search programs heavily rely upon good colorings. But obtaining a good coloring is a demanding task itself. We present some coloring schemes that exploit the property of the product graph itself and can be constructed with ease. We call these colorings hereditary. There are indications that using these colorings some hard problems would become feasible.

ALGator - An Automatic Algorithm Evaluation System

Tomaž Dobravec

In this paper we present an automatic algorithm evaluation system called ALGator, which was developed to facilitate the algorithm design and evaluation process. The system enables unbiased tests of the correctness and quality of implemented algorithms for solving various kinds of problems (e.g. sorting data, matrix multiplication, traveler salesman problem, shortest path problem, and the like). Within the ALGator one can define a problem by specifying the problem descriptors, test sets with corresponding test cases, input parameters and output indicators, algorithm specifications and criteria for measuring the quality of algorithms. When a user of the system submits an algorithm for solving the given problem, ALGator automatically executes this algorithm on predefined tests, measures the quality indicators and prepares the results to be compared with the results of other algorithms in the system. ALGator in meant to be used by algorithm developers to perform independent quality tests for their solutions.

ON NIST test of a Novel Cryptosystem Based on Automata Compositions

Pál Dömösi, József Gáll, Géza Horváth and Norbert Tihanyi

In this paper we discuss on NIST test results of a previously introduced cryptosystem based on automata compositions. Our conclusions based on the statistics confirm that the requirements of NIST test are fulfilled.

Team Work Scheduling

Gyorgy Dosa, Hans Kellerer and Zsolt Tuza

We introduce a quite general scheduling model we call Team Work Scheduling. It mainly means that a team works together to process any job. Its special version is recently defined as MultiProfessor scheduling, and even a more special version is the RAR problem. This last one means that parallel machine scheduling is considered with job assignment restrictions, i.e., each job can only be processed on a certain subset of the machines. Moreover, each job requires a set of renewable resources. Any resource can be used by only one job at any time. The objective is to minimize the makespan. We present approximation algorithms with constant worst-case bound in the case that each job requires only a fixed number of resources. For some special cases optimal algorithms with polynomial running time are given. On the other hand we prove that the problem is APX-hard, even when there are just three machines and the input is restricted to unit-time jobs.

A Branch-and-Cut Algorithm for the Multi-Depot Rural Postman Problem

Elena Fernández, Gilbert Laporte and Jessica Rodríguez Pereira

This paper studies the Multi-Depot Rural Postman Problem on an undirected graph. This problem is the extension of the well-known Undirected Rural Postman Problem to the case where there are several depots instead of just one. A linear integer programming formulation that only uses binary variables is proposed, which includes three families of constraints of exponential size. An exact branch-and-cut algorithm is presented, where violated constraints of both types are separated in polynomial time. Despite the diffi- culty of the problem, the numerical results from a series of computational experiments with various types of instances illustrate a quite good behavior of the algorithm.

Testing the Markowitz Portfolio Optimization Method with Filtered Correlation Matrices

Imre Gera, Balázs Bánhelyi and András London

In this work we analyze the performance of the Markowitz portfolio optimization method on the Budapest Stock Exchange data set using two different filtering techniques de- fined for correlation matrices. The results show that the estimated risk is much closer to the realized risk using filtering methods. Bootstrap analysis shows that ratio between the realized return and the estimated risk (Sharpe ratio) is also improved by filtering

Computational complexity of the winner determination problem for geometrical combinatorial auctions

Dries Goossens, Bart Vangerven and Frits Spieksma

We consider auctions of items that can be arranged in rows, for instance pieces of land for real estate development. The objective is, given bids on subsets of items, to find a subset of bids that maximizes auction revenue (often referred to as the winner determination problem). We show that for a k-row problem with connected and gap-free bids, the winner determination problem can be solved in polynomial time, using a dynamic programming algorithm. We study the complexity for bids in a grid, complementing known results in literature. Additionally, we study variants of the geometrical winner determination setting. We provide a NP-hardness proof for the 2-row setting with gap-free bids. Finally, we extend this dynamic programming algorithm to solve the case where bidders submit connected, but not necessarily gap-free bids in a 2-row and a 3-row problem.

A Graph to the Pairing strategies of the 9-in-a-row Game

Lajos Győrffy, András London and Géza Makay

In Maker-Breaker positional games two players, Maker and Breaker, are playing on a finite or infinite board with the goal of claiming or preventing to reach a finite winning set, respectively. For different games there are several winning strategies either for Maker or Breaker. One class of winning strategies are the so-called pairing strategies. Generally, a pairing strategy means that the possible moves of a game are paired up; if one player plays one, the other player plays its pair. In this study we describe all possible pairing strategies for the 9-in-a-row game. Furthermore, as a concept, we define a graph of these pairings in order to find a structure for them. The characterization of that graph will be also given.

Partitioning polyominoes into polyominoes of at most 8 vertices, mobile vs. point guards

Ervin Gyori and Tamas Mezei

We prove that every simply connected polyomino of n vertices can be partitioned into (3n+4/ 16) (simply connected) polyominoes of at most 8 vertices. It yields a new and shorter/simpler proof of the theorem of A. Aggarwal that (3n+4/16) mobile guards are sufficient to control the interior of an n vertex orthogonal polygon. Moreover, we strengthen this result by requiring combinatorial guards (visibility is only needed at the endpoints of patrols) and prohibiting intersecting patrols. This yields positive answers to two questions of Ot'Rourke [7, Section 3.4]. Our result is also a further example of the metatheorem that (orthogonal) art gallery theorems are based on partition theorems. We also found and interesting sharp bound on the ratio of the necessary number of appropriate mobile and point guards.

Improving flow lines by unbalance

Zsolt Mihály and Zoltán Lelkes

The paper's aim is to provide some insight regarding the performance of balanced and unbalanced discrete manufacturing flow lines. The investigation is based on phyisical simulation systems. The performance characteristics are gathered with a discrete time simulation program using next-event time advance mechanism. The model has been implemented in AIMMS modelling language.

Exploratory Equivalence on Hypercube Graphs

Jurij Mihelič, Uroš Čibej and Luka Fürst

An exploratory equivalent (EE) partition of the vertex set of a graph G comprises sets of vertices that can be regarded as interchangeable when searching for copies of G in some other graph. This property may be used to speed up the search process. Since a graph may have multiple EE partitions, a natural problem is to find one that gives rise to a greatest speedup factor, i.e., a maximum EE partition. This problem is GI-hard for general graphs, so it makes sense to study restricted graph classes. In this paper, we focus on the challenging class of hypercube graphs. We present a set of rules to construct an EE partition for any such graph and prove that the resulting partition is maximum.

The vertex sign balance of (hyper)graphs

Dezso Miklos and Gyula Y. Katona

We define the vertex sign balance of a (hyper)graph G as the minimum num- ber of non-negative edges over all $\omega : V(G) \to R$ satisfying $\sum_{x \in V(G)} \omega(x) \geq 0$ (i.e., the minimum number of edges with non-negative sum of weights of ver- tices in it). Clearly, the vertex sign balance of a (hyper)graph is always less than or equal to the minimum degree, as it is shown by assigning a large pos- itive number to a minimum degree vertex and close to 0 negative numbers to all other vertices.

Diploid Genome Rearrangement

István Miklós and Adrienn Szabó

Next Generation Sequencing (NGS) techniques revolutionized the collection of genomic data. It allows massively parallel sequencing of short fragments reducing the time and cost of sequencing. When pairs of fragments are sequenced, it is possible to detect rearrangement events using NGS, but in case of diploid genomes, rearrangement events might happen on both chromosomes of homologous pairs, and the entire rearranged genome cannot be directly read out from NGS data. We consider the problem of reconstructing the rearranged diploid genome from NGS data, and study the computational complexity of the problem. We prove that finding one solution can be done in polynomial running time. On the other hand, deciding if there is a solution without nonhomologous recombination between homologous chromosomes is NP-complete.

Allocation and Pricing on a Network in Presence of Negative Externalities

Saša Pekeč

We discuss network optimization problems that arise naturally in the context of optimally allocating and pricing indivisible homogeneous items to unit-demand agents in a network, with the caveat that the agents face negative allocative externalities. Specifically, agent's value for (not) getting an item depends on whether any of its rivals did (not) get an item. The rivalry is represented by a network with nodes representing agents and arcs representing whether an agent considers another agent its rival.

Incremental 2-D nearest-point search with evenly populated strips

David Podgorelec and Denis Špelič

The incremental nearest-point search successively inserts query points into the space partition data structure, and the nearestpoint for each of them is simultaneously found among the previously inserted points. The paper introduces a new approach to solve this problem in 2D-space. Dynamic partition successfully prevents situations with over-populated strips but still fails to reach optimality. A variant with two perpendicular partitions and four types of deterministic skip lists is therefore discussed as a possible extension.

Some computable functions without Brouwer fixed-points

Petrus H. Potgieter

This paper is an overview of results that show the Brouwer fixed-point theorem to be essentially non-constructive and non-computable and discusses some computable functions without computable fixed points. The counter-examples of Orevkov and Baigger that imply that there is no procedure for finding the fixed point in general and do so by giving an example of a computable function which does not fix any computable point. In this contribution, we discuss some examples of computable functions not fixing any computable point.

Customizing Hybrid Optimization for Microwave Tomography

Milos Subotic, Laszlo Palfi and Nebojsa Pjevalica

Microwave tomography is an inverse scattering problem, typically solved through optimization methods. The underlying objective function is ill-posed and expensive for evaluation, making microwave tomography a hard optimization problem. This paper presents a novel optimization heuristic for use in microwave tomography. Landscape analysis of objective function is made. Results from landscape analysis helped creating novel optimization heuristic. Significant acceleration is obtained.

Benchmark problems for exhaustive exact maximum clique search algorithms

Sandor Szabo and Bogdan Zavalnij

There are well established widely used benchmark tests to assess the performance of practical exact clique search algorithms. In this paper a family of further benchmark problems is proposed mainly to test exhaustive clique search procedures.

Process Network Solution of a Soleplate Manufacturer's Extended CPM Problem with Alternatives

Nándor Vincze, Zsolt Ercsey and Zoltán Kovács

In this paper a Hungarian soleplate manufacturer's problem is described in details, extended with alternatives and effectively solved. First, after the presentation of the industrial problem, the CPM graph of the problem is given and then it is transformed into a process network. Then the original problem is extended with alternatives specified by various industrial needs, for example an activity is performed in two different ways and resources with different time and costs. Then the corresponding mathematical programming model is formulated: time optimal and time optimal with additional cost constraints mathematical programming models are given. Please note that only the earlier corresponds to the CPM problem and the latter is an extension. The solution illustrates the efficacy of the method.

Wednesday

08:00	Registration – MATCOS, StuCosRec	
	Lecture room MP2	**Lecture room MP1**
	Chair: TBD	**Chair: TBD**
	MATCOS Student	**StuCosRec National**
09:00	Aleksandar Tošić. Reverse logistics problem of waste disposal	Primož Bencak, Dusan Fister. Izdelava klaviatur MIDI
09:20	Damir Deželjin. Using Write-optimized Data Structures in File systems - performance comparison: HDD vs. SSD	Žiga Leber, Luka Horvat, Patrik Kokol, Marko Očko. Zaznavanje plagiatov s pomočjo n-gramov
09:40	László Hajdú. Community detection in directed networks	Tilen Škrinjar, Matej Trop, Filip Urh. Detekcija jezika v šumnih besedilih
10:00	Judit Szűcs and Péter Balázs. Binary Image Reconstruction Using Local Binary Pattern Priors	Gregor Jurgec, Iztok Fister. Stiskanje slik z algoritmi po vzorih iz narave
10:20 - 10:50	coffee break	
	Lecture room MP2	**Lecture room MP1**
	Chair: TBD	**Chair: TBD**
	StuCosRec International-1	**StuCosRec International-2**
10:50	László Tóth. Greedy Heuristics for the Generalized Independent Cascade Model	Aleksandar Tošić, Matjaž Šuber. A GPGPU Implementation of CMA-ES
11:10	Iztok Jr. Fister, Uroš Mlakar, Janez Brest, Iztok Fister. A new population-based nature-inspired algorithm every month: Is the current era coming to the end?	Dušan Fister, Iztok Jr. Fister, Iztok Fister. Visualization of cycling training
11:30	Iztok Jr. Fister, Iztok Fister. Building visual domain-specific languages using the semiotic approach: A case study on EasyTime	Jani Dugonik. Weights Optimization in Statistical Machine Translation using Modified Genetic Algorithm
12:00 - 13:30	lunch time	

	Lecture room MP2
13:45	Official opening of MATCOS and StuCosRec
14:00	Chair: TBD
	Sándor Fekete: Algorithms for robot navigation: From optimizing individual robots to particle swarms
15:00 - 15:20	coffee break

	Lecture room MP2
	Chair: TBD
	MATCOS – Industrial and Medical Applications
15:20	Milos Subotic, Laszlo Palfi and Nebojsa Pjevalica. Customizing Hybrid Optimization for Microwave Tomography
15:40	Balázs Dávid. Schedule assignment for vehicles in inter-city bus transportation over a planning period
16:00	Csongor Gy. Csehi, Márk Farkas and Ádám Tóth. A self-bounding Branch & Bound procedure for truck routing and scheduling
16:20	Zsolt Mihály and Zoltán Lelkes. Improving flow lines by unbalance
16:40	Nándor Vincze, Zsolt Ercsey and Zoltán Kovács. Process Network Solution of a Soleplate Manufacturer's Extended CPM Problem with Alternatives
17:00 - 17:20	coffee break

	Lecture room MP2
	Chair: TBD
	MATCOS – Algorithm design and evaluation
17:20	Pál Dömösi, József Gáll, Géza Horváth and Norbert Tihanyi. ON NIST test of a Novel Cryptosystem Based on Automata Compositions
17:40	Tomaž Dobravec. ALGator - An Automatic Algorithm Evaluation System
18:00	Lajos Győrffy, András London and Géza Makay. A Graph to the Pairing strategies of the 9-in-a-row Game
18:20	Andrej Brodnik, Vladan Jovičić, Marko Palangetić and Daniel Silađi. Construction of orthogonal CC-set
18:40	Matjaz Depolli, Janez Konc, Sandor Szabo and Bogdan Zavalnij. Usage of hereditary colorings of product graphs in clique search programs

19:30 - 21:30	conference dinner

Thursday

	Lecture room MP2
	Chair: TBD
	MATCOS – Algorithms & Optimization
09:00	Imre Gera, Balázs Bánhelyi and András London. Testing the Markowitz Portfolio Optimization Method with Filtered Correlation Matrices
09:25	József Békési and Gábor Galambos. Tight Online Bin Packing Algorithm with Buffer and Parametric Item Sizes
09:50	Elena Fernández, Gilbert Laporte and Jessica Rodríguez Pereira. A Branch-and-Cut Algorithm for the Multi-Depot Rural Postman Problem
10:15	Gyorgy Dosa, Hans Kellerer and Zsolt Tuza. Team Work Scheduling
10:40 - 11:00	coffee break
	Lecture room MP2
	Chair: TBD
	MATCOS – Graph Theory
11:00	Miklós Dezső and Gyula Y. Katona. The vertex sign balance of (hyper)graphs
11:25	Kristof Berczi, Zoltan Kiraly, Changshuo Liu and István Miklós. Packing tree degree sequences
11:50	Sandor Szabo and Bogdan Zavalnij. Benchmark problems for exhaustive exact maximum clique search algorithms
12:15	Bela Csaba and Balint Vasarhelyi. On embedding degree sequences
13:00 - 14:30	lunch
	Lecture room MP2
	Chair: TBD
	MATCOS – Algorithms Complexity
14:30	Dries Goossens, Bart Vangerven and Frits Spieksma. Computational complexity of the winner determination problem for geometrical combinatorial auctions
14:55	István Miklós and Adrienn Szabó. Diploid Genome Rearrangement
15:20	Saša Pekeč. Allocation and Pricing on a Network in Presence of Negative Externalities

15:45	David Podgorelec and Denis Špelič. Incremental 2-D nearest-point search with evenly populated strips
16:10 - 16:30	coffee break
	Lecture room MP2
	Chair: TBD
	MATCOS – Miscellaneous
16:03	Jurij Mihelič, Uroš Čibej and Luka Fürst. Exploratory Equivalence on Hypercube Graphs
16:55	Ervin Gyori and Tamas Mezei. Partitioning polyominoes into polyominoes of at most 8 vertices, mobile vs. point guards
17:20	Dávid Angyal and Benedek Nagy. On Linear Grammars with Exact Control
17:45	Petrus H. Potgieter. Some computable functions without Brouwer fixed-points
	Lecture room MP2
18:10 - 18:20	MATCOS 2016 Closing