

Accommodation

Dear participants! We expect that this guide will help you to answer all questions you have about your accommodation and about “survival” in Kyiv during the conference.

First of all, if you hold this book in your hands, we would like you to wish successful lecture, interesting presentations and discussions, nice parties and enjoy the conference!

General notes

Address is Vasylykivska str., 36.

Ukrainian currency is Ukrainian Hryvnia (UAH). Current exchange rate is about 10.7 UAH per 1 EUR (8 UAH per 1 USD). You will need to change some amount of money (or get some cash from cash- machines or ATMs right on your arrival).

There are several major kinds of public transport in Kyiv:

- Buses (big and long), trolley-buses, trams (state held, price per journey is 1.5 UAH).
- Taxi-buses (not so big as state held, from 20 to 42 seats) (private held, price varies from 2 to 3 UAH per journey).
- Underground (you will need to purchase special tokens to enter and they cost 2 UAH)

Usually bus service finishes its work around 10 p.m., underground and many taxi-buses work till midnight, but be careful.

One big disadvantage of city infrastructure is lack of informational signs in English, so be very careful. If you need to catch a taxi, arrange the price of your journey before you sit in the car. Normally the price from city center to the accommodation is around 30-40 UAH. We recommend you to call taxi by phone. Some of the popular taxi-services:

- Taxi 309: 309
- Absolute taxi: +38(095)455-95-95, +38(067)455-95-95, +38(063)455-95-95
- Etalon taxi: +38(063) 237-54-54, +38(067) 463-54-54, +38(050) 340-54-54, +38(068) 382-54-54
- Narodne taxi: +38(093) 387-0-520, +38(067) 444-0-520, +38(050) 414-0-520, +38(068) 199-0-520

“Boryspil” International Airport

You can either take a taxi (it will cost you about 20–25 EUR or 200–250 UAH) or use public transport. There is a shuttle bus from the airport to the city. The intervals between routes of busses are about 15-20 minutes during the day and 30-45 minutes at night. Journey time - 45-55 minutes.

If you decide to use public transport, you will have to make several interchanges. Firstly you should take shuttle bus to “Harkivska” underground station (underground map: <http://www.metro.kiev.ua/node/101>) and go to “Palats sportu” where you should switch to blue line (“Ploshcha Lva Tolstogo”) and then go to “Vasylykivska”.

FAQ

How do I get to the Cybernetics Faculty building from Kyiv’s railway station?

You can do it using:

- Minibus number 458 (Central railway station). You should go to the station “Expocenter of Ukraine” (Ve-De-En-Ha). Fare — 3 UAH.
- Minibus number 726 (Central railway station, near McDonalds). You should go to the station “Expocenter of Ukraine” (Ve-De-En-Ha). Fare — 2 UAH (within city).
- Minibus number 507 (Southern railway station). You should go to the station “Expocenter of Ukraine” (Ve-De-En-Ha). Fare — 2.5 UAH (within city).
- Kyiv subway. You should get on a subway at “Vokzalnaya” station (near Central railway station and change for another line on “Khreschatyk” station (from red line to blue line) and go to the station “Vystavkovyi Tsentr”. Fare — 2 UAH.

How do I get to the Cybernetics Faculty building from Kyiv's Central bus terminal?

You can do it using:

- Trolleybuses number 11, 12, 43. You should go to the station "ExpoCenter of Ukraine" (Ve-De-En-Ha). Fare — 1.5 UAH.
- Most minibuses. You should go to the station "ExpoCenter of Ukraine" (Ve-De-En-Ha). Fare — 2-3 UAH (within the city).
- Kyiv subway. You should follow to the station "Vystavkovyi Tsentr". Fare — 2 UAH. Accommodation.

All participants, who has mentioned they need an accommodation, will be provided with a room in a hostels of Taras Shevchenko National University of Kyiv:

Hostel of Institute of Postgraduate Education: Vasylykivska str., 36

How do I get to Hostel of Institute of Postgraduate Education?

Minibus number 458 (Central railway station). You should go to the station "Vasyl'kivs'ka subway station" ("Stantsia metro Vasylkivska"). Fare — 3 UAH.

Organizer's phone numbers

- Head of Organization committee Anastasiia Prashchur: +38(096)951-08-34, +38(095)468-84-12
- Secretary Mariana Kotsko: +38(097)465-82-77
- "Computer Science + Artificial Intelligence" (CS+AI) coordinator Mariana Kotsko: +38(097)465-82-77, +38(095)055-92-28
- "Applied Mathematics" (AM) coordinator Margaryta Ambartsumova: +38(066)403-70-70
- "Software Engineering" (SE) coordinator Inga Solomianiuk: +38(097)263-65-87

Schedule

November 24, Sunday:

- 07:00–23:00 — Arrival and settlement of participants

November 25, Monday:

- 09:30–10:30 — Registration for the conference
- 10:30–11:30 — Opening Ceremony of the Conference
- 11:30–12:30 — Lecture “An algorithm for Modeling Tension-Propagation in Chain like Structures” (room № 39)
- 13:00–14:00 — Dinner
- 14:15–15:15 — Lecture “Low-Level Concurrency. Reinventing Vehicles.” (room № 01)
- 15:20–18:20 — Meeting of sections:
 - “Applied Mathematics” (room № 305)
 - “Software Engineering” (room № 610)

November 26, Tuesday:

- 08:45–12:00 — Meeting of sections:
 - “Applied Mathematics” (room № 306)
 - “Computer Science + Artificial Intelligence” (room № 302)
- 12:20–13:20 — Lecture “Classical Limit Theorems for Branching Processes” (room № 39)
- 13:20–14:20 — Dinner
- 14:20–15:20 — Lecture “Graph Search – Facebook Semantic Search Engine” (room № 43)
- 17:00–20:00 — Kyiv tour

November 27, Wednesday:

- 08:45–12:00 — Meeting of sections:
 - “Applied Mathematics” (room № 303)
 - “Computer Science + Artificial Intelligence” (room № 302)
- 12:00–13:00 — Dinner
- 13:05–14:00 — Lecture “Elliptic Featureless Discriminant Analysis and Multivariate Ordering Using Elliptical Peeling” (room № 43)
- 14:05–15:05 — Lecture “Natural Language Addressing: a Step toward Modeling Human Brain Memory” (room № 43)
- 19:00–23:00 — Party

November 28, Thursday:

- 10:30–12:00 — Roundtable (room № 610)
- 12:20–13:20 — Lecture “Hyperclones and Multiclones” (room № 39)
- 13:20–14:20 — Dinner
- 14:20–15:20 — Lecture “Applied Mathematics of Signal Processing in Mobile Devices” (room № 39)
- 15:20–16:00 — Closing Ceremony of the Conference (room № 39)
- 17:00–19:00 — Excursion to the Astronomical Observatory of NAS of Ukraine.

November 29, Friday:

- 08:00–23:00 — Departure of the participants

Lectures

An algorithm for Modeling Tension-Propagation in Chain like Structures

Lecturers: Professor Norbert Sczygiol, Professor Zbigniew Domanski, Faculty of Mechanical Engineering and Computer Science, Czestochowa University of Technology, Czestochowa, Poland.

Lecture preview. The analysis of *Chain – Like Structures (CLS)* has increased in importance over last decades. Studies of such objects as polymers are of primary interest in many branches of science and technology. The complexity of their macromolecular architecture as well as the variability of physical properties make CLS-related problems hardly tractable in a traditional formal-theoretical way. As is often the case, the remedy is to make use of computer simulation which during last years became a fundamental tool for CLS studies.

In our lecture we will introduce new concepts for algorithmization of the CLS movement. The main underlying idea is to *sequentialize* each move of the CLS in order to reduce the complexity involved in the dynamics of polymer transport as well as to reflect the propagation of the tension through its body.

Low-Level Concurrency. Reinventing Vehicles.

Lecturer: Olena Syrota, Candidate of technical sciences, Head of Educational Programs, EPAM Systems, Kyiv, Ukraine.

Lecture preview. This talk is intended to find out computer science in modern information technologies. Nowadays developers are using technologies made by vendors. I propose to sink to layer of creating own technologies. Let's start from mutex algorithms: Dekker's algorithm, Peterson Lock, Lamport's Bakery Algorithm.

Classical Limit Theorems for Branching Processes

Lecturer: Professor Matthias Meiners, Institute of Mathematics, Technical University of Darmstadt, Darmstadt, Germany.

Lecture preview. In my talk, I will survey the development of the theory of branching processes starting from Thomas Robert Malthus' *Essay on the Principle of Population* in which he established the idea that a population, when unchecked, grows exponentially fast. I will introduce the first probabilistic model of a branching mechanism, the Galton-Watson process, and later come to the theory of general branching processes which includes many other branching processes that have been studied before. The focus of the talk will be on limit theorems in these models that reflect Malthus' idea of exponential population growth.

Graph Search – Facebook Semantic Search Engine

Lecturer: Volodymyr Giniak, Software Engineer, Facebook, London, United Kingdom.

Lecture preview. Graph Search is Facebook's search engine that is capable of answering natural language user queries. It provides personalized results based on Facebook object graph that consists of more than one billion users, 240 billions of photos, 1 trillion posts and trillions of connections between them. In the lecture I will cover query understanding and parsing techniques that are used in the Graph Search, document retrieval and ranking and results blending. I will also talk about software and hardware infrastructure that supports Graph Search.

Elliptic Featureless Discriminant Analysis and Multivariate Ordering Using Elliptical Peeling

Lecturer: Professor Dmytro Kliushyn, Cybernetics Faculty, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine.

Lecture preview. In my lecture, I will describe a novel method of elliptic featureless discriminant analysis using Petunin's proximity measure and a new method of multivariate ordering using

elliptical peeling on the basis of Petunin's ellipsoids. The statistical properties of the Petunin's ellipsoids will be demonstrated. The application of the method for the minimization of uncertainty under elliptic discriminant analysis in breast cancer detection will be described.

Natural Language Addressing: a Step toward Modeling Human Brain Memory

Lecturer: Professor Krassimir Markov, Institute of Mathematics and Informatics, BAS, Sofia, Bulgaria.

Lecture preview. Natural Language (NL) addressing is a possibility to access information using natural language words or phrases as addresses of the information stored in the multi-dimensional numbered information spaces. For this purpose the internal encoding of the letters is used to generate corresponded co-ordinates. Several experiments of NL-storing of small, middle-size and large datasets are presented in the lecture. Results from series of experiments for estimating the time of NL-storing of small datasets (dictionaries, thesauruses, and ontologies) as well as middle-size and large RDF-datasets are outlined. From experimental data we concluded that NL-access time: (1) *Depends* on number of elements in a dataset's instances; (2) *Not depends* on number of instances in the dataset. The second is very important for multi-processing because it means linear reverse dependence on number of processors.

Hyperclones and Multiclones

Lecturer: Professor Vladimir Pantelev, Faculty of Computer Science, East-Siberian State Academy of Education, Irkutsk, Russia.

Lecture preview. The lecture will consider partial functions defined on finite sets. The emphasis of the lecture will be on sets closed under superposition – hyper-clones and multi-clones. Several completeness criteria and maximal hyper-clones and multi-clones will be considered. Also the lecture will concern some applications of clones.

Applied Mathematics of Signal Processing in Mobile Devices

Lecturer: Valentin Chernikov, Director of Engineering, P-Product, Inc.

Lecture preview. Nowadays mobile technologies extend a set of mathematical apparatus and methods used in algorithms of the signal forming and processing, compression of audio and video data. The lecture deals with methods and sections of applied mathematics, which a software developer should know to work with physical layer of wireless communication standards 3G, LTE and 802.11ac.

Section One: Computer Science

YA. I. KLIMIANKOU

Tuesday, 26, 09:00

M-M/S-CD Memory Management for Second Generation Microkernels

The paper introduces a new memory management approach for second generation microkernels named M-M/S-CD that was designed in the spirit of minimality principle. It was developed from scratch based on analytical model of computer memory system. M-M/S-CD memory management pushes out all memory management activities and policies into the user mode applications, where kernel only enforces two conditions are met that assure that memory system will remain in closed state.

I. O. LIKHATSKYI

Tuesday, 26, 09:20

Relational-Object Mapping Technique

This paper is focused on describing a technique of creating object-relational transformation components by using code generation system based on database structure. It reviews existing ORM solutions, as well as highlights their main advantages and drawbacks. We describe a technique to create relational-object transformation components by using code generation system to automatically generate persistence layer based on the database structure. Text template engine is used to generate SQL queries, business classes and APIs to access data from application code. Provided default implementations are sufficient to quickly obtain working persistence layer.

I. ASLANISHVILI, G. MODEBADZE

Tuesday, 26, 09:40

Three RD models for two-hop relay Routing with Limited Packets Lifetime in Ad Hoc Networks

We study mobile communication of networks, the ad hoc networks, Ad hoc networks are complex distributed systems that consist of wireless mobile or static nodes that can freely and dynamically self-organize. The parameters of the queuing models depends on the node mobility pattern. The main finding is that the expected relay buffer size depends on the expectation and the variance of the nodes contact time. Such analysis is done for the three dimensional random walks models over a circle, expected relay buffer size depends on the expectation and the variance of the nodes contact time. First model – the source node transmits a packet only once (either to the relay or to the destination node). Thus, the source node does not keep a copy of the packet once it has been sent. Second model – the relay node is moving according to a symmetric random walk (RW) on a circle of $4R + 2w$ steps. Third model – tree nodes: a source a destination and a relay source, nodes are moving according a symmetrical Random Walk over a circle.

O. B. SYNESKYI

Tuesday, 26, 10:20

Evolutional Stability in Mixed Strategies in TCP Network Game

In this paper we continue the investigation of evolutionary games based framework for network congestion control. We consider a wider range of protocols that can no longer be classified as “aggressive” or “peaceful” only and present equilibrium conditions for such protocols as well as simulation results.

D. O. PROGONOV, S. M. KUSHCH

Tuesday, 26, 10:40

Evaluation of the Effectiveness of Applying the Image Quality Metrics for Acquisition the Steganograms

In paper is considered to the analysis of type and evaluation of the level of image distortion by data embedding into frequency domain. The four groups of image quality metrics (spatial and spectral distortion metrics, correlation characteristics and visual quality metrics) are analyzed on the 100 digital images with 8 Megapixels resolution by variation of embedding level from 10% to 90%. Such approach gives us a possibility to make conclusion that applying of specified correlation characteristics (Czenakowski Distance, Mean Angular Difference) and visual quality metrics (Normalized Histogram Similarity) allows reveal the fact of data embedding in frequency domain of images with high precision.

D. V. VOLOSHYN

Tuesday, 26, 11:00

Modeling Time-Series of Stock Price by Stochastic Context-Free Grammars

We propose a stochastic context-free grammar model whose structure can alternatively be viewed as a graphical model, and use it to model time-series of stock prices. A method is presented for extracting characteristic patterns from a time series using such kind of model. We use a modification of expectation-maximization algorithm to estimate the model parameters and present empirical findings.

R. L. VARZAR, O. YA. ANOPRIENKO

Tuesday, 26, 11:20

Postbinary Supersensory Computer: Information Storage and Computing in View of the Measurement Accuracy

The concept of postbinary supersensory computer and its implementation in the form of an experimental prototype are considered. Supersensory computer (SSC) is an intelligent sensor device, which includes a large number of miniature sensors, microprocessor, memory and communications interfaces. Features and characteristics of the developed prototype, including the case of storage and computational processing of sensory information with regard to real accuracy are analyzed. Postbinary supersensory computer (PSSC) means, that the representation, storage, and usage in subsequent calculations of the measured values use postbinary data formats.

A. PETRENKO, D. TOPOR, V. MOSIYCHUK

Wednesday, 27, 09:00

System of Synchronous Remote Collecting and Processing Geological Data

There is the structure of system for remote data collection with an ability to provide synchronous measurement from spatial devices. The structure of the device is shown as a part of a sensor network to provide a thermoatomgeochemical method of measuring in problems of geology. Temperature measurement and determination of geographical coordinates of location, transmission of data to the database on the server, mapping the results of measurement are realized in the prototype system.

D. O. TERLETSKYI

Wednesday, 27, 11:00

Finitely-Generated Algebras and Constructors of Multisets of Objects

This paper contains analysis of the basic concepts of set theory and consideration of the process of sets and multisets creation. The author proposes some approaches for creation sets of objects and different types of constructors of multisets of objects, which are the base for appropriate Finitely-Generated Algebras. The author also proposes description of general scheme of constructor of objects' multisets, and definition of class of finitely-generated algebras which are based on determined constructors of multisets of objects. Such approach gives opportunities to work with sets and multisets of objects, in particular to create them, to search for objects, to compare objects with each other and to classify them, to create new prototypes of objects.

Section Two: Applied Mathematics

**B. KUMALAKOV, A. SHOMANOV, YE. DADYKINA, S. IKHSANOV,
B. TULEPBERGENOV** Monday, 25, 15:20

Solving Dirichlet Problem for Poisson's Equation Using MapReduce Hadoop

This paper described approach of organization distributed computing for solving scientific problems. Iterative distributed algorithms are reduced to the MapReduce model and their performance is measured and analyzed. We implement iterative computation using Hadoop MapReduce technology in three parts: first, through controlling iterations of MapReduce Job (class executing call of run() method for Mapper and Reducer); second, implementing initialization for the first iteration step; and, finally, implement separate class for updating data on each step of iteration. Research result is the comparison of the result with different cluster settings and MPI model.

A. G. ZABUGA Monday, 25, 15:40

Specificity of Numerical Integration of Second-Order Differential Equations for Systems with Coulomb Friction by Runge-Kutta Method

By example of concrete system with one degree of freedom, that firstly was investigated analytically, specificity of numerical integration of ordinary second-order differential equations for systems with Coulomb and viscous friction was considered. A modification of Runge-Kutta formulas for mentioned systems was developed. Efficiency of modified Runge-Kutta formulas was shown for particular case by comparison of numerical and analytical solutions. A mentioned modification of Runge-Kutta formulas can be easily extended for systems with dry friction and any given finite number of degrees of freedom.

I. BONDAR, B. FALEICHIK Monday, 25, 16:00

Iterated Runge-Kutta Methods with Parallelization Capability for Stiff Problems

In this work we describe a class of numerical algorithms for the solution of stiff ODE systems which arise from specific implementation of implicit Runge-Kutta (RK) methods using the principle of steadying. These algorithms do not require Jacobian evaluations and factorizations which is beneficial when the dimension of the ODE is large, and can be naturally parallelized. It is shown that the resulting computational scheme is equivalent to some explicit RK method of first order, but it converges to the solution which corresponds to the base implicit method of high order. Numerical comparison with explicit DOP853 solver is given.

R. P. KRASNIUK Monday, 25, 16:20

Mathematical Modeling Optimal Using Resources in Grid-Systems

The purpose of the work is organized, analyzed and a mathematical formulation of the optimal distribution of resources in the GRID-system. The needs of applications require the creation of distributed computing systems and their optimal use is an important issue. Therefore, the construction and the study of organizational models of functioning of GRID-systems is defined mission work. In the work was constructed mathematical models of the four major organizational problems functioning GRID-systems: the problem of redistribution of resources, two-criteria and minimax optimization problems and planning problem. Was defined class of problems solved these problems, the mathematical statement is made and formulated conditions of construction of efficient computational schemes.

N. D. VAYSFEL'D, Z. YU. ZHURAVLOVA Monday, 25, 17:00

The Plain Problem of Elasticity for the Fixed Semistrip

Axisymmetric problem for an elastic semistrip under the action of an external loading is solved. On the lateral faces the conditions of coupling are executed, at the end the conditions of the elasticity first main problem are given. With the help of the integral sin-, cos-Fourier transformations the initial problem is reduced to the one-dimensional one, which is formulated as a vector semi-homogeneous boundary value problem. Its solving with the help of the Green's matrix leads to the solving of the integral-differential equation with regard to the unknown derivative

of the displacement at the strip's end. The equation is solved approximately by the orthogonal polynomials' method with taking into consideration the real singularities of the unknown function at the ends of the integration's interval. The use of the inverse integral transformations allow to obtain expressions for the displacements' and stress' estimation. The values of the normal stress within the strip are investigated.

K. O. KORKHOV

Monday, 25, 17:20

Comparative Analysis of Stable States of Static and Dynamic Model IS-LM

The article discusses issue of stability of dynamic macroeconomic model taking into account the monetary policy of the Central Bank. Comparison of equilibrium states of static and dynamic models was held. The correlations that were obtained economically justify values of the real interest rate.

O. V. KHAILENKO, M. A. SLEPICHEVA, V. S. DOBRIAK

Monday, 25, 17:40

Event Modeling of the Detonation Process of the Carbon Dust

The method of detonation processes modeling and distribution of a detonation wave based on a discrete-event modeling method is proposed. Detonation experiments of a carbon dust in the oxygen environment are carried out at various concentration parameters. Statistical results of energy and impulse profile changing throughout a settlement area are compiled.

O. V. POLOSMAK

Tuesday, 26, 09:00

Rate of Uniform Convergence for Battle-Lemarie Wavelets Expansions of Gaussian Random Processes

Conversion the problem of analyzing a continuous-time random process to that of analyzing a random sequence, which is much simpler, is useful in various applications. In the paper we work with the wavelet based expansions which have numerous advantages over Fourier series, and often lead to stable computations. This approach is widely used in statistics to estimate a curve given observations of the curve plus some noise. So, conditions of uniform convergence for Battle-Lemarie wavelets expansions of Gaussian random processes are presented. Another useful in various computational applications thing is the rate of convergence, especially if we are interested in the optimality of the stochastic approximation or the simulations. An explicit estimate of the rate of uniform convergence for Battle-Lemarie wavelets expansions of Gaussian random processes is obtained.

I. M. CHORNEI

Tuesday, 26, 09:20

Influenza Epidemic Forecasting Based on Weather Environment Using Multiple Linear Regression and GMDH Tools

This paper presents an approach to predict influenza epidemics based on weather environment. Based on actual statistical data and deterministic models the prediction was made using the multiple linear regression and GMDH tools. Compared the forecasting results got by multiple linear regression and GMDH tools.

YE. G. BUTSAN

Tuesday, 26, 09:40

The Overview of Estimation of a Payment Type of Bank's Credit Risk

The notion of the bank credit risk and its main components – expected and unexpected losses as well as the methods of their estimation are considered in the article. Some of them are the default probability, the loss given default, exposure at default and expected losses had been investigated by the author and have been realized as the software at the “Ukreximban”. The correspondent decisions are taken on the basis of the obtained results. The further work will concern with the investigation of unexpected losses and constructing the algorithms for CreditVaR estimation as well as programming and testing the obtained results.

I. B. KOTSIUBA

Tuesday, 26, 10:00

Calculation of European Call Option Under Uncertainty

The article deals with the Black-Scholes model where parameters depend on the time and environmental state, conditions under which the fair price of an option before and after averaging coincide are considered.

J. MOCKUS, J. STASIONIS

Tuesday, 26, 10:40

Calculus Pareto-Lipschitzian Optimization Solution for Parallel Computing

A well-known example of global optimization that provides solutions within fixed error limits is optimization of functions with a known Lipschitz constant. We propose a novel method called Pareto Lipschitzian Optimization (PLO) that provides solutions within fixed error limits for functions with unknown Lipschitz constants. We use Pareto Optimality (OP) for comparing. The criteria list is formulated out of set of all unknown Lipschitz constants. All they are regarded as multiple criteria in a search for Potentially Optimal (PO) solution. We introduce experimental implementation of PLO in high process computing (HPC) system. PLO algorithm, its realization and parallel solution is made for Vilnius University Institute of Mathematics and Informatics cluster. HPC implementation of PLO is a complex solution is not realized with straight forward methods. We compare counting and optimization speed between simple and HPC solution. The profit of usage of HPC in the PLO is described in experimental state.

T. YA. MASHTALIR

Tuesday, 26, 11:00

Fluctuations of Return of Securities on the Stock Market of Ukraine

Studied the fluctuations of stock returns based on the analysis of data obtained as a result of trading Public Joint Stock Company "Raiffeisen Bank Aval". Built graphs the cumulative distribution of the normalized stock returns for different time intervals and determined that the resulting curves are well described by power law. Established that Ukrainian stocks exhibit behavior similar as the shares of the leading foreign countries.

A. V. LELECHENKO

Tuesday, 26, 11:20

Linear Programming Over Exponent Pairs

We consider the problem of the computation of $\inf_p \theta p$ over the set of exponent pairs $P \ni p$ under linear constrains for a certain class of objective functions θ . An effective backtracking algorithm is presented, which runs in a linear number of steps for typical inputs. The output of the algorithm leads to the improvement and establishing new estimates in the various divisor problems in the analytical number theory.

YA. OLIINYK

Tuesday, 26, 11:40

Application of Particle Swarm Optimization to Discrete Problems

Particle Swarm Optimization (PSO) is an optimization technique originally described for continuous problems. However, PSO modified to apply to discrete problems appears to produce optimal or nearly optimal solutions in reasonable time. Such results are often unreachable for deterministic approaches. The paper introduces the detailed PSO algorithm adapted to solve the group of discrete problems that can be represented in a certain form.

YU. PERESTIUK

Wednesday, 27, 09:00

On Discontinuous Cycles in One Impulsive System

We study a certain class of two-dimensional systems of differential equations that undergo an impulsive action at the moment when phase point passes through a given straight line in plane. Necessary and sufficient conditions for asymptotic stability (non-stability) of solutions of such system and the existence of periodic solutions that have one (two) impulsive perturbations per period are stated. That is the solutions that generate so-called one- (two-) impulsive discontinuous cycles. The result of research may be used in the study of oscillatory processes that undergo a short-term perturbations.

D. V. MYKOLIUK

Wednesday, 27, 09:20

Discontinuous Cycles in Impulsive System

A weakly nonlinear impulsive differential system with center or saddle phase portrait type is considered. System has variable moments of impulses. Points of discontinuity form two parallel lines. Possible types of cycles and conditions of their existence are found for corresponding linear system. Based on these results conditions of existence of cycles of the nonlinear system in vicinities of linear system cycles are found.

YU. YU. KOROL

Wednesday, 27, 09:40

Stability of Solutions of Differential-Algebraic Systems with Impulse Impact

The paper deals with the differential-algebraic systems with impulse impact under the assumption that systems under the consideration can be reduced to the central canonical form. We find necessary and sufficient conditions for the stability of such systems and generalize the Floquet-Lyapunov theory for systems of this type with periodic coefficients.

V. O. KAPUSTIAN, I. O. PYSHNOGRAIEV

Wednesday, 27, 10:00

Zero Component of a Distributed Optimal Control for Parabolic-Hyperbolic Equations with Quadratic Criteria

The paper deals with optimal control problem for parabolic-hyperbolic equations with quadratic criteria and non-local boundary conditions. We have shown the way of solution of this task and found the general view of zero component of a distributed optimal control, using the Fredholm integral equation of the second type. Also we got formulas for some formulation of problem. Results are going to be used for expanding the solution to a non-zero components of the optimal control.

I. V. GREBENNIKOVA

Wednesday, 27, 10:40

The Control of Dynamic System With Delay Under Quadratic Constraints

The control problem for the singularly perturbed system with delay with indeterminate initial conditions and integral quadratic constraints on the control resources according to the minimax criterion is considered. Iterative procedure of constructing control response that approximates the optimal solution with given accuracy with respect to a small positive parameter is proposed.

O. M. MAKASEIEV

Wednesday, 27, 11:00

The Maps of Dynamical Regimes of Non-ideal Pendulum Systems in the Presence of Delay

Non-ideal dynamical system “pendulum–electric motor” with taking into account the delay effect of electric motor impulse on the pendulum and the delay of the medium reaction on the dynamical state of the pendulum is considered. The approaches that reduce the mathematical model of the system to a system of differential equations without delay are proposed. The maps of dynamical regimes are constructed and analysed. The influence of various factors of delay on steady-state regimes of the system “pendulum–electric motor” is investigated.

V. L. MAKAROV, D. V. DRAGUNOV, D. V. BOHDAN

Wednesday, 27, 11:20

Exponentially Convergent Numerical-Analytical Method for Solving Eigenvalue Problems for Singular Differential Operators

The paper summarizes the authors’ recent work on developing and proving an exponentially convergent numerical-analytical method (the FD-method) for solving Sturm-Liouville problems with a singular Legendre operator and a singular potential. It gives a concise general overview of the FD-method, outlines the proof of its convergence and exponential convergence rate when applied to the particular problem at hand and talks briefly about its software implementation.

D. TENENG

Wednesday, 27, 11:40

Risk Processes with NIG Premiums and Gamma Claims

I present a new risk process where premiums are modeled by a normal inverse Gaussian (NIG) Lévy process, and claims by a Gamma Lévy process. I illustrate proposed model¹ with simulated graph and derive a Cramer-Lundberg upperbound for ruin probability.

¹Research supported by Estonian Doctoral School in Mathematics and Statistics.

Section Three: Artificial Intelligence

L. SROBA, R. RAVAS

Wednesday, 27, 09:20

Impact of Subpixel Paradigm on Determination of 3D Position from 2D Image Pair

The idea of subpixel feature detection is widely used in image processing area in these days and it has a high significance in many practical applications. This paper deals with impact of subpixel paradigm on accuracy of 3D coordinates determination using information related to corresponding 2D image pairs. In the other worlds, there is a study how the subpixel corner points detection could influence the accuracy of 3D reconstruction. For that reason our work contains this comparison for image pairs having various mutual position and resolution using data from given datasets. This contribution could answer the question if the paradigm of subpixel detection could be useful in VSLAM methods and other practical tasks where the precision is a key.

G. GOL, N. F. BAYRAKTAR, E. KIYAK

Wednesday, 27, 09:40

Determination of the Vehicles Density with Quadrocopter

This paper includes an application of the four rotor unmanned aerial vehicle named as quadrocopter. In this application, determination of the vehicle density is aimed in the desired area. For this aim, first of all a quadrocopter has been designed. After the obtaining stable flight, it has autonomously been used at desired area and altitude for transformation of the video signals. The signals are transmitted to ground computer and processed using MATLAB program. The processing includes two steps on transformation of the video signal from RGM form to black and white form. This paper differs from the similar studies in terms of some points which are application area, the antenna systems, signal processing methods, and so on. Successful results of this study form a basis for the future planned study on determination of the live intensity.

O. S. DANYLEVSKYI

Wednesday, 27, 10:20

Synthesis of Ukrainian Language Based on Segments Concatenation

The article describes an embedded Ukrainian synthesis approach based on speech concatenation. This approach adopts phonetic sub-words as carrier of variable-length units. Is presented scheme of algorithm of synthesis based on concatenation of variable-length units of audio signal. Is defined three classes of units to cover the set of Ukrainian words and is presented mathematical model based on this 3-class units.

S. GAJAWADA

Wednesday, 27, 10:40

PhD: The Human Optimization

This paper is dedicated to everyone who is interested in the Artificial Intelligence. In the past, researchers have explored behavior of chromosomes, birds, fishes, ants, bacteria, bees and so on to create excellent optimization methods for solving complex optimization problems. The author proposed the Human Optimization in this paper. Humans progressed like anything. They help each other. There are so many plus points in Humans. In fact all optimization algorithms based on other beings are created by Humans. There is so much to explore in behavior of Human for creating awesome optimization algorithms. Artificial Fishes, birds, ants, bees etc have solved optimization problems. Similarly, optimization method based on Humans is expected to solve complex problems. This paper sets the trend for all optimization algorithms that come in future based on Humans.

Section Four: Software Engineering

N. LITVINENKO

Monday, 25, 15:20

Parallel Algorithms for Problems of Cluster Analysis with Very Large Amount of Data

In this paper we solve on GPUs massive problems with large amount of data, which are not appropriate for solution with the SIMD technology. For the given problem we consider a three-level parallelization. The multithreading of CPU is used at the top level and graphic processors for massive computing. For solving problems of cluster analysis on GPUs **the nearest neighbor method** (NNM) is developed. This algorithm allows us to handle up to **2 millions** records with number of features up to **25**. Since sequential and parallel algorithms are fundamentally different, it is difficult to compare the computation times. However, some comparisons are made. The gain in the computing time is about 10 times. We plan to increase this factor up to 50 – 100 after fine tuning of algorithms.

R. V. LYSOGOR

Monday, 25, 15:40

The Application of Information Technologies to Build Business Process of Personal Lending

This paper describes an approach that can be used to build flexible in setting up a decision making information system for personal lending. The peculiarity of such an information system (IS) is that banking subproduct is automatically selected for clients; meets to the fullest extent the requirements of the client and at the same time is the most profitable for the bank. Such IS allows to optimize the charges of the Bank and minimize Time-To-Yes.

J. KŘOUSTEK

Monday, 25, 16:00

Decompilation of VLIW Executable Files: Caveats and Pitfalls

The task of machine-code decompilation is to reconstruct a high-level-language (HLL) representation, such as C code, from a binary executable file. In present, we can find several such tools that support different target architectures (e.g. Intel x86, ARM, PowerPC). Each of these architectures can be classified either as RISC (reduced instruction set computing) or CISC (complex instruction set computing). However, none of the existing decompilers support another major architecture type – VLIW (very long instruction word). In recent years, VLIW processors are once again on the rise because of their high performance. Therefore, there is a demand of a VLIW-supporting decompiler. In this paper, we depict the unique features of the VLIW architecture and we present several approaches how to handle them in the decompilation process.

S. NEDELICHEV, I. ZHELIAZKOVA

Monday, 25, 16:20

A Technology for Generation of Individual Test-Like Exercises for Modeling with Graphs – the Teacher’s Side

The graph theory taught generally in discrete mathematics, mathematical modeling and similar courses is applied mainly for structural and informational modeling in many subject domains. For this purpose both teachers and learners need a problem-solving technology with powerful tools for preparing and performing test-like exercises. The paper is aimed to fill this gap presenting the teacher’s side of a technology for generating individual test-like exercises for modeling with graphs.

O. HORDIICHUK

Monday, 25, 17:00

Tailcast – A Distributed Multicast System with Low End-User Delays

A success of file distributing peer-to-peer applications such as BitTorrent motivated researches to use this idea for video streaming applications. Due to a real-time data generation nature, heterogeneous behavior of peers and underlying network the main challenge is to develop a robust topology structure and a fast dissemination algorithm. This paper presents a simple, but efficient and completely distributed multicasting algorithm that is called Tailcast. It is based on an idea

of building tailed tree topology, which guarantees low stretch and reliability of the network. As compared with the existing tree-based algorithms a time penalty for the peer churn event does not linearly grow with the network size. The results demonstrate robustness and efficiency of this solution.

S. ANGELOV, I. ZHELIAZKOVA

Monday, 25, 17:20

An Instructor's Tool for Generating Individual Test-Like Exercises for Patterns Recognition with Systems of Linear Decision Functions

Recently the approach of patterns recognition has wide application in astronomy, medicine, robotics, remote sensing, etc and it is reduced to classification of the input data set of symbols, text, speech, images, and so on. Systems of linear decision functions are one of the classical methods applied for this purpose and some of the other methods are reduced to it. Its effective and efficient skills acquisition is possible though problem solving technologies focusing the learner's construction learning. The paper deals with a technology for generating individual test-like exercises for visual modeling based on such method.

S. TODOROV, I. ZHELIAZKOVA

Monday, 25, 17:40

A Technology for Generation of Individual Test-Like Exercises for Teaching 3D Geometry – the Instructor's Tool

According to UNESCO, 2002 "An instructional technology can be used to support traditional forms of learning or transform them into innovative and creative ones". The student-centered activities that allow 3D geometry instruction/learning incorporating 2D geometry knowledge and experimentation are especially important as 3D spatial knowledge is difficult for most of the students. The paper focuses on the instructor's tool of a technology for generation of individual exercises of 3D geometry tasks.

ABDULLAH A H ALZHRANI, AMNON EDEN

Monday, 25, 18:00

UML Versus LePUS3 for Modelling Structure of Security Patterns

Unified Modelling Language (UML) is a widely used and accepted software modelling language. However, UML still suffers from many issues such as formality, lack of precision and low support for abstraction. This paper highlights some of the aforementioned issues with comparison to Language for Pattern Uniform Specification (LePUS3).

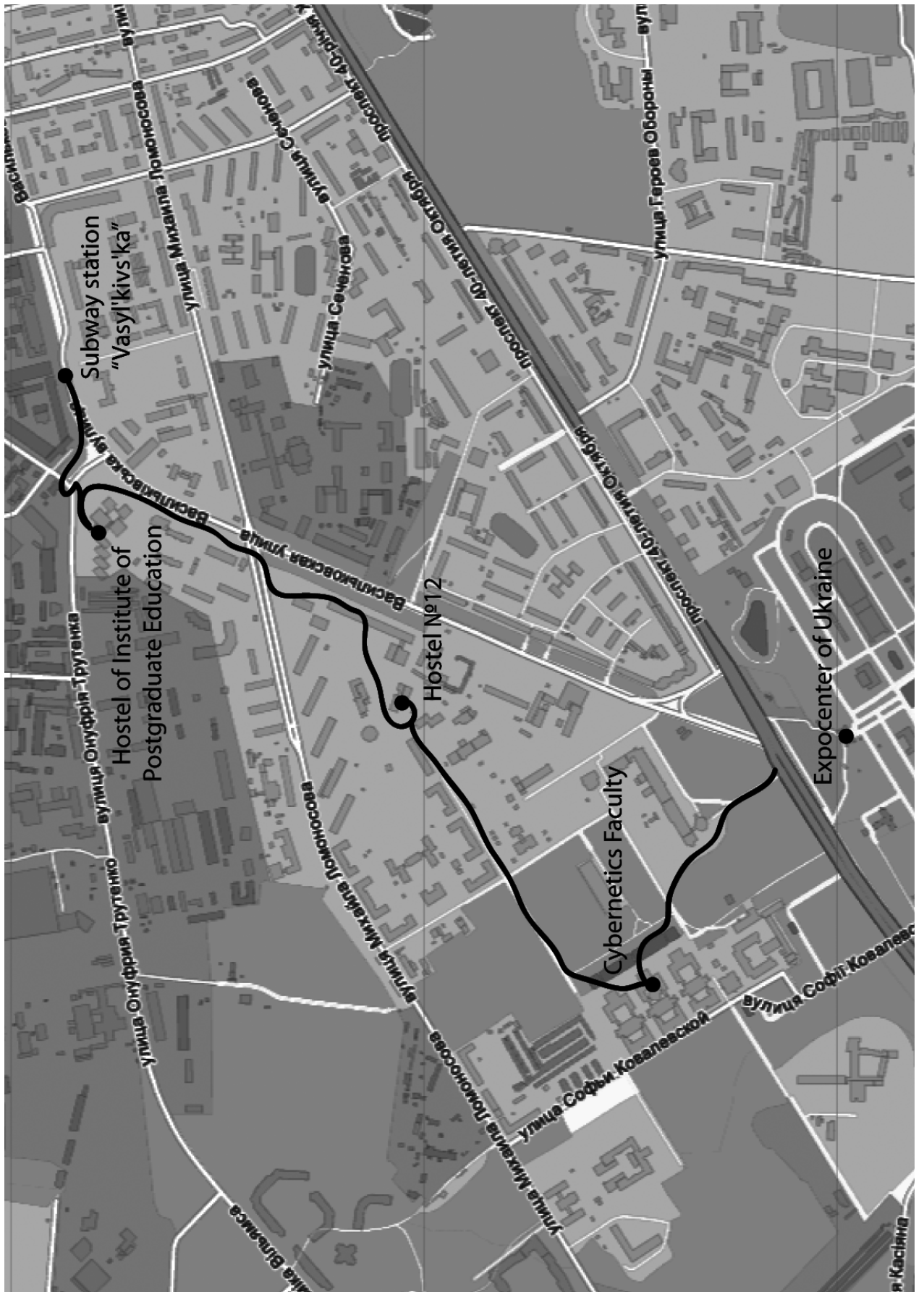
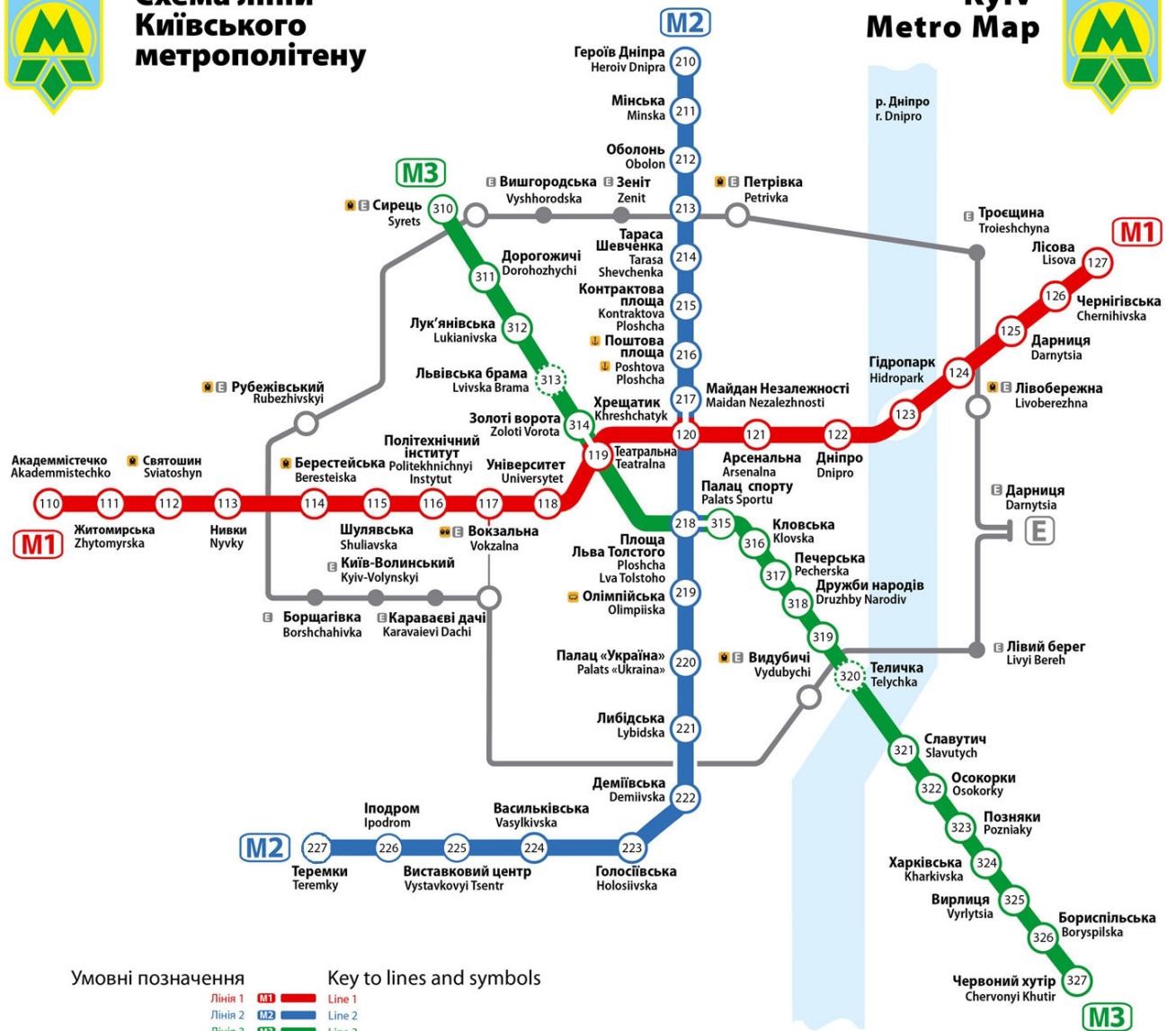




Схема ліній Київського метрополітену

Kyiv Metro Map



Умовні позначення	Key to lines and symbols
Лінія 1	Line 1
Лінія 2	Line 2
Лінія 3	Line 3
Міська електричка	City Train
Ділянка, що споруджується	Section Under Construction
Станції пересадок	Interchange Stations
Вихід до центрального залізничного вокзалу	Central Railway Station
Вихід до приміських електропоїздів	Suburban Train Station
Вихід до річкового порту	River Port
Національний спорткомплекс «Олімпійський»	"Olimpiiskiy" National Sports Complex
Станції, що споруджуються	Stations Under Construction