

1. Prof. Dr. Negru Viorel – (vnegru@info.uvt.ro)

<i>Nr crt</i>	<i>Titlu</i>	<i>Descriere</i>	<i>Spec.</i>
1	<p>Sistem multi-agent pentru simularea unui mediu ambiental inteligent</p> <p>(Drd. Todor Ivascu)</p> <p>1 – 3 teme</p>	<p>Mediile ambientale inteligente pot fi de natura diferita ("case inteligente", sisteme asistive, "smart city", etc) si pot colecta date de natura diferita (date de la diferite tipuri de senzori, date provenite din retele de socializare -Facebook, Google+). Se cere proiectarea si dezvoltarea unui sistem multi-agent generic care sa poata simula date privind functionarea unui asemenea mediu ambiental. O ontologie va descrie mediul ambiental si principiile de simularea. Sistemul construit va "incarca" aceasta ontologie si apoi va construi agentii necesari. Agentii vor produce datele care vor "simula" mediul ambiental respectiv.</p> <p>Tehnologii utilizate: JADE, Facebook API, Protege.</p>	

2	<p>Sentiment Analysis in Customer Relationship Management (CRM) Systems</p> <p>(Drd. Doru Rotovei)</p> <p>1 tema</p>	<p>Here we will explore how Natural Language Processing techniques (NLP) can be used to enhance the knowledge about a potential client using SentiWord. The NLP techniques will be contrasted with supervised learning techniques to extract the polarity of the sentiments in written reviews or notes for CRM products. The work will discover under which conditions one technique is better than the other. Note that the exploration will need prototyping in Python.</p> <p>Yu, J., Zha, Z.J., Wang, M. and Chua, T.S., 2011, June. Aspect ranking: identifying important product aspects from online consumer reviews. In Proceedings of the 49th Annual Meeting of the Association for Computational Linguistics: Human Language Technologies-Volume 1 (pp. 1496-1505). Association for Computational Linguistics.</p> <p>Coussement, Kristof, and Dirk Van den Poel. "Improving customer attrition prediction by integrating emotions from client/company interaction emails and evaluating multiple classifiers." Expert Systems with Applications 36, no. 3 (2009): 6127-6134.</p>	
3	<p>Tehnici hibride in securitatea sistemelor complexe</p> <p>(Drd. Mario Reja)</p> <p>2 – 3 teme</p>		

4	<p>Text Mining for Romanian Language</p> <p>(Drd. Adriana Dinis)</p> <p>1 – 3 teme</p>	<p>The Romanian Language faces a lack of text mining tools for its better understanding and processing.</p> <p>Our aim is to fill this gap.</p> <p>The purpose of the project: gather a large amount of Romanian text from different fields, classify it correctly and store it in a large database. For this we will use various classification algorithms (supervised and unsupervised). New ideas are also welcome.</p> <p>Tools: Python, R, Hadoop/Spark</p>	
5	<p>Sisteme de monitorizare a diabetului</p> <p>(Drd. Bogdan Butunoi)</p> <p>1 – 2 teme</p>		

2. Prof. Dr. Petcu Dana (Dana.Petcu@e-uvv.ro)

Nr. crt.	Denumire temă	Descriere temă	Specializare IACD, IS, BIOINFORMATICA, SECURITATE CIBERNETICA, AIDC, BIGDATA
1.	Programming paradigms and models for data intensive applications/ Paradigme de programare si modele pentru aplicatii ce folosesc intensiv date	The cost of accessing, moving, and processing data across a parallel system is enormous. This requires the design of mechanisms, techniques and operations for efficient data access, placement and querying. Starting from a possible integration of the MapReduce model with MPI model to achieve scalability of large-data processing, the aim is to provide a model and a functional API implementation that allows large-scale data-parallelism on top of the abstraction of multi-dimensional structures subdivided in partitions so that different partitions are placed on different cores/nodes. <i>Required knowledge: C & Java, Parallel Computing, Distributed computing</i>	IACD/AIDC/IS/BIGDATA
2.	Monitoring the usage of data center resources/ Monitorizarea resurselor	A monitoring architecture infrastructure for a data center is expected to gather parameters of the applications and hardware. The aim is to design a solution that enables multiple levels of measurement	IACD/AIDC/IS/BIGDATA

	utilizate intr-un centru de date	with varying degrees of precision, refresh rate and intrusiveness. <i>Required knowledge: C & Java, Parallel Computing, Distributed computing</i>	
3.	Adaptive data distribution strategies/ Strategii de distribuire adaptiva a datelor	One of the major problems parallel systems is the data distribution strategies that can increase data locality taking into account application behaviour. A methodology for profiling and analyzing data-intensive applications for identifying opportunities for exploiting data locality is needed. Following it an adaptive data allocation strategy will be proposed. <i>Required knowledge: C & Java, Parallel Computing, Distributed computing</i>	IACD/AIDC/IS/BIGDATA
4.	Tehnici de planificare dependente de disponibilitatea datelor/Data availability dependent scheduling techniques	Scheduling techniques are currently taking into account the availability of the computational resources from a computing center. For data intensive applications the scheduling of computational tasks should be done close to data in order to maximize the data locality. The trade off between the computational resource availability and the data transfer costs should be investigated in an experimental environment. <i>Required knowledge: C & Java, Parallel Computing, Distributed computing</i>	IACD/AIDC/IS/BIGDATA

3. Prof. Dr. Istrate Gabriel (gabriel.istrate@e-uvv.ro)

Nr. crt.	Denumire temă	Descriere temă	Specializare IACD, IS, BIOINFORMATICA, SECURITATE CIBERNETICA, AIDC, BIGDATA
1.	Algoritmi de tip interior point pentru programarea liniara.	Se vor prezenta, implementa, si evalua experimental algoritmi de tip interior point pentru programarea liniara.	Toate minus BIOINFORMATICA.
2.	Tema teoretica deschisa (de cercetare) in domeniul jocurilor cooperative multi-agent.	Se va coopera cu coordonatorul pentru demonstrarea unor noi rezultate teoretice in domeniul jocurilor cooperative in sisteme multiagent. Tema poate presupune unele implementari si evaluari ale algoritmilor definiti, dar in mod cert presupune abilitati matematice.	Toate minus BIOINFORMATICA.
3.	Tema teoretica deschisa (de cercetare) in domeniul masurilor de centralitate in sisteme multi-agent.	Se va coopera cu coordonatorul pentru demonstrarea unor noi rezultate teoretice in domeniul masurilor de centralitate in sisteme multiagent. Tema poate presupune unele implementari si evaluari ale algoritmilor definiti, dar in mod cert presupune abilitati matematice.	Toate minus BIOINFORMATICA.

4.	Tema teoretica deschisa (de cercetare) in domeniul optimizarii combinatoriale.	Se va coopera cu coordonatorul pentru demonstrarea unor noi rezultate teoretice in domeniul optimizarii combinatoriale. Tema poate presupune unele implementari si evaluari ale algoritmilor definiti, dar in mod cert presupune abilitati matematice.	Toate minus BIOINFORMATICA.
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4. Conf. Dr. Mîndruță Cristina (cristina.mindruta@e-uvv.ro)

Specializarea: IS

Nr. Crt.	Titlu	Descriere
1	Utilizare / Creare servicii administrate (managed) pentru Cloud Foundry. Studii de caz.	https://docs.cloudfoundry.org/services/
2	Service mesh – stratul pentru gestiunea complexitatii comunicarii intre (micro)servicii in context cloud. Studii de caz.	https://www.nginx.com/blog/what-is-a-service-mesh/ https://www.nginx.com/resources/library/the-enterprise-path-to-service-mesh-architectures/ https://dzone.com/articles/api-gateway-vs-service-mesh-1
3-4	Dezvoltare de aplicatii Cloud Native	<u>Cloud native is a term used to describe container-based environments. Cloud-native technologies are used to develop applications built with services packaged in containers, deployed as microservices and managed on elastic infrastructure through agile DevOps processes and continuous delivery workflows.</u> https://thenewstack.io/ebooks/microservices/cloud-native-microservices-2018/ https://thenewstack.io/10-key-attributes-of-cloud-native-applications/

5. Conf. Dr. Fortiș Florin (florin.fortis@e-uvt.ro)

1	Ingesting VIVO	Dezvoltarea/adaptarea unor mecanisme pentru colectare și import automat a datelor în VIVO, utilizând o abordare bazată pe tehnologii workflow (Camunda, Activiti)	Toate temele presupun dezvoltarea de API-uri REST. Alegerea tehnologiilor se va realiza după ce studenții realizează o analiză inițială a aplicațiilor
2	Workflow engines & patterns	Realizarea unui studiu comparativ al principalelor soluții de tipul workflow engine (ex. Camunda, Activiti, jBPM, etc.) prin prisma “workflow patterns”. https://github.com/meirwah/awesome-workflow-engines	
3	Limbaje pentru micro-servicii	Realizarea unui studiu comparativ al principalelor limbaje/biblioteci pentru micro-servicii (ex. Akka, Vert.x, Jolie, etc.)	
4	Integration patterns/data integration	Realizarea unui studiu legat de Enterprise Integration Patterns și utilizarea acestora. Studiul va acoperi diferite sisteme care facilitează transportul mesajelor (Enterprise Service Bus), cu o atenție deosebită pentru Apache Camel și concepte legate de ‘data integration’. (Enterprise Integration Patterns Designing, Building, and Deploying Messaging Solutions by Gregor Hohpe and Bobby Woolf)	
5	Adaptarea bibliotecilor matematice pentru un mediu distribuit	Limbajul Scala oferă suportul ideal pentru construirea de aplicații scalabile. Bibliotecile lapack/blas oferă, pe de altă parte, suportul necesar pentru rezolvarea unor probleme matematice complexe. Prin adaptarea acestor biblioteci la un mediu bazat pe scala se oferă suportul pentru exploatarea intensivă a	

	bazat pe Scala	<p>acestor biblioteci matematice.</p> <p>Lucrarea își propune exploatarea modelului bazat pe actori din scala în scopul expunerii suportului matematic.</p> <p>Suport tehnologic: XML, lapack/blas, platforme bazate pe scala</p> <p>Limbaje: Scala/Akka, Java, C/C++</p>	
6	Teme propuse	Cel mult două teme la propunerea studenților, bazate pe	

6. Conf. Dr. Kaslik Eva (eva.kaslik@e-uvv.ro)

Nr. crt.	Denumire temă	Descriere temă	Specializare IACD, IS, BIOINFORMATICA, SECURITATE CIBERNETICA, AIDC, BIGDATA
1.	Feature selection using fractal dimension.	Feature selection algorithms to select the most important attributes for a given set of n-dimensional vectors, based on correlation fractal dimension, are to be described and analyzed. Their efficiency over test datasets is to be explored.	BIG DATA
2.	Double Q-learning and applications.	Double Q-learning, a relatively new off-policy reinforcement learning algorithm, is to be described and analyzed, as compared to the well-known Q-learning algorithm which may perform poorly in some stochastic environments, due to overestimation of action values.	BIG DATA

7. Conf. Dr. Marin Mircea (mircea.marin@e-uvv.ro)

Nr. crt.	Denumire temă	Descriere temă	Specializare IACD, IS, BIOINFORMATICA, SECURITATE CIBERNETICA, AIDC, BIGDATA
1-3.	Applications of rule-based programming to automated reasoning (3 students)	<p>Rule-based programming is a declarative programming style where labeled conditional rules can be used to specify models of computation (rewriting controlled by strategies) or the rules of inference of a deduction system.</p> <p>The goal of these dissertations is to show how various systems of deduction can be specified and turned into executable code with a rule-based system with support for strategic programming.</p> <p>Interested students are expected to choose a particular system of deduction (such as Linear Temporal Logic, Computation Tree Logic, etc.), to formalize its rules of</p>	AIDC, BIGDATA

		<p>inference using a rule-based system, to experiment with the implementation, and to describe an application.</p> <p>They should get familiar with RhoLog, a rule-based system developed at our university, and implemented in <i>Mathematica</i>.</p> <p>(see http://staff.fmi.uvt.ro/~mircea.marin/rholog/)</p>	
4	Accesul la resurse bazat pe attribute	<p>ABAC este cel mai recent model de autorizare al accesului la resurse, in care orice sistem este o colectie de entitati (utilizatori, subiecti si obiecte) descries cu attribute.</p> <p>Scopul acestei dizertatii este de a descrie modelul ABAC, a face un studiu comparativ al modelului ABAC cu modele anterioare (DAC, MAC si RBAC), si de a argumenta cum poate fi configurat ABAC pentru a le simula.</p>	Securitate cibernetica

8. Conf. Dr. Onchiș Darian (darian.onchis@e-uvt.ro)

Nr. crt.	Denumire temă	Descriere temă	Specializare IACD, IS, BIOINFORMATIC A, SECURITATE CIBERNETICA, AIDC, BIGDATA
1	Optimizarea algoritmilor de învățare automată prin încorporarea invarianților topologici.	Se vor folosi numărul de componente conexe și alți invarianți topologici depinzând de dimensiunea datelor pentru a obține metode de training mai rapide în problema de recunoaștere a obiectelor: https://arxiv.org/abs/1707.04041 .	Toate specializările
2	Deep learning și analiza timp - frecvență pentru prognoză și monitorizare.	Metode de tip deep learning pentru programarea unui agent inteligent numit AgentMec, pentru detectia defectelor în bare fixe: http://anale-ing.uem.ro/2010/28_C.pdf	Toate specializările
3	Alinierea secvențelor multiple în bioinformatica folosind MAFFT.	Scopul acestei lucrări este folosirea și îmbunătățirea metodei MAFFT prin introducerea de noi elemente algoritmice, pentru alinierea secvențelor multiple de aminoacizi sau nucleotide:	Bioinformatică

		http://mafft.cbrc.jp/alignment/software/	
4	Reverse machine learning.	Dezvoltarea de algoritmi pentru inversarea efectelor procesării datelor folosind învățarea automată: https://arxiv.org/abs/1803.00158	Toate specializările
5	Parallel computing algorithms in time-frequency analysis.	Dezvoltarea de algoritmi paraleli pentru metodele de prelucrare în timp - frecvență a datelor: http://ieeexplore.ieee.org/document/6269990/	IACD
6	Genetica comparativa folosind browserul de genom ENSEMBL.	Scopul acestei lucrari este de a descoperi noi conexiuni între gene folosind programul de la ENSEMBL de la Institutul European de Bioinformatica: https://www.ensembl.org/index.html	Bioinformatică
7	Deep learning for style transfer	Artistic Style Transfer with Convolutional Neural Network. Please check the following reference: https://towardsdatascience.com/style-transfer-styling-images-with-convolutional-neural-networks-7d215b58f461	AIDC

9. Conf. Dr. Crăciun Vasile (adrian.craciun@e-uvt.ro)

Nr	Tema	Detalii	Obs
1	Applications of Groebner Bases	<p>The method of Groebner bases is an algorithmic method in multivariate polynomial rings, introduced by Bruno Buchberger in 1965. It has numerous applications in polynomial ideal problems (ideal membership, ideal inclusion), solving systems of polynomial equations, etc. Groebner bases proved useful in many domains: algebraic geometry, functional analysis, coding theory, cryptography, program verification, symbolic summation, theorem proving, combinatorics, graph theory. The algorithm is implemented in many computer algebra systems (Mathematica, Maple, CoCoA, Macaulay, Singular, etc.).</p> <p>The purpose of this thesis is to explore possible applications of Groebner bases (theorem proving in geometry, solving systems of equations, etc.).</p> <p>Previous knowledge: logic, mathematical thinking, algebra, computer algebra systems, programming (C++, C, or Mathematica, Maple, etc).</p>	Licenta, dizertatie
2	Logical Frameworks	<p>A logical framework is a formal meta-language for deductive systems. The primary tasks supported in logical frameworks to varying degrees are</p>	Licenta, dizertatie

		<ul style="list-style-type: none"> * specification of deductive systems, * search for derivations within deductive systems, * meta-programming of algorithms pertaining to deductive systems, * proving meta-theorems about deductive systems. <p>The purpose of thesis is the study of the formalism and its applications.</p>	
3	Higher Order Unification and Matching	<p>Higher-order unification is the problem: given an equation $t = u$ containing free variables, is there a solution substitution σ such that $t\sigma$ and $u\sigma$ have the same normal form? The terms are drawn from the simply typed lambda calculus. Higher order matching is the particular instance: when the term u is closed, can t be pattern matched to u? Although higher-order unification is undecidable (even if free variables are only second-order), higher-order matching was conjectured to be decidable by Huet.</p> <p>The aim of this thesis is to study the theoretical foundations and to implement higher order unification/matching, and apply the implementation in relevant examples.</p>	Licenta, dizertatie

4	Visualization methods for large libraries of mathematical knowledge	<p>There are several formalize mathematical knowledge bases available (e.g. the Mizar library, HELM). There are many computer-supported systems for doing mathematics. Yet these had little impact the way mathematicians work. This has partly to do with the fact that these systems are hard to use. The aim of this thesis is to investigate techniques to make large knowledge bases of mathematics easier to navigate: define and implement (visual) tools to navigate/explore such knowledge bases.</p>	Licenta, dizertatie
5	Abstract State Machines and Applications (1-2 theses)	<p>The Abstract State Machine (ASM) Project (formerly known as the Evolving Algebras Project) was started by Yuri Gurevich as an attempt to bridge the gap between formal models of computation and practical specification methods.</p> <p>The ASM thesis is that any algorithm can be modeled at its natural abstraction level by an appropriate ASM. Based upon this thesis, members of the ASM community have sought to develop a methodology based upon mathematics which would allow algorithms to be modeled naturally; that is, described at their natural abstraction levels.</p> <p>The purpose of this thesis is to investigate and use in practical examples the concept of ASMs.</p>	Licenta, dizertatie

6	K-framework and its applications (1-2 theses)	<p>K is a rewrite-based executable semantic framework in which programming languages, type systems and formal analysis tools can be defined using configurations, computations and rules. Configurations organize the state in units called cells, which are labeled and can be nested. Computations carry computational meaning as special nested list structures sequentializing computational tasks, such as fragments of program. Computations extend the original language abstract syntax. K (rewrite) rules make it explicit which parts of the term they read-only, write-only, read-write, or do not care about. This makes K suitable for defining truly concurrent languages even in the presence of sharing. Computations are like any other terms in a rewriting environment: they can be matched, moved from one place to another, modified, or deleted. This makes K suitable for defining control-intensive features such as abrupt termination, exceptions or call/cc.</p> <p>The purpose of this thesis is to investigate and use in practical examples the concepts from K.</p>	Licenta, dizertatie
7	Computer Supported Theorem Proving using Isabelle	<p>Isabelle is a generic proof assistant. It allows mathematical formulas to be expressed in a formal language and provides tools for proving those formulas in a logical calculus. The main application is the formalization of mathematical proofs and in particular formal verification, which includes proving the correctness of computer hardware or software and proving properties of computer languages and protocols.</p>	Licenta, master

8	Computer Supported Theorem Proving using Coq	Coq is a formal proof management system. It provides a formal language to write mathematical definitions, executable algorithms and theorems together with an environment for semi-interactive development of machine-checked proofs.	Licenta, master
9	Topics proposed by students	I will also accept to supervise topics proposed by students, provided that I'm in position to do so, i.e. topics covered are logic, logic programming, constraint solving, theorem proving, computer algebra.	Licenta, dizertatie

10.Lector Dr. Mihalaş Stelian (stelian.mihalas@e-uvv.ro)

Nr. crt.	Denumire temă	Descriere temă	Specializare
1.	Desktop Collaboration Tool on a Windows platform	Design and implement a tool that provides groups management, resource sharing, messaging, project management.	AIDC, IACD
2.	Desktop Collaboration Tool on a Linux platform	Design and implement a tool that provides groups management, resource sharing, messaging, project management.	AIDC, IACD
3.	Proximity Server design and implementation	A proximity server provides security services, VPN, resource sharing, messaging, etc., at community (~4000 clients) level.	AIDC, IACD
4.	Algorithm for planar graphs representation	Design and implement an algorithm for drawing planar graphs in the plane or on the sphere, based on its GraphML description.	AIDC, IACD

11.Lector Dr. Micota Flavia (flavia.micota@e-uvv.ro)

Nr. crt.	Denumire temă	Descriere temă	Specializare IACD, IS, BIOINFORM ATICA, SECURITATE CIBERNETIC A, AIDC, BIGDATA
1.	Euristici de rezolvare ale problemei comis voiajorului folosind ferestre de timp	Folosirea de euristici inspirate din natură pentru rezolvarea problemei comis voiajorului care implică constângerii legate de ferestre de timp în care trebuie să aibă loc livrarea Limbaje: python, java	IACD, IS
2.	Identificare dialecte română, română din Republica Moldova	Pe baza benchmark https://github.com/butnaruandrei/MOROCO dezvoltarea unei aplicații de identificare a dialectelor limbii române. https://arxiv.org/pdf/1901.06543.pdf	IACD, IS

12.Lector Dr. Ing. Pungilă Ciprian (ciprian.pungila@e-uvv.ro)

Nr	Tema	Detalii	Specializare
1	Review/study of pattern-matching algorithms on heterogeneous CPU/GPU systems	<p>Analiza și implementarea a cel puțin 6 algoritmi diferiți pentru regăsirea de șabloane (texte) pe CPU și GPU (CUDA sau OpenCL). Realizarea unui profil de performanță a algoritmilor testați. Evidențierea domeniilor de interes pentru acest tip de algoritmi. Analiza posibilității implementării algoritmilor în arhitecturi eterogene CPU/GPU. Opțional: propunerea unui algoritm propriu pentru pattern-matching, și compararea acestuia (ca nivel de performanță) cu cele existente.</p> <p>Cunoștințe necesare: structuri de date avansate, algoritmică, calcul paralel.</p>	Securitate cibernetică, Big data, IS
2	Review/study of static and/or dynamic data analysis methods for threat detection/mitigation in intrusion detection systems.	<p>Analiza metodelor recente de analiză statică și/sau dinamică, folosite în mod activ în detecția programelor malițioase (e.g. trojans, viruses, etc.) sau în sistemele de detecție a intrușilor (e.g. firewalls, packet sniffers, etc.). Evidențierea metodelor de detecție și contextul aplicării acestora în sistemele de detecție a intrușilor. Analiza performanțelor metodelor selectate și compararea acestora sub formă de studiu bibliografic. Opțional: Propunerea unei metode proprii de analiză statică și/sau dinamică pentru sistemele de detecție a intrușilor.</p> <p>Cunoștințe necesare: structuri de date avansate, algoritmică, calcul paralel.</p>	Securitate cibernetică, Big data, IS

3	<p>Review/study of static and dynamic data analysis in digital forensics.</p>	<p>Analiza metodelor de analiză statică și/sau dinamică de date pentru investigații digitale. Compararea performanțelor acestora sub formă de studiu bibliografic (cu implementarea cel puțin a unui algoritm din cele studiate). Studiul fezabilității aplicării metodelor în diverse contexte: reconstrucția imaginilor, recuperarea datelor, reconstrucția formatelor video, etc. Opțional: propunerea și implementarea unui algoritm propriu pentru analiză statică și/sau dinamică de date în contextul ales (cu compararea performanțelor sale cu cele existente).</p> <p>Cunoștințe necesare: structuri de date avansate, algoritmică, calcul paralel.</p>	<p>Securitate cibernetică, Big data, IS</p>
4	<p>Review/study of static analysis applied to biometric forensics. Case-study: DNA analysis through pattern-matching techniques.</p>	<p>Analiza metodelor de analiză statică pentru investigații biometrice. Compararea performanțelor acestora în diverse contexte și sub diverse abordări (e.g. folosind expresii regulate simple, complexe sau ambele), sub formă de studiu bibliografic (cu implementarea cel puțin a unui algoritm din cele studiate). Opțional: propunerea, formalizarea și implementarea unui algoritm propriu de analiză statică, cu sau fără suport pentru expresii regulate.</p> <p>Cunoștințe necesare: structuri de date avansate, algoritmică, elemente de bază de bioinformatică.</p>	<p>Securitate cibernetică, Big data, Bioinformatică, IS</p>

13.Coordonator: Lector Dr. Daniel POP (daniel.pop@e-uvt.ro)

Nr · crt ·	Denumire temă	Descriere temă	Specializare IACD, IS, BIOINFORMATICA, SECURITATE CIBERNETICA, AIDC, BIGDATA
1.	Accessing NoSQL databases using Object Mapping libraries	There are various libraries – multi-database support as Kundera or Spring Data and various native drivers (Cassandra, Mongo), – that can be used to abstract the access to data in NoSQL database, similar to libraries for relational database.	BIGDATA
2.	Sistem pentru recomandarea de jurnale / conferinte	Pe baza unui abstract al unei lucrari (stiintifice), sistemul sa ofere recomandari cu privire la conferinte / jurnale potrivite pentru publicare	BIGDATA, IACD, AIDC
3.	Comparatie intre Angular 6 and React	Cele doua framework JS ofera nivele mai inalte de abstractizare pentru dezvoltarea de aplicatii FE. Care ar fi framework-ul cu care sa incepeti in proiect acum? Studiul isi propune sa investigheze productivitatea si facilitatile oferite de cele doua framework-uri oferind un set de recomandari in final care sa ajute in alegerea celei mai potrivite solutii.	IS
4	Open Data	Ce este Open Data? Platforme pentru publicarea datelor deschise (CKAN) Standarde pentru publicarea datelor deschise	IS

14.Lector Dr. Drămnesc Isabela (isabela.dramnesc@e-uvt.ro)

Informatica toate specializarile

Titlu	Deprinderi si Redactare
<p>Teme la alegere care abordeaza probleme din lumea reala, limbajul natural, rationamentul automat:</p> <ul style="list-style-type: none">• Explorarea teoriilor matematice,• Sinteza algoritmilor,• Verificarea corectitudinii algoritmilor,• Analiza complexitatii algoritmilor,• Eficienta, predictii,• Aplicatii pentru muzicieni.	<p>Deprinderi: Mathematica/Theorema/Coq/ SMT & SAT solvers</p> <p>Redactare: LaTeX, limba engleza.</p>

15. Lector Dr. Eraşcu Mădălina (madalina.erascu@e-uvt.ro)

Bachelor and Master Theses

Specialization: All Bachelor and Master Specializations

Remarks:

1. All theses must be written in English.
2. Usage of Latex is mandatory.

Nr	Tema	Detalii
1.	Optimization techniques using constraint programming solvers (Gurobi, CPLEX, Google OR-Tools) for the deployment of component-based applications in the Cloud.	<p>Suppose you want to deploy your component-based application in the Cloud at the lowest price This can be formalized as an optimization problem and solved using constraint programming solvers. The solution will be included into a recommendation engine.</p> <p>Requirements: <i>Programming:</i> Python; <i>Math:</i> Logic</p>
2.	Optimization techniques with priorities in constraints SMT solvers	<p>Suppose you want to buy, at the lowest cost, virtual machines (VM) with certain CPU, memory, storage, from cloud providers which are geographically distributed. You don't know precisely the characteristics of the machines you want to buy but you know you need a machine for installing games and storing your collection of movies and music. Hence it's most likely you give priority to memory and storage VMs. But what precisely the characteristics of these VMs and from which Cloud Provider should you buy them in order that you pay the lowest price?</p> <p>In this thesis we aim to ask these questions by developing optimization techniques in which the constraints might not be fully specified but have a certain priority. These will be integrated into a recommendation engine.</p>

		Requirements: <i>Programming:</i> Python; <i>Math:</i> Logic
3.	Predicting the fastest method for optimization	<p>As seen above, there might be different optimization techniques for a problem. But which one should be used on optimization problem? We will try to solve the problem using machine learning techniques.</p> <p>Requirements: <i>Programming:</i> Python; <i>Math:</i> Basic linear algebra and statistics</p>
4.	Verification of Deep Neural Networks	<p>Deep learning is everywhere. It has been shown its practical application in a variety of fields, image recognition, natural language processing, recommendation systems, autonomous driving, just to name a few. Deep learning algorithms are mainly used as a black-box and hence difficult to debug. In fact, the main criticisms to deep learning algorithms are <i>uncertainty</i> and unexpected behavior on <i>adversarial examples</i>.</p> <p>When we talk about safety-critical systems, it is important that correctness guarantees exist. This leads to the application of <i>formal verification</i> to deep neural networks (DNNs), that is, given a DNN and a specification, is there a proof that the DNN satisfies the specification for all inputs? Not surprisingly, the main challenge of applying formal methods to the verification of DNNs is <i>scalability</i>. This is because verification is a non-trivial problem: DNNs are large (high number of neurons and layers) and involve activation functions which are non-linear and non-convex. These make the problem NP-complete.</p> <p>We offer three theses for studying three different verification approaches. The theses should contain a comprehensive state-of-the-art as well demo with at least one of the tools from the state-of-the-art. New results are also welcomed.</p>

		Requirements: <i>Programming:</i> Python; <i>Math:</i> Logic, linear algebra and statistics
5.	Synthesis of optimal numerical algorithms	<p>Program synthesis is the automatic construction of software that provably satisfies a given specification (input and output condition). Given a specification of what a program should do, the synthesizer generates an implementation that satisfies this specification. The aim of the thesis is to study the possibility of the synthesis of algorithms (e.g. reciprocal, square root, reciprocal square root of numbers) suitable for hardware implementations. The main characteristic of these algorithms is that they do not contain the division operation, which is expensive. The experiments will be conducted in Mathematica.</p> <p>Requirements: <i>Programming:</i> Mathematica; <i>Math:</i> Logic</p>
6.	Deep learning techniques in autonomous driving	<p>We will try to give solutions to the following tasks of self-driving Car: (1) <i>Localization and Mapping</i> (Where am I?); (2) <i>Scene Understanding</i> (Where is everyone else?); (3) <i>Movement Planning</i> (How do I get from A to B?); (4) <i>Driver State</i> (What's the driver up to?).</p> <p>A variate number of theses are offered.</p> <p>Requirements: <i>Programming:</i> Python/TensorFlow; <i>Math:</i> Statistics, Linear Algebra</p>

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Nr. crt.	Denumire temă	Descriere temă	Specializare IACD, IS, BIOINFORMATICA, SECURITATE CIBERNETICA, AIDC, BIGDATA
1.	Operatii de baza pe matrici rare	In general, o matrice rara este o matrice in care procentul valorilor nenule nu depaseste 5%. Rezolvarea sistemelor de ecuații a caror matrice asociata este o matrice rara poate fi făcuta mult mai eficient atât în ceea ce privește spațial de stocare, cât și timpul de calcul. Stocarea eficienta in memorie a matricilor rare se face folosind formate specifice (CSR, CSC, Coordinate, Diagonal Storage, Skyline Storage, BSR). Candidatul va trebui sa propuna si sa implementeze metode de operare in astfel de matrici, inclusiv pentru cazul in care matricile operand sunt stocate in formate diferite.	-/- 1 student
2.	Preconditionarea sistemelor de ecuații cu matrici rare stocate in formate condensate, prin	Preconditionarea sistemelor de ecuații consta in transformarea matricii asociate astfel incat o anumita metoda de rezolvare sa fie mai eficienta. Candidatul va trebui sa propuna si sa implementeze o metaheuristica pentru reducerea celor doi indicatori prin exploatarea formatelor eficiente de stocare a matricilor rare	2 studenti

	reducerea benzii si a benzii medii.		
3.	Paralelizarea algoritmilor evolutionari	Stiut fiind ca implementarea seriala a algoritmilor evolutivi nu conduce la solutii eficiente din punct de vedere al timpului de executie, candidatul va trebui sa propuna si sa implementeze algoritmi paraleli pentru cativa algoritmi evolutivi.	3 studenti
4	Simulator circuite logice	Implementarea unei aplicatii cu interfata grafica care sa permita simularea functionarii unui circuit logic. Utilizatorul poate construi circuitul prin selectarea si interconectarea grafica a portilor logice de baza. Gasirea unui circuit echivalent mai eficient din punct de vedere al numarului de porti utilizate va fi o alta optiune. Reprezentarea grafica a circuitului pornind de la expresia logica, respectiv gasirea unei expresii logice simplificate precum si reprezentarea grafica a celei din urma ar putea fi alte facilitati ale aplicatiei.	1 student
6	Aplicatii ale recunoașterii starilor emoționale folosind dispozitive mobile	Recunoașterea stărilor emoționale ale utilizatorilor umani a atras multa atenție în ultimii ani, în principal datorită abundenței aplicațiilor capabile să exploateze și să se adapteze la utilizatori.	2 studenti
<i>Alte subiecte pot fi acceptate la propunerea studentului / Other topics could be accepted after student's proposal</i>			