Computer Science & Engineering Department

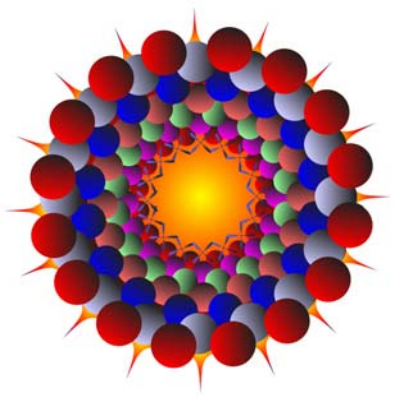
Master of Science in Artificial Intelligence

Research Master

4 semesters

http://aimas.cs.pub.ro/master_ai/

AI-MAS Group



Aim

Theoretical and practical knowledge and skills in:

- artificial intelligence
- knowledge engineering
- development of intelligent applications

- Trains specialists in
  - exponential growing technologies
  - for the global knowledge economy
  - capable of holding leading positions in academia, research or high-tech companies

AI Masters

1785

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Artificial Intelligence

The University of Georgia

Using computers to model and extend the human mind...

The University of Georgia has always seen cognitive science as an interdisciplinary field where computer science intersects with philosophy, psychology, linguistics, engineering, and other fields.

This comprises both classical **artificial intelligence**, which focuses on getting computers to behave intelligently, and newer approaches to **cognitive computing**, where the computer is seen as an extension rather than a model of the human mind.

The Artificial Intelligence Center is an interdepartmental research and instructional center within the Franklin College of Arts and Sciences of the University of Georgia.

Strengths include logic programming, expert systems, neural nets, genetic algorithms, natural language processing, and computational psycholinguistics.

The Artificial Intelligence Center houses two degree programs, the Master of Science program in Artificial Intelligence and the bachelor's degree program in Cognitive Science.

Affiliated with the Center are over 75 people hailing from over 10 different countries. We pride ourselves on the diversity of our student body and the ability of our program to allow for the pursuit of personal research interests.

Recent Announcements

The Robotics Master's Program

See also: RI Graduate Education | Financial Assistance

The Master's Program

The degree requirements for students in the Robotics Master's Program at Carnegie Mellon consist of core courses, electives, and supervised research culminating in a presentation and a short written summary.

The Master's Degree Program is designed to be completed in 12 months for those who are full-time students. There are also a limited number of research assistantships For students holding assistantships, the program is designed to take two academic years. RA's are often expected to remain on campus during the summer between the second year of the program, in order to make significant contributions to their research projects.

Full-time students enrolling in **January 2007 or thereafter** will have 12 to 16 months to complete the Master's Degree Program.

Review of Progress

Since the bulk of the M.S. curriculum is course work, there is no formal review of the student by the entire faculty. Satisfactory progress in coursework will be assessed by keeping up with the course schedule and passing the courses. All courses must be passed with a grade of B-, or better.The advisor will assign a pass / fail grade every s the supervised research. To oversee completion of the M.S. requirements the student will form a Masters Committee that will verify the final presentation of the supervise oral and written forms.

Faculty Advisor

Master's students beginning in the fall semester must have a faculty advisor by September 30th; those beginning in the spring semester must have a faculty advisor by Fe

Masters Committee

To complete the M.S. curriculum the student will form a Masters Committee consisting of two faculty members and one Robotics Ph.D. student who has completed his or year of study. The committee should include the student's advisor and a second Carnegie Mellon faculty member from a different research group or project than that of th Masters Committee must be formed by the end of the student's first semester. A form is available to verify completion of the speaking and writing presentation of the sup research and must be filled out by the Masters Committee.

Course of Study

The Master's Degree curriculum is designed to be a subset of the Ph.D. curriculum. Each M.S. student must complete 96 credits, equivalent to eight 12-unit courses.

Core Courses:

Four of the courses must be drawn from the "Core Courses", one course from each of the following four areas.

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Information for current:
Staff
Taught Students
Research Students

MSC/DIP IN ARTIFICIAL INTELLIGENCE

Research in AI at Edinburgh spans knowledge representation and reasoning, the study of brain processes and artifical learning systems, computer vision, mobile and assembly robotics, music perception and visualization. AI research is interdisciplinary by nature and draws on disciplines such as neuroscience, cognitive science, linguistics, computer science, mathematics and statistics, psychology.

'I enjoyed this course enormously and was introduced to many exciting areas of research'. More...

WHY STUDY AI IN EDINBURGH?

Edinburgh is the oldest and one of the best AI research centres in the world. The MSc in AI was first offered in 1983 and is one of the University's most popular degree programmes. The strengths of the degree are its flexible structure and interdisciplinary approach. Over the years, Edinburgh has attracted the best specialists in AI, which means our students are taught by the best researchers in the field.

PROGRAMME CONTENT AND STRUCTURE

The course spans a full 12-month period from September to August the following year and consists of two parts: taught and research. During the taught part of the course, September to April, you will attend lectures, tutorials and group practicals and acquire the theoretical foundation to enable you to engage in independent research.

Between May and August, you will get the opportunity to make a practical application of your knowledge by undertaking a major individual research project on which you will write a dissertation. The project is normally isupervised by a member of academic staff as one of his/her research interests, with assistance from his/her research team. To give you an idea of the kinds of projects our students undertake, please see our recent MSc Thesis List.

MSc courses in AI in Edinburgh are grouped in four major areas of specialisation:

- Intelligent Robotics
- Knowledge Representation and Reasoning
- Learning from Data
- Natural Language and Language Engineering

Flexibility is a key aspect of our degree as it allows you to choose courses that interest you, in addition to courses which are prescribed. Your Director of Studies will help you select courses and guide your research.

You might also be interested in some of our other Masters degrees in Informatics, Cognitive Science and Computer Science.

ENTRY REQUIREMENTS

You should have a first or upper second class honours degree or its equivalent, and in an area of Informatics, such as Artificial Intelligence, Cognitive Science or Computer Science. You should also have experience in computer programming.

Applicants with degrees in these disciplines will also be considered: Education, Electrical Engineering, Psychology, Mathematics, Philosophy, and Physics

1st for teaching
1st for research
DEGREE PROGRA
MSc/Dip
European MSc
MSc by Research
MPhil
PhD
MONEY MATTERS
Course Costs
Scholarships
Careers
STUDYING IN EDINBURGH:
City
What Our Student
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APPLY
CONTACTS

Informatics

Intelligent systems (MSc)

In detail...

Overview

The aim of the MSc programme is to provide a one-year specialist course for very able graduates in arts or science fields, preparing them for and development work on intelligent systems. A proportion of the students should be able to continue to do DPhil work on fundamental artif intelligence research or applied research on intelligent systems. Students are introduced to theoretical issues in artificial intelligence and co science, and to practical techniques for designing and implementing knowledge-based systems using a variety of high-level languages. The organised around a small core of compulsory courses leaving a wide choice of optional courses, including courses from Evolutionary and Adap Systems, Human-Centred Computing Systems and Cognitive Science.

Programme structure

The MSc consists of a programme of full-time study running from October in one year to the following September, or part-time study over tw This course is also offered as a Postgraduate Diploma.

Assessment

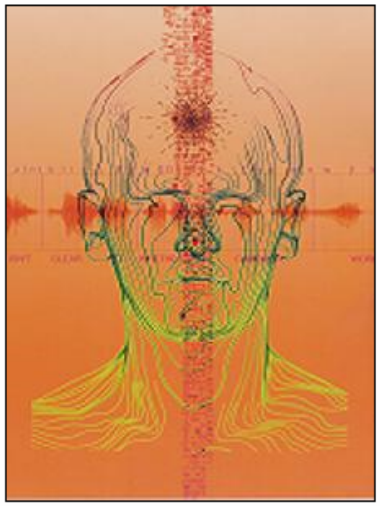
Each course on the degree is assessed by either a short term-paper (a 3,500 word essay), a 3.5 hour examination paper, a programming pro 3,500 word report, literature review, group project, or a combination of coursework and unseen examination. Each of the eight courses taken weighted.

The MSc dissertation (maximum 12,000 words) is equivalent to 4 courses (which is one third of the MSc mark). To be awarded the degree, st must gain a pass mark in the dissertation and in at least six of the courses.

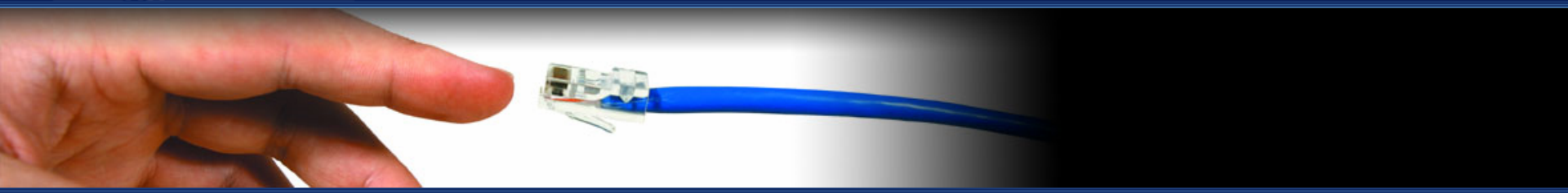
Maintained by: Tom Armour (T.Armour@sussex.ac.uk)

Master of Artificial Intelligence

Welcome on the Master of Artificial Intelligence website at K.U.Leuven.



Download Master of Artificial Intelligence brochure (pdf file)



Master's programme in Artificial Intelligence

- Language: English
- Duration: 2 years
- Application date:
  - 1 August 2008 (Dutch students, including those from VU University)
  - 1 April 2008 (EU-students, except The Netherlands)
  - 1 March 2008 (Non-EU students)
- Start date: 1 September 2008
- Basis: Full-time
- Field of interest: Computer Science and Mathematics
- Specializations:
  - Knowledge Technology and Intelligent Internet Applications
  - Cognitive Science
  - Computational Intelligence and Self-organization
  - Technical Artificial Intelligence
  - Artificial Intelligence and Communication (taught only in Dutch)

Current research topics at VU University Amsterdam:

Structuring information
How can you bring structure to the information on the internet? Is it possible to make the internet smarter and more personal?

What turns information into knowledge?
Introducing structure, so that the computer can do something with it. But how do you generate the right knowledge? And how do you make sure the computer knows what to do with the information presented?

Cognitive Artificial Intelligence

English	**2 years**	**MSc**
Start: September and February	research programme	
Offered by: Graduate School of Natural Sciences		
This Master's programme is officially registered under the name Artificial Intelligence (code 66981). You will need to use this name and code when you apply for this programme.		

The central theme of the Master's programme in Cognitive Artificial Intelligence (CAI) is the integration of two kinds of knowledge: knowledge of human intelligence and knowledge of machine intelligence.

The man/machine theme can go in two different directions: our primary focus can alternate between understanding human intelligence and constructing intelligent machines. If the primary focus is understanding human intelligence, then knowledge of machines becomes a modelling tool. We use machines to simulate human abilities, thereby learning things about those abilities. If, on the other hand, the primary focus is the construction of intelligent machines, then our knowledge of human capacities can be used as a heuristic guideline in developing the desired capabilities for such machines. The Cognitive Artificial Intelligence Master's programme achieves a balance between the two perspectives: both directions are omnipresent throughout the programme.

It will be clear that the idea of modelling plays a crucial role in Cognitive Artificial Intelligence. The methodology of modelling functions as a bridge between theory and experiment. For this reason, our students have to master the use of modelling tools from logic and computer science.

An additional essential component of our curriculum, which makes the Cognitive Artificial Intelligence programme unique among the Artificial Intelligence Master's programmes offered in the Netherlands, is the importance it attaches to philosophical reflection. Various philosophical courses in the curriculum study the man/machine theme from a foundational perspective.

Roland Staring, Cognitive Artificial Intelligence alumnus
"In any domain, changing the way a person works requires not only a

Opleidingenzoeker
Soorten masters
Schakelprogramma's voor wo-ers
FAQ
Zoeken in UvAweb

Printbare versie

Admission criteria	Admissions information (Dutch)
Type of master	Master
Language of instruction	English
Duration of programme	Two years
Title	Master of Science (MSc)

Artificial Intelligence (MSc)

The primary focus in the field of Artificial Intelligence is on development and understanding of intelligent computational processes for the benefit of both creating useful artefacts and of helping better understand human intelligence.

The MSc programme in Artificial Intelligence consists of four tracks; graduates receive an MSc degree in Artificial Intelligence. Students are advised to make a choice for one of these tracks early and to register for the track of their choice straight away if possible.

Tracks in Artificial Intelligence:

- Forensic Intelligence (MSc)
- Gaming (MSc)
- Intelligent Systems (MSc)
- Learning Systems for Language, Knowledge and Speech (MSc)

For information about the tracks, please follow the links below.

Refer to

Track Forensic Intelligence

Track Gaming

Track Intelligent Systems

Track Learning Systems for Language, Knowledge and Speech

Accreditation and degree

The Dutch government has legally accredited this master's programme in 2002. This means that upon successful completion of the programme students will receive a legally accredited master's degree in Artificial Intelligence and the title Master of Science (MSc). Before 2010, the study programme will be presented to the

Artificial Intelligence (Master of Science)

» Faculty of Behavioural and Social Sciences
» University of Groningen
» Groningen, Netherlands

Disciplines

- Informatics & Information Science
- Computer Science & IT
- Behavioral Science

Languages

- English

Duration:	24 months
Annual Tuition Fee:	€ 1.600 € 9.300 (non-EEA)
Starting Date:	February, September
Application Deadline:	March 1
Educational Variants:	
Educational Form:	

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Contact Persons

Mw. drs. E.H. van der Feen

Contact person for this programme.

International Service Desk

Contact person for *University of Groningen*.

Programme Description

Artificial Intelligence focuses on designing and implementing intelligent systems. Main themes are autonomous perceptive systems (perceiving robots), cognitive robotics (interacting robots) and multi agent systems (for example software agents).

Autonomous systems are systems that can operate and carry out missions indepently. For example robots driving around on the moon collecting information. Even in unpredictable surroundings these robots respond with a certain intelligence and take decisions about what to do. In Groningen we concentrate on autonomous perceptive systems, for example robots finding a sign in an unknown environment and having to read that sign.

Cognitive robotics is also a major theme in the master's programme Artificial Intelligence in Groningen . The subjects taught are highly connected to the research on social robotics at our research department: the origin of communication and recognizing movements of other robots. Examples of research topics are getting one AIBO (robot dog) to recognize another AIBO or trying to find out how robots can interact with humans and learn from that interaction.

An example of multi-agent systems is a team of robots playing soccer. These robots have to communicate and cooperate with each other. In the process of designing these types of intelligent systems knowledge about thinking and acting of humans and animals is necessary. This knowledge is

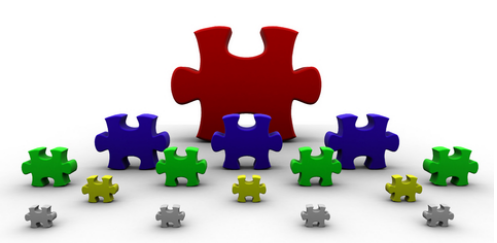
Curriculum

Semester I

- Knowledge representation and reasoning
- Data mining
- Type systems and functional programming
- Parallel programming (module SCPD)
- Sisteme adaptive/colaborative (module ISI)

Semester II

- Multi-agent systems
- Natural language processing
- Symbolic and statistical learning
- Distributed systems (module SCPD)
- Distributed algorithms (module SCPD)
- Aplicatii Web semantice (module ISI)



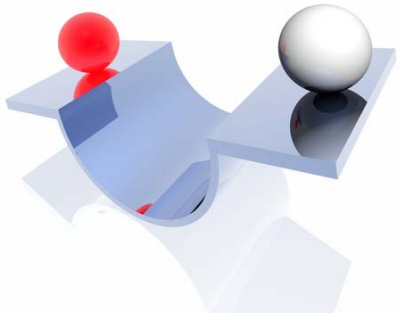
Curriculum

Semester III

- Self-organizing systems
- Neural networks
- Data driven and machine learning based NLP
- Optimization methods in learning and vision
- Advanced Topics in Distributed Systems (SCPD)

Semester IV

- **Selected topics in Artificial Intelligence (invited lectureships)**



Professors (faculty)

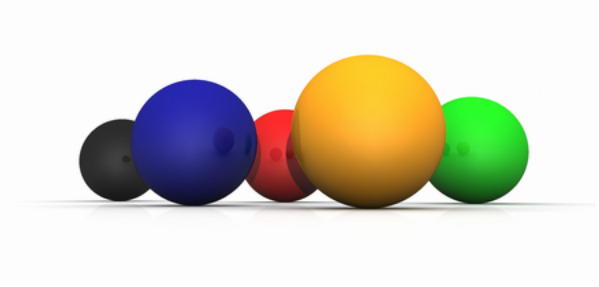
- Adina Florea
- Stefan Trausan
- Cristian Giumale
- Florin Radulescu
- Paul Cristea
- Dan Tufis
- Adriana Tapus
- Invited professors

- Traian Rebedea
- Serban Radu
- Andrei Mogos
- Andrei Olaru
- Costin Chiru
- Irina Mocanu

Erasmus Mundus Master of Science in **"Data Mining and Knowledge Management"**

- Starts in 2010
- 6 courses per semester (2 extra)
- 2 diplomas
- Semester 3 or IV – partner universities

- Université Lumière Lyon 2
- Université Pierre et Marie Curie, Paris 6
- Ecole Polytechnique de l'Université de Nantes
- Universitat Politècnica de Catalunya
- Università degli Studi del Piemonte Orientale



Research activity

- Research laboratories of the CS Department or UPB
  - Research projects / work in teams
- Companies in Romania
- Research Institute for Artificial Intelligence (RACAI), Romanian Academy
- EU partner universities

Research themes

Prof. Cristian Giumale

Desambiguation based on fluid qualities in story telling

Duration: 2-3 semesters

Students: 2

Dynamic prediction of entities behaviour based on qualitative time/space models

Duration: 2-3 semesters

Students: 2

Research themes

Prof. Stefan Trausan-Matu

Asistent conversational intelligent pentru sprijinirea rezolvarii de probleme folosind conversatiile chat - 1-3 studenti

Se va dezvolta un program de prelucrare a limbajului natural care se va comporta ca un participant la o conferinta chat (de exemplu, in yahoo messenger sau in ConcertChat). Acest asistent citeste replicile celorlalti si intervine si el cu replici pentru a stimula interactiunea intre ceilalti. Limba in care se fac discutiile este romana sau engleza.

Sistem de detectare a legaturilor implicite intre replicile unui chat – 1 student

Se va dezvolta un program de prelucrare a limbajului natural care analizeaza inregistrarea (“log”-ul) unei conversatii chat (de exemplu, in yahoo messenger sau in ConcertChat) si detecteaza legaturile intre replicile conversatiei. Limba in care se fac discutiile este romana sau engleza.

Sistem de evaluare si notare a studentilor care au participat la o conversatie chat – 1-2 studenti

Se va dezvolta un program de prelucrare a limbajului natural care analizeaza inregistrarea (“log”-ul) unei conversatii chat (de exemplu, in yahoo messenger sau in ConcertChat) purtata de studenti in cadrul unor teme de casa (de exemplu, IE, anul 5, si IOC, anul 4). Limba in care se fac discutiile este romana sau engleza.

Sistem de detectarea legaturilor intre texte – 1-2 studenti

Se va dezvolta un program de prelucrare a limbajului natural care detecteaza legaturile intre textele dintr-o colectie. De exemplu, se pun intr-o secventa logica mai multe texte care formeaza un lant de argumentare sau se pun intr-o secventa cronologica. Este preferabila limba engleza deoarece exista mai multe programe de prelucrare existente pe web.

Sistem de extragere a lemei unui cuvant in limba romana – 1-2 studenti

Se va dezvolta un program de prelucrare a limbajului natural care determina cea mai probabila lema are un cuvant dat in limba romana, adica ce radacina are (de exemplu, “calculato” pentru “calculator”, “calculatoare”, “calculatorului” etc.), ce parte de vorbire este (substantiv, verb etc.) si alte informatii, de exemplu, persoana, gen, caz etc.

Research themes

Stefan Trausan-Matu, Costin Chiru

Monitorizarea evenimentelor (event tracking)

Dându-se descrierea unor evenimente si datele la care aceste evenimente s-au produs, se încearcă detectarea urmărilor pe care aceste evenimente le au in presă. (caz practic: se dau laboratoarele de la o anumită materie si bloguri care discută despre subiectele făcute la laborator si se încearcă să se detecteze dacă blogurile respective discută despre toate laboratoarele, precum si care este interanimarea dintre aceste bloguri – cum sunt preluate subiectele de la un blog la altul)

Analiza chaturilor din perspectiva afectiva – 1 student

Acest proiect își propune analiza contribuției participanților la un chat din perspectiva a doua concepte antagonice. Pentru aceasta, se pleacă de la o pereche de concepte (ex: alb-negru, bun-rău, constructiv-destructiv) si se încearcă sa se vadă cat de departe se găsesc spusele fiecărui participant de cele doua concepte.

Analiza textelor din punctul de vedere al ritmicității – 1-2 studenti

Pentru acest proiect se vor construi o serie de corpusuri de texte de mai multe feluri: text literar, text tehnic, poezie, chat, blog si se va încerca determinarea unei masuri pe baza căreia sa se poată încadra un text nou intr-una din cele 5 categorii. Măsura respectiva se va baza pe repetițiile, lanțurile lexicale si paronimice si pe colocațiile/n-gramele identificate in textele respective.

Crearea unui POS tagger pentru limba romana – 1 student

Scopul acestui proiect este realizarea unui program care sa primească un text si care sa specifice la ieșire, care este partea de vorbire asociata fiecărui cuvânt in parte (http://ro.wikipedia.org/wiki/Parte_de_vorbire)

Research themes

Stefan Trausan-Matu, Traian Rebedea

Studiul teoriei si arhitecturii cognitiei (ACT-R - http://act-r.psy.cmu.edu/) pentru intelegerea modelului teoretic si utilizarea aplicatiei ACT-R 6 pentru rezolvarea de probleme si luarea deciziilor.

Aceasta tema are doua obiective diferite: primul este de a intelege conceptele teoretice ce stau la baza unuia dintre cele mai de succes modele ce modeleaza procese complexe din cognitia umana: ACT* si ACT-R. Al doilea este un obiectiv practic si anume de a studia implementarea curenta in Lisp a ACT-R 6 si modalitatile de utilizare a acestuia pentru rezolvarea de probleme si luarea deciziilor.

Numar studenti: 1-2

Detectarea plagiatului folosind atat comparatia cu un corpus de documente, cat si comparatia cu diverse resurse Web.

Problema detectarii plagiatului este una extrem de complexa si se poate descompune in doua subprobleme diferite: detectia plagiatului prin copierea exacta (*word-by-word*) sau prin parafrazare. In plus, problema poate fi rezolvata diferit in functie de resursele avute la dispozitie: un corpus de documente sau/si acces la Internet. Se vor aplica diferite metode de analiza a limbajului natural (metode *bag of words*, *POS-tagging*, n-grame, etc.), cat si folosirea (si antrenarea) unor euristici potrivite.

Numar studenti: 2-3

Pozitionarea unui student prin comparatia textelor scrise fata de cele ale expertilor.

Prin folosirea PLN si a ontologiilor, hartilor conceptuale se doreste pozitionarea unui student comparatia cunostintelor sale cu cele ce sunt extrase din textele expertilor. Se vor considera mai multe scenarii: comparatie student-carti, student-Wikipedia, Wikipedia-carti.

Numar studenti: 1-2

Comparatie intre rezultatele obtinute prin aplicarea tehnicilor de tip LSA si a celor de tip *frequent itemset mining* pentru un set de documente (atat conversatii, cat si rezumate).

Tehnicile de tip LSA sunt din ce in ce mai folosite pentru descoperirea relatiilor semantice de suprafata intre cuvintele dintr-un text / dintr-un domeniu. Intrucat modelul matematic folosit este oarecum asemanator cu cel al metodelor *frequent itemset mining* se doreste realizarea unei comparatii pentru a determina relatiile semantice extrase de catre LSA, respectiv de tip *frequent itemset mining*.

Numar studenti: 1-2

Research themes

Stefan Trausan-Matu, Traian Rebedea

Comparatie a tuplelor descoperite de LSA cu distantele semantice din ontologii pentru diverse domenii (medical, etc.)

In cadrul acestei teme se doreste realizarea unei cercetarii asupra corelatiei intre tuplelele de cuvinte inrudite semantic descoperite de metode statisitice precum LSA si distantele semantice intre aceste cuvinte existente in ontologii pentru diverse domenii. Astfel, se doreste realizarea unei comparatii intre metodele de analiza semantica a textelor de suprafata si de profunzime.

Numar studenti: **1**-2

Utilizarea toolkit-ului de invatare automata WEKA pentru a clasifica mesajele dintr-un forum medical adnotat de la Universitatea din Manchester

Studiul clasificatoarelor implementate in WEKA si testarea lor pentru a determina care este cel mai potrivit pentru a clasifica mesajele dintr-un forum medical adnotat de la Universitatea din Manchester.

Numar studenti: **1**

Utilizarea TagHelper Tools (http://www.cs.cmu.edu/~cprose/TagHelper.html) pentru clasificarea mesajelor din acelasi fir de discutie intr-o conversatie chat

TagHelper Tools este o aplicatie (si un API) pentru analiza conversatiilor / interactiunilor folosind tehnicile de clasificare din WEKA. Scopul proiectului este ca: pornind de un corpus de chat-uri sa se adnoteze manual un subset de documente cu firele de discutie prezente in fiecare conversatie si sa se foloseasca TagHelper pentru antrenarea unui clasificator pentru detectarea firelor de discutie intr-o conversatie din acelasi domeniu.

Numar studenti: **1**

Research themes

Stefan Trausan-Matu, Traian Rebedea

Extragerea automata de retele sematice (tip RDF) si apoi a ontologiilor din Wikipedia si Wiktionary.

Folosind PLN si identificarea de sabloane se doreste extragerea automata a ontologiilor de domeniu din resurse web semi-structurate de mari dimensiuni (cele mai bune exemple sunt Wikipedia si Wiktionary).

Numar studenti: **2-3**

Identificarea dovezilor in text.

Pentru fiecare replica / thread de discutie dintr-un chat, sa se gaseasca intr-un corpus de documente dat, ce corespunde domeniului studiat, fragmentul care este cel mai legat de fiecare thread/ replica in parte, pentru a se oferi feedback si suport

Numar studenti: 1-**2**

Sumarizarea documentelor text si a conversatiilor.

Implementarea mai multor mecanisme pentru sumarizarea documentelor scrise si a conversatiilor, atat *stand-alone*, cat si atunci cand exista un corpus de alte documente din acelasi domeniu. (A se citi si http://www.nist.gov/tac/2009/Summarization/index.html)

Numar studenti: 1-**2**

Research themes

Prof. Florin Radulescu

Data mining for a database on Student Records System.

The target of this research topic is to analyze the student educational information at department and/or university level in order to improve the educational processes. The student data mining process allows to have a better perspective on the student progress throughout the educational processes, and at the same time to analyze the information related to the specifics of the programs.

Duration: 2-3 semesters

Students: 1-2

Data mining a database with baccalaureate exam results.

The target of this research topic is to analyze the results of the baccalaureate exam on national level in order to improve the educational processes. The data mining process allows having a better perspective on the high school student educational level, and at the same time to analyze the information related to the type of studies.

Duration: 2-3 semesters

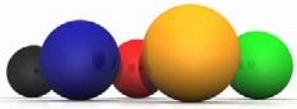
Students: 1-2

Multidimensional scaling algorithms. Applications.

Multidimensional scaling (MDS) is a set of related statistical techniques often used in information visualization for exploring similarities or dissimilarities in data. MDS is a special case of ordination. An MDS algorithm starts with a matrix of item–item similarities, and then assigns a location to each item in /N/-dimensional space, where /N/ is specified a priori. For sufficiently small /N/, the resulting locations may be displayed in a graph or 3D visualization (wikipedia).
The target of this research topic is to evaluate and improve a set of MDS algorithms and to use them on data contained in a Student Records System.

Duration: 2-3 semesters

Students: 1-2



Research themes

Prof. Paul Cristea

1. Classifiers using direct propagation learning machines (Artificial Neural Networks and Support Vector Machines)

The work will be oriented towards developing new guided learning feed-forward architecture systems, in an effort to attach specific features to structural elements.

Duration: 2-3 semesters

Students: 1

2. Recursive Artificial Neural Network Classifiers

Study of ANN classifiers operating with long input vectors: Comparison of feed-forward and recursive architectures for minimizing system size and complexity

Duration: 2-3 semesters

Students: 1

3. Sequence prediction with Principal Component Analysis (PCA) - Artificial Neural Network (ANN) systems

The complexity of time (and space) sequence prediction systems can be significantly reduced by using an architecture comprising a two step signal processing: PCA followed by ANN. Previous work has shown that, for signals satisfying some mild statistical regularities, the trained PCA block actually implements a direct DFT, while the trained ANN gradually approaches a restrictioned inverse DFT.

Duration: 2-3 semesters

Students: 1

Research themes

Prof. Paul Cristea

4. Artificial Neural Networks for local image processing

Study of low level image processing and system classification based on visual features. The method will be applied to model the interactions (hydrophobic-hydrophilic and polar) between protein molecules.

Duration: 2-3 semesters

Students: 1

5. Use of ANN for GIS

The synthesis of multiple feature data collected by satellite and shuttle for Geographic Information Systems (GIS) by using ANN

Duration: 2-3 semesters

Students: 1

6. Spiking Neural Networks

Application of Spiking Neural Networks to Computer Vision Systems

Duration: 2-3 semesters

Students: 1

Research themes

Prof. Adina Magda Florea

Argumentation based reasoning in multi-agent systems

The main aim of this research topic is to create a theoretical and practical framework capable of representing the reasoning process of BDI (Belief Desire Intention) agents based on arguments towards reaching common decisions in goal adoption, both in competitive and in cooperative settings.

Duration: 2-3 semesters

Students: 1-2

A system for argumentation based negotiation

In the last years, defeasible argumentation has proven to be a confluence point for many formalisms for commonsense reasoning. Research in Multiagent Systems (MAS) has highlighted the role of argumentation as a process which underlies different kinds of interaction among agents. In many settings, the exchange of illocutions between two agents can be conceptualized as the presentation of offers and counter-offers (equivalently, arguments and counter-arguments) in order to determine whether an original proposal is accepted or rejected. Such a dialogical setting has a natural analogy with computational models for defeasible argumentation.

Duration: 2-3 semesters

Students: 1-2

Models of trust and reputation in multi-agent systems

Computational trust and reputation models have been recognized as key to design and implement multiagent systems. These models manage and aggregate the information needed by agents to efficiently select partners in uncertain situations. In open multiagent systems agents have unknown intentions and thus, some kind of interaction control is necessary to ensure a well-fare society. At the social level, reputation and trust models endow agents with a powerful social control artifact that permits them to evaluate potential partners considering certain criteria before the interaction is produced.

The research theme is dedicated to the study of such trust and reputation mechanisms and to the implementation of an associated system in which interaction partners are selected based on their reputation. The system is to be tested in electronic market settings.

A future development may link the research theme to the theme for argumentation based negotiation, as reputation may be used in building arguments.

Duration: 2-3 semesters

Students: 1

Co-advisor: Ass. Prof. Andrei Mogos

Research themes

Prof. Adina Magda Florea

The emergence of norms in multi-agent systems based on social interactions

Behavioral norms are key ingredients that allow agent coordination where societal laws do not sufficiently constrain agent behaviors. Whereas social laws need to be enforced in a top-down manner, norms evolve in a bottom-up manner and are typically more self-enforcing. The aim of the research theme is to develop a multi-agent system in which individual agents repeatedly interact with other agents in the society over instances of a given scenario. Each interaction is framed as a stage game. An agent learns its policy to play the game over repeated interactions with multiple agents.

Duration: 1-2 semesters

Students: 1

Co-advisor: drd. Andreea Urzica

Efficient localization of resources in P2P networks

Develop a system for efficient resource localization based on agent technology. Intelligent agents maintain local resource information and mobile agents migrate on network to discover shared resources. The mobile agents adaptively learn paths within the P2P networks to enable efficient localization of resources.

Duration: 1-2 semesters

Students: 1

Co-advisor: Ass. Prof. Mircea Bardac

Study and applications of self-adaptive and self-organizing systems

Self-adaptive systems work in a top-down manner. They evaluate their own global behavior and change it when the evaluation indicates that they are not accomplishing what they were intended to do, or when better functionality or performance is possible. Self-organizing systems work bottom-up. They are composed of a large number of components that interact locally according to simple rules. The theme is dedicated to the study and development of a system capable of showing both properties. The system is to be used and tested on different setting, such as a demonstration simulated world, or giving solutions to CSP (constraint-satisfaction problem) problems, e.g., frustrated interacting systems (seating people around a table with preferred adjacent partners), the school timetabling problem, etc.

Duration: 2-3 semesters

Students: 1-2

Co-advisor: Ass. Prof. Andrei Olaru

Research themes

Prof. Adina Magda Florea

Intelligent agents competition platform

The AI-MAS Winter Olympics is a competition and interaction platform designed to promote and encourage the development of intelligent agents for game playing and/or simulation. A competition scenario is to be developed and several competitors will be able to submit their autonomous playing agents. The competition has as aim to compare different AI algorithms, both those based on learning techniques and those that are completely hand-coded used by the competitors to develop such agents.

Duration: 1 semester

Students: 2-3

Co-advisor: Ass. Prof. Mircea Bardac

Affective computing for enhanced human-machine interaction

Affective computing is a branch of the study and development of artificial intelligence that deals with the design of systems and devices that can recognize, interpret, and process human emotions.

The main aim of this research theme is to develop and a computational model for decision making and human-like reactions of intelligent agents, based on both cognitive and affective intelligence. The underlying system will include the visual representation of emotional attitudes while the affective agents interact with the user.

Duration: 2-3 semesters

Students: 1-2

Co-advisor: Assoc. Prof. Irina Mocanu, Ass. Prof. Andrei Mogos

TAC Market Design

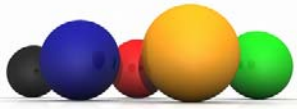
The classic Trading-Agent Competition (TAC Classic) and the supply chain scenario (TAC SCM) were motivated by the desire to develop automated strategies for buyer and seller software agent in marketplaces. The trading rules or interaction mechanisms are fixed by the TAC Classic/TAC SCM organizers, and competition entrants compete with one another by creating agents that seek to trade under these fixed rules.

In contrast, the CAT Competition is the exact reverse of this: The software trading agents are created by the organizers of the competition, and as an entrant you will compete by defining rules for matching buyers and sellers and setting commission fees for providing this service. Entrants compete against each other in attracting buyers and sellers and making profits. This is achieved by having effective matching rules and setting appropriate fees that are a good trade-off between making profit and attracting traders.

Duration: 2-3 semesters

Students: 1-2

Co-advisor: Ass. Prof. Serban Radu



Research themes

Assoc. Prof. Irina Mocanu

A framework for implementing and testing genetic algorithms

The aim of this project is to develop a framework for implementing and evaluating any types of genetic algorithms for resolving a wide set of problems. The framework will allow the selection of an appropriate set of parameters such as maximum number of generations, number of chromosomes in population, structure and length of chromosome representation, selection method, number of crossover points and crossover type, fitness function, type of filter. The performances of different implementations will also be provided.

Duration: 2 semesters

Students: 1

Co-advisor: Prof. Adina Magda Florea

Multi-modal semantic interrogation of image databases

The aim of the project is to develop and evaluate of multi-modal retrieval schemes which employ both image and text. The system will allow users to visually search and sort a collection of images based on intrinsic visual attributes (such as color, shape and texture) and thus enables the user to search using visual information – a multiple search paths which use integrated information of text and image contents. Users can browse guided by a classification and search by queries, in order to narrow the search to the point where the system can efficiently employ content-based analysis.

Duration: 2 semesters

Students: 1

Co-advisor: Prof. Adina Magda Florea

Research themes

Assoc. Prof. Adriana Tapus, **École Nationale Supérieure de Techniques Avancées**

Online Emotion Detection from Physiological Signals

This research project is part of the project called HRIAA (Human-Robot Interaction for Assistive Applications). Working with vulnerable users is a very hard task and therefore the need for reliable information about the current emotional condition of the user is necessary. For this purpose, different physiological signals (e.g. heart rate, skin conductivity, breathing rate) that characterize the internal state of the user need to be extracted. Classification algorithms will be used in order to detect different emotional states. In a first step, different physiological features shall be extracted from the physiological data and be classified into the different emotional states. In a second step this can be tested on a simulated robot (using Gazebo or Webots) and examine how to change the robot's behavior as a function of the different emotion detected. Depending on the results, the time and the interests of the students, they may also design a new emotion experiment.

Duration: 2-3 semesters

Students: 1

Online Emotion Detection from Speech

This research project is part of the project called HRIAA (Human-Robot Interaction for Assistive Applications). Working with vulnerable users is a very hard task and therefore the need for reliable information about the current emotional condition of the user is necessary. If the robot is capable of recognizing user emotion, it could respond and adapt its behavior accordingly to his/her emotional state. Emotion recognition by speech is one of research fields for emotional human-computer interaction or affective computing. In a first step, different speech features will be extracted from the sound data recorded during the experiment and be classified into the four emotional states (plus the neutral state). Different classifiers will have to be developed so as to compare their efficacy (e.g., SVM, linear discriminant analysis (LDA), QDA, hidden Markov model (HMM), Gaussian SVM, GMM). The different classifiers developed will be used on different existing speech databases (e.g., SUSAS, AIBO). In a second step, this work will be integrated with a simulated robot (expressed through Gazebo or Webots). As a function of the different emotions detected in the speech the robot will change its behavior accordingly (e.g., change its facial expressions, have different verbal content for different emotions, have a pallet of gestures/postures that will match the emotions). Depending on the results, the time and the interests of the students, they may also design a new experiment.

Duration: 2-3 semesters

Students: 1

Research themes

Assoc. Prof. Adriana Tapus, **École Nationale Supérieure de Techniques Avancées**

Online Visual Simple Gestures Recognition

A socially assistive robot that works and interacts with humans and operates among them should have a clear understanding of humans, acting in its visual range. The robot must have capabilities to recognize and perceive the human and reason on his/her activity and internal state. This project addresses the field of online visual detection and recognition of humans' actions and gestures and includes modeling of human activities. The related research areas are: human models, human activity, matching, tracking and generative models. In a first step, a Hidden Markov Models (HMMs) for the recognition of head and upper body gestures will be developed. A second step will be focus on the integration of the first part into a simulated robot (expressed through Gazebo or Webots).

The simulated robot will be have to be able to recognize and imitate online all the previous learned situations (body and head gestures).

Duration: 2-3 semesters

Students: 1

AI-MAS

http://aimas.cs.pub.ro/

AI-MAS

Association for the Advancement of Artificial Intelligence (formerly the American Association for Artificial Intelligence)
http://www.aaai.org/home.html

http://www.aiinternational.org/universities.html

EU Co-ordination Action for Agent Based Computing
http://www.agentlink.org/index.php

http://www.agentlink.org/members/membs-romania.html

Agreement Technologies (AT) refer to computer systems in which autonomous software agents negotiate with one another, typically on behalf of humans, in order to come to mutually acceptable agreements.
http://www.agreement-technologies.eu/

The International Foundation for Autonomous Agents and Multiagent Systems
http://www.ifaamas.org/