Research subjects
Master of Science in Artificial Intelligence
2011-2013

Research subjects of the
Artificial Intelligence and Multi-Agent Systems Laboratory

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Negotiation between humans and artificial agents
No students: 1-2

Closed negotiation, when opponents do not reveal their preferences to each other, is an important class of real-life negotiations. Negotiating agents designed using heuristic approach need extensive evaluation, typically through simulations and empirical analysis, since it is usually impossible to predict precisely how the system and the constituent agents will behave in a wide variety of circumstances.
The theme implies the study of these aspects of negotiation and the development of several negotiation agents in a system that can be used to train human negotiators by means of negotiations against automated agents or other humans.

Advisor: Adina Magda Florea

Self-adaptive and self-organizing systems
No students: 1-2

Self-adaptive systems work in a top-down manner. They evaluate their own global behaviour 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), e.g., frustrated interacting systems (seating people around a table with preferred adjacent partners), the school timetabling problem, etc.

Advisor: Adina Magda Florea

Games and normative behaviour
No students: 1-2

Norms are shared expectations of behaviours that exist in human societies. Norms help societies by increasing the predictability of individual behaviours and by improving co-operation and collaboration among members. Norms have been of interest to Multiagent Systems (MAS) researchers as software agents may violate norms due to their autonomy. In order to build robust MAS that are norm compliant and systems that evolve and adapt norms dynamically, the study of norms is crucial. The research studies how norms emerge in agent societies. Associated implementations will be developed, with focus on applying normative behaviour in virtual communities.

Advisor: Adina Magda Florea

A framework for daily activity recognition and emergency detection in smart environments
No students: 1-2

The aim of this project is to develop a multi-agent system for daily activity recognition and emergency detection in smart environments. The goals of the project are: developing a model for activities representation, a method for activity recognition and also a method for activity prediction in order to detect emergencies.

The aim of this project is to develop a multi-agent system for daily activity recognition and emergency detection in smart environments. There are different ways for daily activities representation. Generally, activities are composed by sequences of sub-activities. Each sub-activity takes place at different location in the room. Thus, each room is divided in some zones. Only specific activities are held in each zone. Thus each sub-activity must be discovered. Then a list of sub-activities will be composed in a recognized activity. In order to detect a sub-activity the context of the supervised person is needed (the location in the room). The multi-agent system will be composed of (i) context agents, (ii) working agents, (iii) activity agents (iv) prediction agents and (v) emergency agents. The necessary information for discovering are obtained from supervising images and from different sensors.

Requirements:
- Develop a model for activities representation;
- Develop a method for activities recognition;

- Develop a method for activity prediction;
- Develop a method for emergency detection;
- Design the architecture of the multi-agent system.

Advisor: Irina Mocanu

The emergence of the leader in a group

No students: 1-2

The leader of a group has certain characteristics that offers him this position in the group. This project aims to propose a model of the leader and how the leader emerges from the interactions between the members of the group. For this goal, one must first define the context, i.e. the group that will be studied in a formal way. Then, taking into account the values of several parameters that describe the group, the emergence of the leader will be studied using several simulations based on multi-agent systems. This is a typical case in which we have emergence in multi-agent systems that contain cognitive agents.

Advisor: Andrei Mogos

Swarms composition

No students: 1-2

Consider two similar swarms in terms of the members of a swarm, but not necessarily with the same number of members. The two swarms move into a given environment in different directions. The project studies the way the two swarms behave if they meet: in which conditions the two swarms will form a single swarm; in which conditions, after they met, there will be two or more swarms. There may be the need for defining "the power of a swarm" in order to finish the project and to reach the conclusions needed.

Advisor: Andrei Mogos

The Shapley Value and the welfare in a group

No students: 1-2

"Cooperation in games means that the players are allowed to communicate and coordinate their actions". ... "In a cooperative approach of competitive situations, the Shapley value represents a fair sharing of the total utility available for the grand coalition." [A. Stefanescu, "Competitive Analysis", Editura Universitatii din Bucuresti, 2008]

This project aims to study the way that the welfare of the grand coalition (i.e. the group of players) evolves when the payoff of each player is given based on the Shapley value. A competitive scenario must be defined, and then, several simulations based on multi-agent systems must be performed in order to finish the analysis. The project aims to discover situations when the Shapley value leads to the welfare of the grand coalition.

Advisor: Andrei Mogos

Study of Self-organizing Multi-Agent Systems
No students: 1-2

The project starts from the AmIciTy:Mi platform for the simulation of multi-agent systems formed by large numbers of agents, previously developed in the AI-MAS team. This platform allows the simulation of a MAS formed of many, similar, cognitive agents. It also provides the possibility to design complex scenarios and the visualization of the system from multiple points of view.

The aim of this project is to develop new and improved tools for the visualization and evaluation of the system, based on numerical measures, their distribution in the system and their evolution over time. This will allow for better understanding of self-organization in a cognitive MAS and of the dynamics of such systems.

Advisor: Andrei Olaru

Graph pattern matching for context recognition
No students: 1-2
Description

The aim of this project is to research in depth the problem of building a graph matching algorithm that is suited for the matching of "context patterns" - represented as graphs having some generic components - against "context graphs" - graphs representing the situation of an agent.

This project would consist of a study of existing algorithms for graph matching, a comparison of their performance in different scenarios related to context recognition, and the development (or adaptation) of a new algorithm for the matching of context graphs.

Advisor: Andrei Olaru

Implementing norms in multi-agent systems
No students: 1
Description:

Most definitions of intelligent software agents converge in assigning agents three fundamental properties: autonomy, pro-activity in pursuit of individual goals, and the capacity of having dynamic interaction with other software agents or human users.

Using norms in agent societies allows creating flexible organizations where agents are neither fully autonomous, as they must respect the rules, nor totally restricted to a predefined behavior.

The aim of this project is to investigate how to represent, propagate and adopt norms within multi-agent systems.

Advisors: Andreea Urzica, Adina Magda Florea

Investigating the properties of abstract argumentation frameworks from a logical perspective

No students: 1-2

Abstract argumentation was introduced in 1995 as a directed graph representation where the nodes are arguments and the arcs encode an attack relation between arguments, based on the logical content of the arguments. Further on, claims are made about the validity of the arguments based solely on this graph representation. Many papers introduce new ways of working with arguments and finding sets of acceptable arguments (extensions), but the actual link with a logical language is often overlooked or only consists in very simple examples. The purpose of this project is to build a platform that can automatically generate arguments from a given knowledge-base and use them to investigate logical properties of extensions defined in the literature.

Advisors: Cristian Gratie, Adina Magda Florea

A service for object tracking based on the Predator algorithm
No students: 1-2

Predator is an innovative object tracking algorithm released in 2011 by Zdenek Kalal (http://info.ee.surrey.ac.uk/Personal/Z.Kalal/). However, the official implementation has a few shortcomings that prevent it from being used easily in an AmI (Ambient Intelligence) environment: it is dependent on the Matalb runtime (and the existing C++ ports aren't mature enough), it doesn't support multi-object tracking and it cannot save its state for later use. The goal of the project is to create a web service capable of tracking one or even more objects in a frame sequence, running at a minimal of 5 frames per second. The service should provide a clean API and allow for training and later re-use of a state of the system.

Advisors: Andrei Ismail, Adina Magda Florea

Arduino-based sound source localisation
No students: 1-2

Arduino is an open-source hardware platform aiming at making embedded applications more easy to develop. Given a set of 3 Arduino boards, each having at least 2 microphones and a WiFly shield, we would like to develop an algorithm for detecting the position of a sound source with a precision of 50 cm. It is assumed that the sound source makes a sound known before-hand (with which the system is trained), like the sound of a person stepping on the floor. Sound processing should take place on a central server, where all the sound streams are sent.

Advisors: Andrei Ismail, Adina Magda Florea

Argumentation in Multi-Agent Systems in scenarios for Ambient Intelligence
No. of students: 1-2

The goal of this research is to study the impact of introducing Argumentation in Multi-Agent Systems designed of AmI.

Detailed description: Argumentation theory reached maturity and proved to be useful in toy problems for both agent reasoning and agent communication. The next natural step is to empower situated agents with argumentative capabilities in order to study the added value of this theory to real scenarios. Such scenarios are those considered in Ambient Intelligence, where conflicting information from different sensors, conflicting preferences from different users or different contexts represent a common problem.

Where to start from:
1. state-of-the-art argumentation protocols
2. state-of-the-art argumentation frameworks
3. Andrei Olaru's PhD thesis

Advisors: Tudor Berariu, Adina Magda Florea

Semantic Clustering of Questions
No students: 2

The aim of this research effort is to define a method to cluster questions written in English from a given domain by their object and by their meaning.

Detailed description:

Imagine a scenario in which a lot of people address questions regarding the content of an article or a presentation, but probably addressing different aspects of it and using different words to ask the same thing. The main goal of this research is to build a system capable of real-time clustering of questions by their object and by their meaning. The clusters should be organized in a hierarchical way with the top groups of questions corresponding to different topics and bottom clusters containing different expressions of the same question.

E.g. Consider the questions:
- *Where do lions live?*
- *How tall is a giraffe?*
- *Why do giraffes have a long neck?*
- *How many meters tall is a giraffe?*

The resulting clusters might be:
- Cluster **1**: *Where do lions live?*
- Cluster **2**:
    - Cluster **2.1**: *How tall is a giraffe? How many meters tall is a giraffe?*
    - Cluster **2.2**: *Why do giraffes have a long neck?*

Possible research sub-topics:
- analyze questions and identify some structural features (kind of question, object/subject of question, etc.)
- define semantic distance measures for questions
- search for clustering algorithms suitable for real-time clustering of text phrases

Where to start from:
1. existing semantic distance measures
2. corpora of texts and questions related to them (e.g. Remedia Corpus http://www.lsi.upc.edu/~horacio/doctorat/master_ia/remedia_release.tar.gz)

3. Article: *Learning Question Classifiers* (Xin Li, Dan Roth)
   http://l2r.cs.uiuc.edu/~danr/Papers/qc-coling02.pdf

Advisors: Tudor Berariu, Adina Magda Florea

Artificial Intelligence Techniques in Computer Games
No students: 1-2

The goal of this thesis is to establish current AI techniques used in the video game industry, identify current and future challenges and propose and develop solutions for these. The student will research solutions to common computer game problems such as path finding, learning, prediction, anticipation and pattern-matching applied to a game of their choice or design.
Advisors: Valentin Lungu, Irina Mocanu

Emotion Simulation for Artificial Agents in Role-Playing Games
No students: 1-2
Description
The goal of the research is to design and develop a feasible (emotion-driven) reasoning engine that will allow the creation of complex believable characters. The student will look into emotion as motivation for artificial characters, as well as deal with the way emotions influence perception, memory management and decision-making. As an application domain we have chosen computer roleplaying games for the wide array of human-agent and agent-agent interactions possible. The student will also need to research knowledge representation and reasoning techniques appropriate for the application domain.

Advisors: Valentin Lungu, Adina Magda Florea

JaCaMo Learning Platform
No students: 2-3

JaCaMo is a framework for Multi-Agent Programming that combines three separate technologies (Jason, CArtAgO, Moise), covering all levels of abstractions that are required for the development of sophisticated multi-agent systems.
We aim at developing a game platform for an online virtual world of autonomous agents, built around the JaCaMo framework, in which users can create agents, develop artifacts for their agents and multi-agent organizations, etc.
Theoretical research topics:
·   Normative organizations, coordination, communication and negotiation in MAS
·   Study of human-agent collectives
·   Designing a virtual community of agents: developing game specifications, developing multi-agent organizations (*e.g*, systems of government), etc
Technical research topics:

Creating a distributed network of CArtAgO workspaces as supporting infrastructure for the game platform

Advisors: Andrei Ciortea, Adina Magda Florea

Prof. dr. ing. CRISTIAN GIUMALE

Specification and Interpretation of Ontological-Based Models for Time-Dependent Behavior
No students: 1-2

The approach should be suitable for building and processing ontologies for applications where time-dependent evolution is of crucial importance. We say that such applications are fluid. Specific parts from the evolution of these applications can be seen as services offered by the application. A suitable ontology can be used to search the past evolution of the application for a specific service or to decide whether a requested service can be currently fulfilled.

Conf. dr. ing. LORINA NEGREANU

Directed Model checking based on heuristics
No students: 2

In direct model checking the traversal of state space is guided by an estimate of the distance from the current state to the nearest error state. The idea is to allow one to compute an estimate of the error distance based on heuristics without hitting the state explosion problem
2 students

Error detection based on symbolic execution
No students: 2

The problem of finding errors for programs that have unbounded state spaces is difficult. Among the program analysis techniques that have gained prominence in the past few years are model checking with abstraction and static analysis. The idea of this research is to investigate the use of subsumption checking for error detection.

Prof. dr. ing. PAUL CRISTEA, S.l. dr. ing. BUJOR PAVALOIU

Committee Machines. Adaptive Grouping.
In committee machines, an ensemble of estimators (mainly neural networks and/or decision trees) is created by learning processes. The prediction of the committee for a new input is

generated in form of a combination of the predictions given by the individual committee members. The classic aggregation schemes (majority, averaging, median,…) will be compared to schemes where the importance/weight of the committee voters adapts from the data points.
1-2 students

Cellular Neural Networks in Image Processing
Cellular neural networks (CNNs) are a parallel computing paradigm similar to neural networks, where the communication is allowed between neighbor units only. All image processing morphological algorithms can be performed by CNNs.
1 student

Spiking Neural Networks
Spiking Neural Networks (SNNs) belongs to the third generation of ANNs, incorporating the time in the functional model. The activation level (potential) is decreasing over time, but is increased by incoming neural spikes. A simulator for this kind of network is intended to be buit.
1-2 students

Concept Representation in a Social Network
Web mining will be performed regarding the presence of a given concept in a social network. Dynamic pursue of messages/posts will be executed and the structure of the social network (weighted graph) will be obtained. Specific metrics (size, centrality, density and degree, clique) will be tagged in time to analyze the interactions between the members of the social network regarding that concept.
1-2 students

FLORIN RADULESCU

Data mining personalized e-learning modules

Research subjects of the Computer-Supported Collaborative Knowledge Construction (K-Teams) Laboratory

Prof.dr.ing. STEFAN TRAUSAN-MATU
As.drd.ing. TRAIAN REBEDEA
As.drd.ing. COSTIN CHIRU
As.drd.ing. MIHAI DASCALU

Computing a 'Balanced' Measure of Textual Complexity
Joint work UPB (Romania) & UPMF (Grenoble, France)

The aim of this project is to design and implement software that automatically gives a measure of the complexity of texts read by children. There are numerous software which give such information, but they seldom rely on cognitive models of human reading. We chose to build a model who propose a "balanced measure" of complexity integrating a viable cognitive model of human reading. It is supposed to identify two main facets of textual complexity: *sophistication* (i.e., richness) and *diversity* (i.e., variability of forms). One could further identify these two features among lexical, syntactical, and semantic levels of the read texts (and moreover for a discursive one).

Automatic Analysis of Self-Explanations during Reading

Joint work UPB (Romania) & UPMF (Grenoble, France)

The aim of this project is to implement a software that helps analyze the metacognitive verbalizations (also called "self-explanations") of pupils during reading. A very common learning situation is that of a learner reading a text (e.g., a tale or a course text), who stops at predefined parts of the text to explain what he or she has understood, to what knowledge s/he can relate the events, what events s/he can predict to come next the passage, etc. The richer and different from mere paraphrases these verbalizations are, the better the understanding of the text is. If one can semantically compare a particular passage of the reading with its related verbalizations, one can have an idea of the cognitive processes undertaken by the pupil. Moreover, the pupil is asked to perform a summary of the read text once read and this summary can be also used to analyze some kinds of the cognitive processes.

Computer-Supported Group Creativity

Development of software systems for supporting and analysing creative work in virtual teams using chats and discussion forums. Several methods of group creativity may be considered, as brainstorming, lateral thinking, six red hats etc.

Identification of metaphors in texts

The goal of this research is the analysis of the state of the art and the development of Natural Language Processing programs that identify metaphors in texts. Ontology-based, machine learning and Latent Semantic Analysis techniques will be integrated.

Identification of sentiments in chat conversations

Besides using SetiWordNet, the project focuses on integrating several models and the available technologies in order to obtain a deep and detailed analysis, for example, LSA, pattern matching and social networks analysis for highlighting the mutual social influence between participants.

Intelligent Tutoring

The goal of the research theme is the development of an Intelligent Tutoring System that uses a knowledge base of a domain for diagnosing and directing the learning process of a student. It should build and maintain a model of student's knowledge. It should also generate multiple-answers tests, analyse the answers and generate personalized curricula.

Music Enhancement

The goal of this research is the development of programs that add accompaniments to a given melody. An analysis of the melody is needed, followed by generating an accompaniment according to musical rules.

Music Composition

The goal is the composition of music using Artificial Intelligence tools (expert systems, genetic algorithms, constraint-based systems, etc.)

- Personalized Music Retrieval

Search engines on the web were until now developed mainly for textual data. For music retrieval usually also a text retrieval is performed, considering attached meta-data. We focus on the more difficult retrieval based on the musical features (analysing the mp3, wav, midi, etc. music files) and generating semantic annotations. Moreover, we will perform a personalized search, starting from examples.

- Efficient Digit (and Character) Recognition from Mobile Phone Pictures

With the advancements in mobile technology and machine learning, more and more software solutions have been developed to solve and help users that are using their mobile phones for everyday tasks. There are many applications that use some feature recognition and extraction from images taken with the smartphone's camera. However, there are few open source programs that can handle efficiently extraction of digits and numbers from this kind of images. While other character (beside digits) recognition and extraction may also be studied within this project, the focus will be on efficient solutions for digit recognition that could be also be used offline (without Internet connection). There exists a specific corpus of images that have common characteristics and a small number of different fonts that shall be used for assessing the performance of the project.
May also be used as a SSL project.

- Implicit Links Detection in Online Conversations

This project aims to discover (implicit) links between utterances (posts) in chat conversations (and discussion forums). Several types of implicit links exist and should be detected: lexical, semantic, coreferences/anaphora, lexical chains, adjacency pairs of speech acts, etc.
May also be used as a NLP and SSL project.

- Improving Coreference Detection for Online Conversations

While several open source projects exist for coreference (and anaphora) detection that work with good results for normal written texts, they still have poor results for conversations, especially online conversations (chats, forums) with multiple participants. The project aims to test several of the existing applications for coreference detection and improve the results by using heuristics (utterance reordering by topic, participant, semantic similarity and more) and new coreferences corpora for chat conversations.
May also be used as a NLP and SSL project.

- Algorithms for Identifying Conversation Threads in Multiparty Online Discussions

The objective of the project is to determine which are the most coherent conversation threads from online discussions (chat, forums) with multiple participants that allow for a large number of different discussion threads to be active at a given moment during the conversation. The project shall start from a list of manually (or automatically) annotated set of conversations with links between utterances and the scope of the research is to develop various algorithms for identifying the (most probable) different conversation threads (starting from text segmentation, but not only) and then studying the influences between these threads
May also be used as a NLP project.

- Uncovering Plagiarism, Authorship, and Social Software Misuse

The objective of the research is to participate to the PAN'12 workshop (sponsored by Yahoo! Research) and to try to have a good position in the overall classification of the proposed solutions.

The 5th International Workshop on Uncovering Plagiarism, Authorship, and Social Software Misuse PAN'11 will be held as competition in conjunction with the CLEF conference in Amsterdam, Netherlands, on September 19-22, 2011.

This year's edition divides into three tasks, namely plagiarism detection, author identification, and Wikipedia vandalism detection:
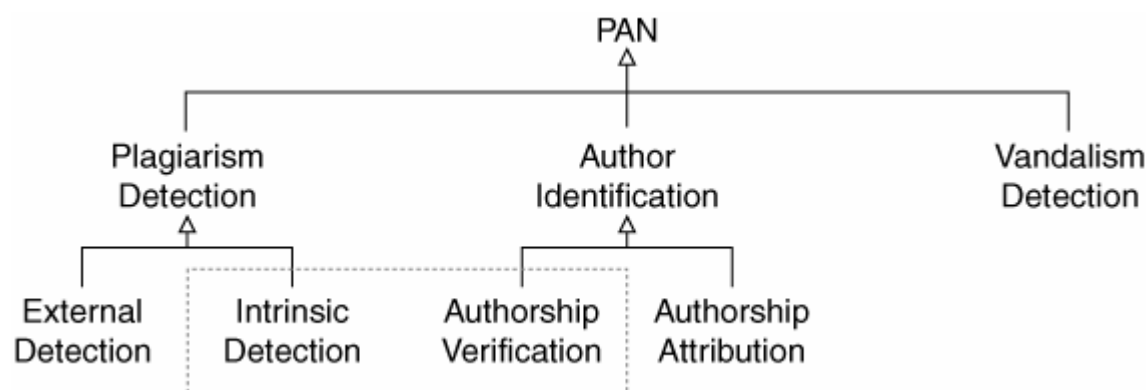
Plagiarism detection in text documents is a challenging retrieval task: today's detection systems are faced with intricate situations, such as paraphrased plagiarism within and across languages. Moreover, the source of a plagiarism case may be hidden within a large collection of documents such as the Web, or it may not be available at all. Building on the successful evaluation framework developed in the last two years, we continue to add new challenges this year.

Author identification is the task of determining the true author of a text. Throughout history and especially today, many texts are written anonymously or under false names, so that readers may not be certain of a text's alleged author. Within author identification, one of the main challenges is to automatically attribute a text to one of a set of known candidate authors. For the purpose of the evaluation, we have developed a new authorship evaluation corpus.

Vandalism has always been one of Wikipedia's biggest problems. However, the detection of vandalism is done mostly manually by volunteers, and research on automatic vandalism detection is still in its infancy. Hence, solutions are to be developed which aid Wikipedians in their efforts.

More info: http://pan.webis.de/
May also be used as a SSL project.

- ### Identification of Important Moments from the Human History

The purpose of this project is to use the pictures generated by the n-gram viewer tool from Google (http://ngrams.googlelabs.com/) for automatically detecting the important events from human history (from their reflection in the time literature).

- ### Text Analysis for Picture/Movie Generation

The purpose of this project is to analyse some written text in order to extract the main elements present in it and then to generate a picture (or even a movie) to represent the text.

- ### Analysis of the Way Different Concepts Appeared in Medical Publications

The purpose of this project is to analyse a corpus of texts and, being given a set of concepts, to discover who introduced these concepts, who worked to develop them and if possible, to identify some patterns for the apparition of these concepts.

- ### Probabilistic Parse Tree building

The purpose of this project is to use the information given by a search engine and hypothesis testing methodology for building the parse tree of a phrase.

- ### Statistic Recovery of Damaged Documents

Using the results from a search engine, the application should "guess" the right words that are missing from a damaged document.

- ### Text segmentation using sentiments

The purpose of this project is to segment a text (a review, for example) according to the sentiments transmitted in that text.

Research subjects of TEAMNET Company

1. Simulator multi-agent pentru agenti in miscare (aer/sol/apa)

a. Dezvoltarea unui simulator in care sa poata evolua agenti in cele trei medii (aer/sol/apa),

b. Sa isi poata folosi senzori de tip video/audio/radio/presiune/viteza/etc.

c. Sa simuleze cat mai aproape de realitate miscarea pe sol/aer/epa

d. Agentii sa dispuna de actionari care sa le permita interactiunea cu mediul cat mai aproape de realitate (roti, suprafete ce control, sisteme de propulsie)

e. Sa dispuna de mecanisme de comunicatie care sa simuleze realitatea (propagare semnal radio, audio, video)

2. Recunoasterea tintelor in miscare sau statice cu ajutorul camerelor video si evitarea coliziunilor

a. In cadrul simulatorului si in realitate se doreste dezvoltarea unui sistem care sa identifice cu ajutorul unor camere video cu acoperire 180 grade a tintelor in miscare, clasificarea lor, detectarea vector directiei de miscare si viteza.

b. Identificarea reperelor din mediu care nu se misca

c. Identificarea unor alogortmi simpli de evitare a coliziunii

3. Pilot automat adaptiv bazat pe o retea neurala

a. Sistem de control al suprafetelor de control si al propulsiei pentru stabilizarea unui avion in aer si deplasarea pe o anumita directie

b. Invatarea prin simulare a exercitiilor la limita ale avionului

c. Recuperarea in caz de avarie

4. Limbaje de comunicare multi-agent in mediu non-determinist

a. Dezvoltarea unui limbaj de comunicare intre agenti pe distante scurte in scopul coordonarii actiunilor si a atingerii unor obiective.

b. Mediul in care vor lucra nu este perfect, mesajele nu ajung intocmai cum au fost emise, distantele variaza in functie de starea vremii.

5. Coordonare zborului in stol pentru atingerea obiectivelor de cautare si recuperare

a. Algoritmi genetici pentru cresterea unei populatii de cautatori ale unor obiective terestre in miscare

b. Recunoasterea de forme intr-un mediu non-determinist

c. Scop final = cautarea pe mare a naufragitilor sau a oamenilor pierduti pe munte, identificarea zonelor cu potential de incendiu intr-o padure, identificare braconieri, etc.

Research subjects of Digital Optics Corporation

1. Scene categorization

The goal should be to develop tools to allow a potential customer to set the scene categories according to their preference together with the category decision algorithm (once the categories have been defined).

The tool that creates the categories should receive as input:
- Number and names of categories
- Sets of relevant images for each category (not more than 50 images, preferably 10)
- Optional: sets of images that are clearly NOT from a given category
 Training can be offline, the tools should produce some definition for the categories.
 The decision needs to be online. Decision time should be even across categories and not too dependent on the image content. Decision tool should receive as input:
- Image (for stills) or sequence of images (for preview/movie) coming from the sensor/ISP
- Categories created at previous step
- Optional Acquisition Metadata.

2. Generic Dominant Features extraction
    - Generic Dominant Features extraction in still images
    - Generic Dominant Features extraction for video sequences

Examples of preferred particular implementations:
- Face recognition based on "*PCA (Principal component Analysis)/LDA (Linear Discriminant Analysis)*"
- Face Recognition based on "*Hidden Markov Model*"
- Face Expressions Classification based on PCA
- Face Expressions Classification "*Hidden Markov Model*"
- Dual or Multi Camera (3D) face recognition

Digital Optics will provide support in providing the input training databases and in setting the output expectations.