Bachelor and Master Theses

Specialization: IA, IR, IE, AIDC, IACD, IASTE

Remarks:

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

Nr	Tema	Detalii
1.	Detecting fake news	The word *post-truth i*s considered by Oxford Dictionaries Word of the Year 2016. The word is an *adjective relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief*. There is no doubt that fake news influences our daily life in a subtle way all of us being subject to manipulation. Theses in this topic aim to study and develop methods and tools for detecting fake news or to detect relevant features of fake news. **Requirements**: *Programming*: Java/C#/Python; *Math*: Probabilities and Statistics
2.	Transforming informal text to formal text. Applications to software specification and general first-order logic structures	Program documentation (specification) is typically written in plain text. Specifications are useful for program verifiers if they are written in a formal language, most notably first-order logic. This thesis aims to bridge this gap by using natural language preprocessing and natural language understanding techniques. **Requirements**: *Programming*: Java/C#/Python; *Math*: Probabilities and Statistics
3.	Optimization techniques with priorities in constraints using exact or heuristic methods	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 preciselly the chacteristics 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 preciselly the characteristics of these VMs and from which Cloud Provider should you buy them in order that you pay the lowest price? 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. The optimization techniques should be designed using (1) SMT solvers (exact results); (2) heuristics (approximate results). On this thesis should work two students, one for the SMT part, the other on the heuristics. **Requirements**: *Programming*: Java/C#/Python; *Math*: Logic
4.	Optimizing SMT encoding and testing SMT solvers for Cloud resource management problems	Resource management problems in the Cloud can be encoded as linear optimization problems. Different methods can be applied for solving them, in particular Satisfiability Modulo Theory (SMT). Performance of state-of-the-art SMT solvers depends on

		the encoding used in the formalization problem. The role of this thesis is to examine the pros and cons of different encodings for specific Cloud problems on different state-of-the-art SMT solvers. **Requirements**: *Programming*: Java/C#/Python; *Math*: Logic
5.	Machine and deep learning techniques in autonomous driving	We will try to give solutions to the following tasks of self-driving Car: (1) *Localization and Mapping* (Where am I?); (2) *Scene Understanding* (Where is everyone else?); (3) *Movement Planning* (How do I get from A to B?); (4) *Driver State* (What's the driver up to?). **Requirements**: *Programming*: Java/C#/Python; *Math*: Statistics, Linear Algebra