Selected topics in distributed computing

Lecturer: Andrzej Pelc, Ph.D. (Université du Québec en Outaouais, Canada)

Course description:

The lecture covers two large sub-domains of the field of distributed computing: one of them are algorithmic aspects of radio communication and the other concerns information processing by mobile agents in networks. We give a survey of recent results in these areas, discuss various models used in the literature, show main challenges and suggest some open problems.

The first subject concerns the situation when several radio stations need to accomplish a communication task, such as broadcasting (transmitting a message from one station to all others) or gossiping (all stations have to exchange pieces of information they originally hold). In radio networks a signal from a station can be transmitted to all stations within its reach, but if two stations transmit simultaneously, a station within the reach of both of them cannot properly receive the messages due to a collision. We are interested in designing efficient broadcasting and gossiping algorithms in radio networks.

The second subject deals with autonomous mobile entities, called agents, that navigate in a network modeled as a graph and have to accomplish some basic task, such as exploration (visiting all nodes and traversing all links of the network) or rendezvous (gathering all agents at the same location in the same time). We focus attention on the conditions under which a given task is feasible and on the design of efficient exploration and gathering algorithms, both in terms of time needed to accomplish the task and of the memory size of the agents.

While the lecture is accessible to anybody with working knowledge of computer science on undergraduate level, we will discuss some results and problems at the forefront of current research in distributed network algorithms.

Syllabus of the lecture:

1.What is distributed computing
2. Communication in networks - tasks and models
3. Models of radio networks
4. Broadcasting in known radio networks
5. Broadcasting in ad-hoc radio networks
6. Gossiping in radio networks
7. Broadcasting in geometric radio networks
8. Mobile agents in networks
9. Gathering in the CORDA model
10. Exploration in the CORDA model
11. Rendezvous problems - taxonomy and challenges

Projekt „Rozwój interdyscyplinarnych studiów doktoranckich na Politechnice Gdańskiej w zakresie nowoczesnych technologii" jest współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego.

12. Anonymous vs. labelled agents
13. Synchronous rendezvous in networks
14. Asynchronous rendezvous in networks
15. Future research directions

TERMINY WYKLADÓW			
Data	**Dzień tygodnia**	**Godzina**	**Sala**
5 maj 2014	Poniedziałek	15:15 - 18:00	EA 245 na wydziale ETI
6 maj 2014	Wtorek	15:15 - 18:00	EA 245 na wydziale ETI
7 maj 2014	Środa	15:15 - 18:00	EA 245 na wydziale ETI
8 maj 2014	Czwartek	15:15 - 18:00	EA 245 na wydziale ETI
9 maj 2014	Piątek	15:15 - 18:00	EA 245 na wydziale ETI

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