Soft Computing and Decision Support Systems (CSc 876)

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Course Level: Graduate/Senior undergraduate
Number of Credits: 3 (three hours of lecture per week)
Prerequisite: Formal prerequisite is CSc 810 or consent of instructor for students who completed CSc 510. Essential prerequisite is a clear interest in individual creative work in the area of computational intelligence, based on standard preparation in mathematical modeling and software development. Undergraduate seniors who satisfy prerequisites are welcome, but CSc 876 is not designed as a traditional homework-exam CS undergraduate elective.

Topics of interest

General goals:
- To promote critical thinking as a prerequisite and motivation for creative work.
- To be exposed to recent soft computing research results, decision methods, tools, and applications, presented by their developer (the knowledge that is created is different from the knowledge that is borrowed).
- To learn how to develop new techniques and software tools based on observation, experiments, and modeling of human mental activities.
- To learn how to find, read, and analyze research papers, and how to present research and development results in professionally correct and efficient scientific way.

Specific goals:
Presentation of selected areas of soft computing in an advanced research-oriented way. In particular, the course will include in-depth presentation of the following topics:
- Observable properties of human reasoning and their modeling.
- Development, validation, and use of graded logic models.
- Graded logic as a soft computing generalization of classic Boolean logic.
- Decision engineering techniques based on the LSP method and corresponding software tools: evaluation and selection of complex objects and alternatives.
- Critical thinking that stimulates developments of soft computing methods and tools.
- Critical reading of modern literature in the area of computational intelligence.
- Cooperative experimental work in modeling human reasoning.
- Development of realistic and justifiable decision criteria.
- Development and use of decision support software.
- Soft computing applications in real estate, medicine, ecology, space management, geography, computer science, and personal decision making.
Projects and grading:
CSc 876 has no exams. During the semester students will work on projects related to material presented in the class. Projects will stimulate creativity, independence, critical thinking, and have a moderate research component. Results will be reported in the form of technical reports or research papers. Individual projects will be graded and the final grade will be derived from the grades in individual projects.

New book:
This course has a unique opportunity that it is offered simultaneously with the publication of instructor’s new book:
The course is expected to benefit from this coincidence.

Important textbooks:

Recommended Literature:

Journals that publish research in soft computing:

Conferences on soft computing:
FUZZ-IEEE, IPMU, IEEE WCCI, WCSC, EUSFLAT, AGOP, MDAI (Proceedings of these conferences contain the latest research results in this area).