Towards setting up the research centre of soft computing in East-Hungary

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Abstract: The presentation is going to show the directions determined by a research team to establish an East-Hungary Research Area on Smart Technologies.
We show the activities that have been done up till now to reach our objectives.

1 Research Plan

According to the future image of Information Society there will be a hard competition for having the largest knowledge base in the area of science and technology.

Why is it so important?
Generally people are successful if they have abilities to decide quickly and correctly.

To reach the best optimum by quick reasoning we need to be familiar with the theme thoroughly and to have a great deal of experiences in that area.

The stored quantity of knowledge in our brain depends on its capacity. Our memory and abilitiy of reasoning are bounded. To extend the limits we need the help of machines, systems having large embedded intelligence.

With the purpose of helping our country to take part in this competition successfully we decided to set up an East-Hungarian Research Centre to add our research work to the national resources.

Our intention is to increment the number of projects dealing with soft computing and smart adaptive systems.

1.1 Main Objectives

- Looking for researchers working on artifical intelligence and bringing them into a group in the Eastern Region of Hungary.

- To associate young engineers and teachers interested in these themes.

- To make good circumstances for consulting, learning, and publishing.

- Creating the repository of theoretical materials, and using it for applications in different sectors of economy, agriculture, and medicine.

- Distributing the knowledge and experience to have more and more users.

- Co-operation with other researchers in Hungary.

2. Getting experiences from EUNITE and BISC

2.1 European Network on Intelligent TEchnologies

There are two research projects we studied on the Internet. One of them is the EUropean Network on Intelligent TEchnologies for Smart Adaptive Systems (EUNITE). It was founded within the Fifth Framework Program of European Commission. In 2001-2003 we often linked to the the site www.eunite.org, downloading a lot of useful materials including the tasks of competitions and other papers.

David Anguita [1] chairman of the SAS committee of EUNITE from the University of Genova, summarized the results of the discussion on Smart Adaptive Systems that were talked over by excellences of EUNITE.

"Smart adaptive systems are hybrid systems that combine two or more computational artificial intelligence techniques and/or that address issues on adaptivity, preferably with special interest to solve industrial problems.

They are adaptive intelligent systems that coordinate perception, reasoning and action while functioning in dynamic environments. Three levels of adaptation are distinguished:

1. *Adaptation to a changing environment* (drift over time or space). For example, customer preferences in e-business and control of communication systems under changing physical conditions.

2. *Adaptation to a similar setting* (abrupt change of environment). For example, a financial application (like concerning a stock market analysis) is ported to another similar market without explicitly performing a porting of its main parameters.

3. *Adaptation to a new/unknown application* (starting with very few information). For example, building up a system from outlines through incremental learning."

They had not mentioned the Soft Computing specification.

2.2 The Berkeley Initiative in Soft Computing

BISC is the world-leading center for basic and applied research in soft computing. Browsing on their homepages [2] we found the definition of soft computing. "The principal constituents of soft computing (SC) are fuzzy logic (FL), neural network theory (NN) and probabilistic reasoning (PR), with the latter subsuming belief networks, evolutionary computing including DNA computing, chaos theory and parts of learning theory. "

The program will focus on developing a unified theoretical foundation for the next generation of intelligent decision systems and knowledge-based systems, building on the tremendous advances made in various individual disciplines in the last decade and recent advancement in the field of fuzzy logic.

To encourage close cooperation between the industrial, governmental, and academic communities and the BISC program, they added an Associate Program to BISC.

Lotfi A. Zadeh very well known researcher, is the director of the BISC project. He laid the basic ideas of soft computing. According to his specification the soft computing is "a partnership of fuzzy logic neural network theory and probabilistic reasoning" and each of the partners contributes a distinct method to solving the problem successfully. As he told " soft computing represents a significant paradigm shift in the aims of computing" – the shift means that the computer will be able to compute with imprecise information like the human mind.

The site of BISC really provided us with very useful knowledge to design our research center. The vision of the future seemed to be quite exciting on this WEB-site.

3 Activities to implement the plan

In order to achive the aims we continued the development of our fuzzy clustering program. This program is a part of the "Fuzzy mathematics and applying in economics" research and development project at the Faculty of Economics and Social Studies, College of Nyíregyháza. The coordinator of the research community is Agnes B. Simon . Co-researchers: Dezsõ Kancsár, Gergely Dezsõ, Istvan Forgó, János Sajtos. This WEB application (v1.1) was developed by Dezsõ Kancsár [4].You can use the program on URL: http://pingvin.nyf.hu:8080/fuzzy/.

There are two different levels of the usage of the program. The first level is called 'demo' where several parameters and the size of the input data matrix are limited. In the second level called 'full' there are no limitations for parameters or data. The 'demo' level is open for everyone who has already registered (the registration is very easy and free), while the 'full' level is open for members only.

The program was developed by JSP tehnology. JavaServer Pages technology separates the user interface from content generation enabling designers to change the overall page layout without altering the underlying dynamic content.

Sun has made the JSP specification freely available to the development community, with the goal that every Web server and application server will support the JSP interface. JSP pages share the "Write Once, Run Anywhere™" characteristics of Java technology.
All parts of our software platform are under the GNU/Open Source/Freeware licence policy. [5]

Parallel with our own programming we continue the study of a purchased software to develop neuro-fuzzy systems.

Balancing our results and the future challenge of innovation policy of EU and in Hungary as well, we decided to set up a research centre on soft computing. The environment for taking the first steps in research work is good at our college. We managed to bring together several collegues from other workplace too to take part in the project. We organised a platform on the Internet and created The First Regional Group of Hungarian Fuzzy Society. We have made our own home page.

Conclusions

When we determined our goals we couldn't hear about "Regions of Knowledge" pilot action of European Parlament to reach the knowledge based economy.

Thanks to the internet we have read about this project recently, and we concluded that our intentions and initiatives harmonize with the pilot action.

References

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