Definition of Soft Computing

Source: www.soft-computing.de

- What Is Soft Computing?

  Soft computing differs from conventional (hard) computing in that, unlike hard computing, it is tolerant of imprecision, uncertainty, partial truth, and approximation. In effect, the role model for soft computing is the human mind. The guiding principle of soft computing is: exploit the tolerance for imprecision, uncertainty, partial truth, and approximation to achieve tractability, robustness and low solution cost. The basic ideas underlying soft computing in its current incarnation have links to many earlier influences, among them Zadeh's 1965 paper on fuzzy sets; the 1973 paper on the analysis of complex systems and decision processes; and the 1979 report (1981 paper) on possibility theory and soft data analysis. The inclusion of neural computing and genetic computing in soft computing came at a later point.

  At this juncture, the principal constituents of Soft Computing (SC) are Fuzzy Logic (FL), Neural

Computing (NC), Evolutionary Computation (EC) Machine Learning (ML) and Probabilistic Reasoning (PR), with the latter subsuming belief networks, chaos theory and parts of learning theory. What is important to note is that soft computing is not a melange. Rather, it is a partnership in which each of the partners contributes a distinct methodology for addressing problems in its domain. In this perspective, the principal constituent methodologies in SC are complementary rather than competitive. Furthermore, soft computing may be viewed as a foundation component for the emerging field of conceptual intelligence.

- Fuzzy Systems
- Neural Networks
- Evolutionary Computation
- Machine Learning
- Probabilistic Reasoning

- Importance of Soft Computing

  The complementarity of FL, NC, GC, and PR has an important consequence: in many cases a problem can be solved most effectively by using FL, NC, GC and PR in combination rather than exclusively. A striking example of a particularly effective combination is what has come to be known as "neurofuzzy systems". Such systems are becoming increasingly visible as consumer products ranging from air conditioners and washing machines to photocopiers and camcorders. Less visible but perhaps even more important are neurofuzzy systems in industrial applications. What is particularly significant is that in both consumer products and industrial systems, the employment of soft computing techniques leads to systems which have high MIQ (Machine Intelligence Quotient). In large measure, it is the high MIQ of SC-based systems that accounts for the rapid growth in the number and variety of applications of soft computing.

- A Glimpse Into The Future

  In many ways, soft computing represents a significant paradigm shift in the aims of computing - a shift which reflects the fact that the human mind, unlike present day computers, possesses a remarkable ability to store and process information which is pervasively imprecise, uncertain and lacking in categoricity. Soft computing is likely to play an especially important role in science and engineering, but eventually its influence may extend much farther.

- References
  - Journal of Soft Computing

  - The World Federation of Soft Computing Homepage and its journal Applied Soft Computing

Journal of Soft Computing

Aims & Scope

Soft Computing stands for system solutions based on soft computing techniques. Soft Computing is aimed to provide rapid publication of important and timely results on soft computing technologies, intended as a fusion of the following research areas:

- Evolutionary algorithms and genetic programming

- Neural science and neural net systems

- Fuzzy set theory and fuzzy systems

- Chaos theory and chaotic systems

Soft Computing will be seen from various perspectives: mathematical, system, hard and soft ware. The journal will encourage the integration of soft computing techniques, as well as tools, in both real every-day and advanced applications.

The ideas and techniques of soft computing, cross-linked to other disciplines, will find in Soft Computing an ideal unified platform, suitable to stimulate comparisons, extensions and new applications. Soft Computing will thus offer an international forum for all scientists and engineers engaged in research and development activities in this fast growing field.

Soft Computing Overview

Source: P.P. Bonissone, "Soft Computing: the convergence of emerging reasoning technologies ", Soft Computing v. 1, 6-18, 1997.
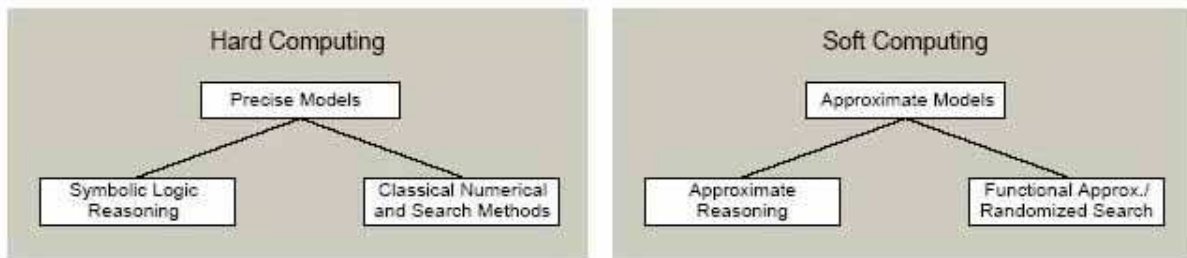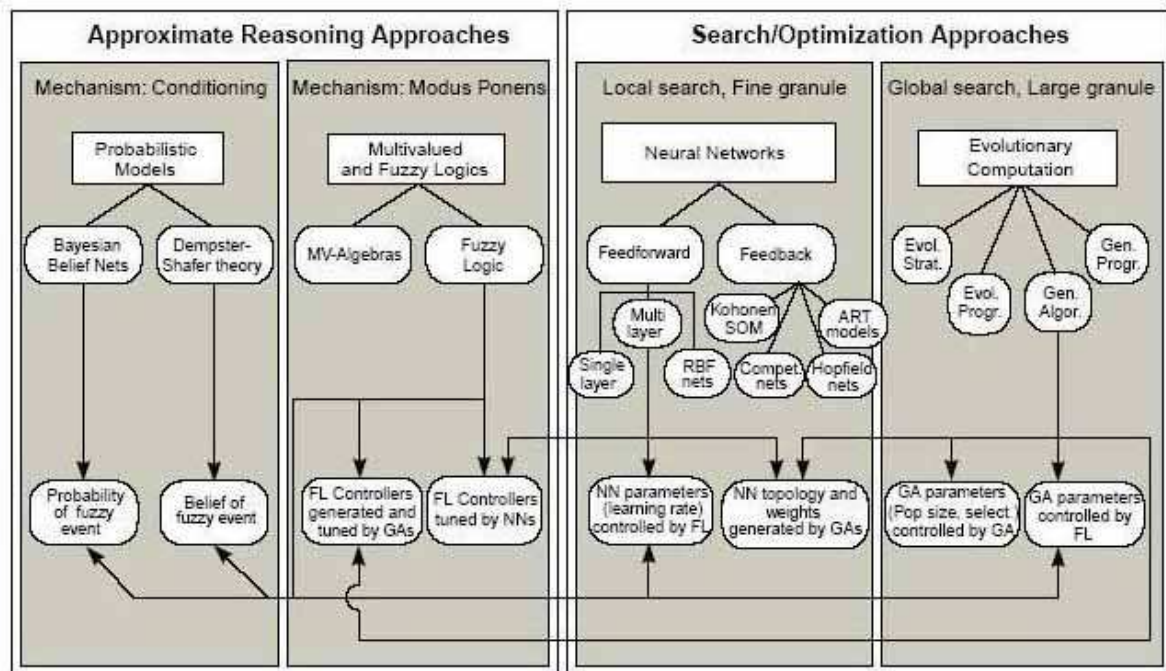
Figure 1: Hard and Soft Computing

Figure 2: Soft Computing Overview