TENTATIVE AGENDA FOR REMAINING FL/SC LECTURES

Lecture 10: 11/4/99 (completed)

Fuzzy Control of Type I, II, and III — **Pages in SC Notes /Other Ref.**

- Example of Type III: Supervisory (Hierarchical) Fuzzy Control - page 16
- Example of Application of Fuzzy Supervisory Control:
  Aircraft Engine Control (LV100) - pages 18-21

Framework of FLC Applications: Cost-Complexity Drivers

- Low Deployment cost:
  Appliances [I will bring copies of slides]
- High Response time:
  Power Supply (Resonant Converter) Control - pages 31-35
  [I will bring copies of slides]

Tuning of FLC using gradient information

- Tool: ANFIS - page 49 (just the pointer)
  [I will bring Jang's paper]

Lecture 11: 11/11/99 (completed)

Tuning of FLC using gradient information (Cont.)

- Example of ANFIS Application:
  Oil Film Compensation in Steel Mill - pages 28-31
  Smart Relay: Control of Voltage Instability [I will bring copies of slides]

Framework of FLC Applications: Cost-Complexity Drivers (CONT.)

- High Complexity/Performance Payoff:
  Locomotive Wheel Slip Control

(Hybrid) Soft Computing Systems

- FL (and FLC) as part of Soft Computing (SC)

Lecture 12: 11/18/99

(Hybrid) Soft Computing Systems (cont.)

SC Overview & Components:
- Prob. Systems - pages 38-41
- FL Systems - pages 42-43
- Neural nets - pages 43-45
- Evolutionary Algorithms - pages 45-46

Hybrid SC systems - pages 46-49

- Probability of fuzzy events - [historical hybrid system]
- FLC tuned by neural Nets (ANFIS) - [already covered before]
- FLC tuned by GAs - [very important]

Hybrid SC systems (cont.)

- NN parameters controlled by FLC (Convergence accelerators) - page 57
- GA parameters controlled by FLC (Exploration/Exploitation Mgmt.)
- GAs tuned by GAs

Hybrid SC Applications (cont.)

- Configuration/Scheduling
- Agile manufacturing Design (assignments of parts, suppliers, manufacturers)

Lecture 13: 12/2/99

Hybrid SC Applications

- Controllers
  - Train Handling Control (GA tuned FC) - pages 49-55
- Controllers
  - Steam Turbine Load Cycling Control (FC + MPC) - pages 23-28

More Hybrid SC Systems: Fuzzy Case Based Reasoning (Fuzzy CBR)

- Review [I posted a paper on the Web covering this topic]
- Models for Estimation and Prediction
  - Residential Property Evaluation
    - Fuzzy CBR model [I posted a paper on the Web covering this topic]
    - Fusion of Predictive Models

Hybrid SC Applications (cont.)

- Configuration/Scheduling
  - Scheduling of maintenance tasks for a Constellation of LEOs satellites

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Lecture 14: 12/9/99

Soft Computing: Summary & Trends

A Subset of the following:

Fuzzy Pattern Recognition and Classification

- Introduction to PR and CA
- Similarity Relations
- Fuzzy Isodata
- Example: Fuzzy Filter for Character Recognition
- Other classifiers (NN, Wavelet NNS, etc.)

First and Second Generation ES

- Knowledge Representation and Inference Engine
  - Predicate Calculus and Resolution Principle
  - Frames, Inheritance and methods
  - Productions Rules and Chaining
- Production Rules Based ES
  - Inference: Forward & Backward Chaining
  - Control: Conflict resolution, Metarules
  - Explanation systems (traces of inference path)
- Examples of Forward Chaining Formalisms
  - Markoff Algorithms: Definition and Example
  - OPS5: Definition and Example
- Representation of Uncertainty in ES
  - Historical approaches (MYCIN, PROSPECTOR)
  - Modern Approaches: Probabilistic and Possibilistic Reasoning Systems