Session 0: Introduction to the Course

Course Title: Computational Intelligence
Course Code:19CSE422A
Monday, 1-Sept-2021

Course Leader:
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Objectives of this Session

I wish to discuss the following:

- Why this Course?

- Course Objectives

- Course Aim and Summary

- Course's Intended Learning Outcomes (ILOs)

- Course Contents

- Course Assessment

- Course Resources

- Course Delivery Schedule

- ILOs of Subsequent Sessions

Why this Course?

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- CI-based computational techniques are immensely popular in control, reasoning, prediction and optimization

- They have been applied successfully in many engineering fields, such as robotics, computer vision and wireless networks

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6. The objective is to lead students to in-depth research in a particular paradigm

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- The objective of this Course is to provide theoretical and practical knowledge of CI for building intelligent systems

- The Course lays major emphasis on the computational modeling of natural intelligent systems: evolutionary computation, fuzzy logic, swarm intelligence and artificial immune systems

- In addition to these dominant paradigms, the Course includes hybrid intelligent systems that seek to solve real-world and complex problems within the CI development framework

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5. Specify, implement, customize and evaluate typical CI algorithms in response to a practical problem

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4. Recommend the most suitable CI technique to address a specific engineering problem

5. Specify, implement, customize and evaluate typical CI algorithms in response to a practical problem

6. Develop variants and hybrids of the typical CI algorithms

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- Evolutionary Computation (EC): genetic algorithms, genetic programming, evolutionary programming, evolution strategies, differential evolution, coevolution, recent trends, implementation considerations and applications

- Fuzzy Systems (FSs): Fuzzy sets and logic, fuzzification, fuzzy inferencing, fuzzy controllers and rough sets, recent trends, implementation considerations and applications

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- Swarm intelligence (SI): Particle swarm optimization algorithm, bacterial foraging algorithm, artificial honeybee algorithm, ant colony optimization algorithm, recent trends in SI, variants and hybrids of SI algorithms, implementation considerations and applications

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- Performance issues of CI algorithms, suitability of CI algorithms for desired functionality, hybrid intelligent systems, relative performance analysis of CI algorithms

Course Assessment

There are **two components** for assessment in this Course:

Component 1: (50% weight)
- Assignment (50% weight)

- Term Test (50% weight)

Component 2: (50% weight)
- Semester End Examination

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- The maximum number of such opportunities is limited as per the academic regulations governing this programme

Course Resources

a. Essential Reading

1. Class Notes

2. Engelbrecht, A. P. (2007). *Computational Intelligence: An Introduction*. Chichester, England, John Wiley & Sons.

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3. Eberhart, R. C. (2007). *Computational Intelligence: Concepts to Implementations*. San Francisco, CA, USA, Morgan Kaufmann Publishers Inc.

4. Konar, A. (2005). *Computational Intelligence: Principles, Techniques and Applications*. Syracuse, NJ, USA, Springer-Verlag New York, Inc.

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b. Recommended Reading

1. Kennedy, J. & Eberhart, R. C. (2001). *Swarm Intelligence*. San Francisco, CA, USA, Morgan Kaufmann Publishers Inc.

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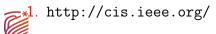
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3. Ross, T. J. (2004). *Fuzzy Logic with Engineering Applications*. John Wiley & Sons.

4. de Castro L. R. & Timmis, J. (2002). *Artificial Immune Systems: A New Computational Intelligence Paradigm*. Syracuse, NJ, USA, Springer-Verlag New York, Inc.

Course Resources

c. Magazines and Journals

1. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?
   punumber=10207

2. http://cis.ieee.org/
   ieee-transactions-on-neural-networks-and-learning-systems.
   html

3. http://cis.ieee.org/
   ieee-transactions-on-fuzzy-systems.html

4. http://cis.ieee.org/
   ieee-transactions-on-evolutionary-computation.html

d. Websites

1. http://cis.ieee.org/

Any Questions?