Summer 2005

CS 765: Foundations of Neurocomputation

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Foundations of Neurocomputation

Course Objectives:
This course is designed to help you develop a solid understanding of neural network algorithms and architectures. At the end of this course, you should be able to read and critically evaluate most neural network papers published in major journals, (e.g., IEEE Transactions on Neural Networks, Neural Networks, and Neural Computation). In addition, you should be able to implement a broad range of network architectures and learning algorithms for a variety of applications.

Prerequisites:
Familiarity with multivariate calculus, linear algebra and matrix algebra.
Familiarity with algorithmic complexity concepts and programming.

Textbooks:
Required: Neural Networks: A Comprehensive Foundation by Simon Haykin, Prentice-Hall, 1999
Recommended: If you are not familiar with Matlab, obtain a book on programming in Matlab such as: Mastering Matlab 7, by D. Hanselman and B. Littlefield, Prentice-Hall, 2005

Workload:
2-3 Programming / Homework Exercises 30%
1 Course Project / Presentation 30%
1 Midterm Examination 20%
1 Final Examination 20%

Topics:
Introduction to artificial neural networks Ch. 1
Overview of principles and methods of neural computing Ch. 2
Single layer networks Ch. 3
Multilayer networks Ch. 4
Radial-Basis function networks Ch. 5
Self-organizing maps and vector quantization Ch. 9
Neurodynamics Ch. 14
Recurrent networks Ch. 15
Applications of Neural Networks
Project Presentations