

CSE 5526 (Approved): Introduction to Neural Networks

Course Description

Survey of fundamental methods and techniques of neural networks; single- and multi-layer perceptrons; radial-basis function networks; support vector machines; recurrent networks; supervised and unsupervised learning.

Prior Course Number: 779

Transcript Abbreviation: Neural Networks

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad, Graduate

Student Ranks: Senior, Masters, Doctoral

Course Offerings: Autumn

Flex Scheduled Course: Never

Course Frequency: Every Year

Course Length: 14 Week

Credits: 3.0

Repeatable: No

Time Distribution: 3.0 hr Lec

Expected out-of-class hours per week: 6.0

Graded Component: Lecture

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites: CSE 3521

Exclusions: Not open to students with credit for CSE 779

Cross-Listings:

The course is required for this unit's degrees, majors, and/or minors: No

The course is a GEC: No

The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.0901

Subsidy Level: Doctoral Course

Programs

Abbreviation	Description
BS CSE	BS Computer Science and Engineering
MS CSE	MS Computer Science and Engineering
PhD CSE	PhD Computer Science and Engineering

Course Goals

Master basic neural network methods
Be competent with solving problems using neural network techniques
Be familiar with enough background about neural networks to take other specialty courses on neural networks

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Introduction and McCulloch-Pitts networks	3.0							
Perceptrons	3.0							
Regression and least mean square algorithm	6.0							
Multilayer perceptrons	7.0							
Radial-basis function networks	5.0							
Support vector machines	6.0							
Recurrent networks	3.0							
Unsupervised learning and self-organization	2.0							
Applications	2.0							
Current research	3.0							
Exam and discussion	2.0							

Representative Assignments

Implement a two-layer perceptron with the backpropagation algorithm to solve the parity problem
Implement a radial basis function network for one input variable, one output variable and Gaussian basis function; the function to be approximated is a sine function with added noise

Grades

Aspect	Percent
Homeworks	18%
Projects	30%
Midterm	22%
Final	30%

Representative Textbooks and Other Course Materials

Title	Author
<i>Neural networks and learning machines</i>	Simon Haykin

ABET-EAC Criterion 3 Outcomes

Course Contribution	College Outcome
***	a An ability to apply knowledge of mathematics, science, and engineering.
*	b An ability to design and conduct experiments, as well as to analyze and interpret data.
**	c An ability to design a system, component, or process to meet desired needs.
	d An ability to function on multi-disciplinary teams.
**	e An ability to identify, formulate, and solve engineering problems.
	f An understanding of professional and ethical responsibility.
*	g An ability to communicate effectively.
	h The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i A recognition of the need for, and an ability to engage in life-long learning.
	j A knowledge of contemporary issues.

Course Contribution		College Outcome
*	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

BS CSE Program Outcomes

Course Contribution		Program Outcome
***	a	an ability to apply knowledge of computing, mathematics including discrete mathematics as well as probability and statistics, science, and engineering;
**	b	an ability to design and conduct experiments, as well as to analyze and interpret data;
**	c	an ability to design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints such as memory, runtime efficiency, as well as appropriate constraints related to economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability considerations;
	d	an ability to function on multi-disciplinary teams;
**	e	an ability to identify, formulate, and solve engineering problems;
	f	an understanding of professional, ethical, legal, security and social issues and responsibilities;
*	g	an ability to communicate effectively with a range of audiences;
	h	an ability to analyze the local and global impact of computing on individuals, organizations, and society;
*	i	a recognition of the need for, and an ability to engage in life-long learning and continuing professional development;
	j	a knowledge of contemporary issues;
**	k	an ability to use the techniques, skills, and modern engineering tools necessary for practice as a CSE professional;
**	l	an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
**	m	an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
*	n	an ability to apply design and development principles in the construction of software systems of varying complexity.

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