CISC 889: Machine Learning
Recitation Hall 101
2:00pm – 3:15pm

**Instructor:** Vijay K. Shanker
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**Office Hours:** Tuesdays 3:30-4:30pm, Wednesdays 1:30-2:30pm

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**Office Hours:** Wednesdays 2:30-4:30pm


**Course Content:** Machine Learning is concerned with the development of methods to learn to solve a task using examples. This course’s primary purpose will be to cover different machine learning algorithms/techniques and discuss their strengths and weaknesses and situations they are or are not suited for.

The specific techniques/topics that will be covered include:

- Bayesian Decision Theory–classification, risks and loss, discriminant functions: Ch 3.1-3.4
- Parametric Methods – maximum likelihood estimation, bias and variance: Ch 4.1-4.8
- Concept Learning (not in text)
- Decision Trees – Classification trees, pruning, rule extraction: Ch 9.1-9.5
- Linear Discrimination – general linear models, gradient descent, logistic discrimination, regression, perceptron, perceptron learning: Ch 10.1-10.8, 11.2-11.4
- Multilayer Perceptron (artificial neural networks): Ch 11.5, 11.7-11.9

• Combining multiple learners – Voting, Bagging, Boosting, Stacked Generalization – Ch 17.1-17.4, 17.6-17.9

• Analysis and Comparing Different Classifiers – cross validation, resampling, assessing and comparing performance: Ch 19

• Based on time and interest, some of these topics may be covered: Hidden Markov Models (Chapter 15), Genetic Algorithms (not in text), dimensionality reduction (chapter 6) and Clustering (chapter 7).

General Items

• **Homeworks and Exams:** There will be 4-5 homeworks that might include some programming exercises, a mid-term and final exams. The exams will carry 50-60% of the grade and the homeworks the rest.

• Retain copies of your class notes, handouts, and homeworks.

• All homeworks (written/programming exercises) will have to be turned in at the beginning of the class on the due date. No late submission will be accepted without prior permission of the instructor.

• In case of questions regarding grading of homeworks, you should first contact the TA. Then, if you still have questions, contact the instructor. For questions regarding the use of machine learning tools (e.g., Weka tools), please contact the TA. For other questions, you may contact either the instructor or the TA first.

• All work must be done independently. Cooperative efforts at understanding the material conceptually are encouraged. You may consult with others about conceptual problems with homeworks or even debugging Prolog programs. However, collaboration beyond this is not permitted. Each student must complete his or her homework independently. Submitting work that is not your own is considered cheating, as per Departmental and University policy.

• Please turn off your cell phone, pagers etc. and refrain from using laptops during class.

• I will strive to respond to emails from students within 24 hours during the week. I may not be able to respond to email over the weekends.