

CS 491Q/790Q SEM: Machine Learning Fall 2005: Biometrics

Prerequisites

Students should have previously taken courses on Data Structures (CS302), Calculus (MATH 181, MATH 182), Math of Computer Science (CS 365), Linear Algebra (MATH 330), Algorithms (CS477/677), and Image Processing (CS474/674). **If you do not meet the prerequisite requirements for this course, you should see us immediately.**

Credit hours: 3.0

Instructors: Dr. George Bebis and Dr. Ali Erol

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Course Webpage: <http://www.cse.unr.edu/~bebis/CS790Q>

Office Hours: MW: 4:00-5:00 pm and by appointment.

Required Texts:

BK1: *Guide to Biometrics*, by R. Bolle et al., Springer, 2004.

BK2: *Handbook of Fingerprint Recognition* by D. Maltoni et al., Springer, 2003.

Optional Texts:

BIOMETRICS: Personal Identification in Networked society, by A.K. Jain, R. Bolle, and S. Pankanti (eds.), Kluwer Academic Publishers, 1998.

Course description and objectives

The main objective of the course is to introduce you to the area of Biometrics. Biometrics refers to the identification of an individual based on his/her physiological characteristics, like a fingerprint, face, voice or behavior like handwriting or keystroke patterns. Because biometric characteristics are unique to each individual, they can be used to prevent theft of fraud. In addition, unlike a password or a PIN, a biometric cannot be lost, stolen, or recreated. This course is primarily intended for **highly motivated** students who are interested in working on the area of Biometrics. There are many problems in this area suitable for investigation by graduate students leading to a master thesis or dissertation.

Course Outline (tentative)

- Introduction to Biometrics (BK1, Chapter 1)
- Authentication of Biometrics (BK1, Chapter 2)
- Common and Other Biometrics (BK1, Chapters 3&4)
- Basic System Errors (BK1, Chapter 5)
- Identification System Errors (BK1, Chapter 6)
- Performance Testing (BK1, Chapter 7)
- Selecting Biometrics (BK1, Chapter 8)
- Creating and Maintaining Databases (BK1, Chapter 9)

- Large-Scale Applications (BK1, Chapter 10)
- Integrating Information (BK1, Chapter 11)
- Thwarting Attacks (BK1, Chapter 12)
- APIs, Standards, and Databases (BK1, Chapter 13)
- Biometric's Individuality (BK1, Chapter 14)
- What's next (BK1, Chapter 17)
- Overview of Fingerprint Recognition (BK2, 1.6 - 1.20)
- Fingerprint Sensing (BK2, Chapter 2)
- Fingerprint Analysis and Representation (BK2, Chapter 3)
- Fingerprint Matching (BK2, Chapter 4)
- Fingerprint Classification and Indexing (BK2, Chapter 5)
- Multimodal Biometric Systems (BK2, Chapter 7)
- Fingerprint Individuality (BK2, Chapter 8)
- Securing Fingerprint Systems (BK2, Chapter 9)
- Paper presentations

Course Requirements

Each student would be expected to participate actively in the presentations of the course material during the semester. Presentations should be professional as if they were presented in a formal conference (i.e., slides, projector). The student who is responsible for presenting a subject on a specific day would be expected to be well prepared and have a good understanding of the material. Every other student would be expected to have read the same material and participate in class discussion. The course also requires that each student completes two project assignments. We will discuss with you possible project ideas but you are also encouraged to discuss with us your own project ideas. Each student would be required to turn in a report upon the completion of his/her project and possibly give a demo. Specific instructions about the structure of the reports will be given later.

Course Policies

Regular attendance is highly recommended. If you miss a class, you are responsible for all material covered or assigned in class. Late assignments will not be accepted. If you are unable to hand in an assignment by the deadline, you must discuss it with me **before** the deadline.

Grading Scheme

Presentations: 50%

Project Assignments: 50%

A 90 and above

B 80-89

C 70-79

D 60-69

F < 59

Important dates

10/21/2005 - last day for dropping classes