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## BIOM 426: Biometric Systems

Fall 2014

Lane Department of Computer Science and Electrical Engineering  
West Virginia University

<http://www.csee.wvu.edu/~gdguo/courses/fa14/biom426>

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### Prerequisites:

STAT 215, MATH 261, CS 111 (Suggested: EE 327)

### Instructor and Office Hours:

Dr. Guodong Guo

Office: 753 ESB

Office hours: 4:50 – 5:50pm, TR, or by appointment

### Lecture Details:

Time: Tuesday and Thursday, 3:30-4:45p

Room: ESB-E 355

### Textbook:

Introduction to Biometrics, by Jain, Ross, and Nandakumar. Springer, 2011. ISBN 978-0-387-77325-4.

### Recommended Reading:

- **Handbook of Biometrics**, Jain et al., Springer
- **Guide to Biometrics**, Bolle et al., Springer.
- **Biometric Systems: Technology, Design and Performance Evaluation**, Wayman et al., Springer.
- **Handbook of Fingerprint Recognition**, Maltoni et al., Springer.
- **Handbook of Face Recognition**, Li and Jain, Springer.
- **Handbook of Multibiometrics**, Ross et al., Springer.

### Description:

Biometrics refers to the automated method of establishing identity by utilizing the physical (e.g., fingerprint, face, iris) and/or behavioral (e.g., gait, signature) traits of an individual. This course will discuss several of these traits and the techniques used to extract salient information from them in order to represent an individual. Topics related to multimodal biometrics, performance evaluation, securing biometric templates and privacy will also be presented. The projects will be geared toward implementing basic feature extraction and matching algorithms.

### Objectives:

To equip students with a good knowledge of: (a) the design and working of a generic biometric system; (b) the features used to represent and match individual biometric traits; (c) the performance metrics used to evaluate a biometric system; (d) the socio-legal implications of biometrics.

### Expected Learning Outcomes:

- (a) A good understanding of various modules constituting a biometric system.
- (b) Familiarity with different biometric traits and to appreciate their relative significance.
- (c) A good knowledge of the feature sets used to represent some of the popular biometric traits.
- (d) Be able to assess the performance of a biometric matcher.
- (e) Recognize the challenges and limitations associated with biometrics.

**Course Topics:**

- (a) Introduction [5 lectures]: What is Biometrics? History of Biometrics, Applications, Biometrics as a Pattern Recognition System, Characteristics of a Biometric System.
- (b) Performance Evaluation [3 lectures]: Error Rates, ROC curve, DET curve, CMC curve.
- (c) Feature Extraction and Matching of Biometric Traits [14 lectures]: Face, Fingerprint, Iris
- (d) Other topics [4 lectures]: Multibiometrics, Security, Privacy.

**Programming:**

Programming assignments in homework are based on Matlab.

**Grading:**

The *tentative* weight associated with each grading component is as follows:

- a. Homework - 30%
- b. Quiz - 15%
- c. Exams - 20%
- d. Project - 35%

**Grading Policy:**

- Assignments have to be turned in before lecture begins on the due date.
- Make-up quizzes will only be granted under exceptional circumstances. Instructor reserves the right to deny requests for make-up quizzes.

**Grade Assignment:**

The grading scheme will be as follows:

- 90-100 : A
- 80-89 : B
- 70-79 : C
- 60-69 : D
- 0-59 : F

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**Academic Integrity:**

*The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be compromised. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at <http://www.arc.wvu.edu/rightsa.html>. During the course of completing an assignment, should you have any questions about improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter.*

**Social Justice:**

*The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Disability Services (293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see <http://diversity.wvu.edu>.*

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