

17CS013 BIOMETRICS

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Course Description and Objectives:

Biometrics has emerged as a specialized field in criminal forensics, public safety surveillance, user authentication and identification. Expansion of biometric modalities are ranged from fingerprint, face and other traits to multimodal biometric traits. Objectives of this course include scientific foundations needed for the design, implementation, and evaluation of large scale biometric identification systems.

Course Outcomes:

The Student will be able to

- ✓ Understand the technological uplifts with biometrics compared to traditional securing mechanisms.
- ✓ Gain knowledge in building blocks of research fields like Pattern Recognition, Image Processing and Machine Learning etc.
- ✓ Evaluate and Design security systems with biometrics.

Activities:

- ✓ Hands-on training to acquired biometric data using different sensors
- ✓ Designing and development of different identification/ verification systems to validate the user identity
- ✓ Simulation of a multimodal biometric recognition system to know the challenges of Uni-modal system.

Skills:

- ✓ Design and develop a biometric security system
- ✓ Explore the challenges and limitations of Uni-modal biometric systems
- ✓ Solve the Identification/ Verification problems
- ✓ Explore different fusion scenarios at Information-level, fusion-level etc.,

Unit 1: Introduction

Person Recognition, Biometric Systems, Biometric Functionalities, Biometric System Errors, The Design Cycle of Biometric Systems, Applications, Security and Privacy issues.

Unit II: Fingerprint Recognition

Introduction, Friction Ridge Pattern, Fingerprint Acquisition, Feature Extraction, Fingerprint Matching, Fingerprint Indexing, Synthesis

Unit III: Face Recognition

Introduction, Acquisition, Face Detection, Feature Extraction and Matching, Advanced Topics

Unit IV: Iris Recognition

Introduction, Design of an Iris Recognition System, Image Acquisition, Iris Segmentation, Iris Normalization, Iris Encoding and Matching, Iris quality and performance evaluation.

Unit V: Multimodal Biometrics

Introduction, Sources of Multiple Evidence, Acquisition and Processing Architecture, Fusion levels.

TEXTBOOK:

1. Anil K. Jain, Arun Ross, and Karthik Nandakumar, "Introduction to Biometrics", Springer, 2011.

REFERENCE BOOKS:

1. Anil K Jain, Patrick Flynn and Arun A Ross, "Handbook of Biometrics", Springer, 2007. ISBN: 978-0-387-71040-2.
2. Nikolaos V Boulgouris, Konstatinos N Plataniotis and Evangelia Micheli Tzanakov, "Biometrics Theory, Methods and Applications", IEEE & Wiley, 2009, ISBN: 978-0470-24782-2
3. John D Woodward, Nicholas M Orlans and Peter T Higgin, "Biometrics: The Ultimate Reference", Dream Tech, 2009.