

## **DATA FUSION**

Mestrado em Engenharia Eletrónica e de Computadores

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Code: 26800

Main Scientific Area: Intelligent Systems and Control

Lecturer: José Henrique de Araújo Silveira de Brito

Language of Instruction: Portuguese

Regime: S1

Contact Hours: 30h Total Workload: 138h

ECTS: 6,0

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### **Objectives**

This curricular unit will enable to the students that successfully complete it, understand, identify and select and implement different sensory information fusion techniques. Specifically, it is intended to inform strategies for sensorfusion, sensor types, sensor network architecture for sensor fusion, feature extraction, classifiers based decisiontrees and neural networks, and, other types of classifiers and applications of common sensor fusion techniques.

### **Learning Outcomes**

Besides acquiring the theoretical knowledge described in the key goals of the course, the students should be able to implement the described algorithms in a high level programming environment (Python) making use of the available tools.

### **Course Contents**

1. Introduction to the fusion of sensory information
2. Sensory information
3. Sensor network architectures
4. Data alignment - spatial, temporal, semantic and normalization
5. Common data representation
  - 5.1 Principal Component Analysis (PCA)
  - 5.2 Linear Discriminant Analysis (LDA)
6. Pattern Recognition
  - 6.1 Decision trees, neural networks and other classifiers
  - 6.2 Anomaly detection
  - 6.3 Evaluation strategies

### **Recommended Bibliography**

Data Fusion: Concepts and Ideas, H B Mitchell, 2nd edition, 2012, Springer

Multi-Sensor Data Fusion with MATLAB, Jitendra R. Raol, 2009, CRC Press

### **Learning and Teaching Methods**

The contents of this curricular unit intend to do an exhaustive exposition of the main sensor fusion techniques, as well as the main applications of fusion of sensory information.

### **Assessment Methods**

The grading of this curricular unit comprises a practical component (75%), focused on the use of pattern recognition and anomaly detection in a practical project, and a theoretical component (25%), assessed through an evaluation form, focusing on all aspects of programmatic content.