DATA FUSION

Mestrado em Engenharia Eletrónica e de Computadores

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: 130h

ECTS: 6,0

Objectives

This curricular unit will enable to the students that successfully complete it, understand, identify and select andimplement 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 ableto implement the described algorithms in a high level programming environment (Python) making use of theavailable 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, aswell 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 ofpattern recognition and anomaly detection in a practical project, and a theoretical component (25%), assessedthrough an evaluation form, focusing on all aspects of programmatic content.