Advanced Research
Intelligent
Embedded
Systems

Cognitive Cyber-physical Systems: course projects

Ph.D. and Master Course

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Course EVALUATION

- **Project types:**
  a) Demos (course)
  b) Development (course)
  c) Research (course + more …)
- **Up to two people**
- Knowledge of Matlab or C/C++
- ***Project Deadline (tentative): April, 30***

Project Topics

Embedded programming (C/C++)

- Design and development of **Intelligent Mechanisms for embedded systems**
  - Recurrent Neural Networks for datastream learning
  - Adaptive sampling for energy conservation
  - Change detection and learning mechanisms on networked embedded systems (e.g., graph analysis)

Learning in Nonstationary Environments (Matlab)

- **Change detection** mechanisms for multivariate and big data
  - Multivariate CPM-based change detection
  - Analysis of performance in big data scenarios
  - Qualitative datastreams
- **Application scenarios**
  - Textual information, user preferences, sentiment analysis, etc..
- **CDT demos on datastreams/residual**

Learning in Nonstationary Environments (2)

- **Learning** for multivariate and big data
  - Analysis of performance in imbalance datasets
  - Dynamic knowledge base management
  - Adaptive and ensemble classifiers
- **DEMOS on prediction/classification:**
  - Active solutions
  - Passive solutions
- **Application scenarios**
  - Textual information, user preferences, sentiment analysis, activity recognition, etc..

Probabilistic Computation in Embedded Systems

- *From a determinist to a probabilistic framework in embedded systems*
- **Topics**:
  - Randomized Algorithms
  - Robustness Analysis
  - Performance estimation and Probably Approximately Correct Computation