



Laboratoire LEAT
UMR CNRS 7248

Research Internship

Distribution of Artificial Neural Networks on Wireless Sensors for smart IoT

Context

Biological brain shows unmatched capacities for the fusion and the processing of complex and heterogeneous (multimodal) data.

This subject aims at studying the transposition of computational models of Artificial Neural Networks (ANN) in the domain of wireless sensor networks for the joined fusion of data coming from multiple sensors and the minimization of the global power consumption [1].

The study will specifically focus on ANN models derived from the Self-Organizing Maps (SOM) and adapted to an execution in an embedded context. After being studied and compared to the state of the art, the distributed model developed at LEAT Lab [2] will be deployed both onto an industrial Gateway and micro-controllers hardware devices through software stacks dedicated to Internet of Things (IoT) [3].

This work is leaded in collaboration with an industrial partner located in Sophia Antipolis. The validation of the work will then be realized by considering their particular use case.

Internship mission

A first prototype has been developed at LEAT lab and will be reused as starting point for this work.

The internship mission will be organized into several periods

- Theoretical study of the SOM based artificial neural networks and bibliography,
- Adaptation of the model to the context of sensor fusion in low energy wireless networks,
- Exploration of the deployment of neurons (scalability, heterogeneous data and distribution of the execution) with system level simulation under the Omnet++ Environment,
- Embedded validation onto industrial real use case.

References

- [1] Machine Learning in Wireless Sensor Networks: Algorithms, Strategies, and Applications, Mohammad Abu Alsheikh, Shaowei Lin, Dusit Niyato, Hwee-Pink Tan, in IEEE Communications Surveys & Tutorials, vol. 16, no. 4, 2014
- [2] Toward a sparse self-organizing map for neuromorphic architectures, L. Rodriguez, B. Miramond, Journal on Emerging Technologies in Computing Systems, 2015
- [3] Thread Stack Fundamentals, <http://threadgroup.org/>, July 2015

Practical information

Location : LEAT Lab, Sophia Antipolis
Duration : 6 months from March 2017
Grant : 546 € / month
Profile : Computer Science, Machine Learning, Embedded Systems, Wireless Networks

Contact

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