LivEMUSIC

Living-Environment Monitoring Use Scenario with Intelligent Control

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Abstract

This is a revised version of the proposal with the same name that was submitted by the author in June 2014 in response to the *"appel d'offre"* emitted by the *"Programme Avenir Lyon Saint-Étienne"* (PALSE) in September 2013.[1] Although the original project proposal was not accepted in its original form by the reviewing committee, the author was notified that an exceptional funding of 150,000 € had been granted to him for a one-year project to be adapted from the submitted proposal (out of the 416,300 € originally requested for a two-year project). This document gives a work plan derived from the original to be carried out within the new budget and time restrictions and specifies a reallocation of the granted funds.

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Revised work plan

We explain what parts of the original proposal can be adapted, and how, in view of the revised budget allocation. Then, we give the reallocation of the granted funds in a new budget grid.

Revised task plan

This makes references to the work plan's tasks that had described in the original proposal.

[1] http://www.biosyl.org/jobs/appel-a-projets-packages-2013-2014

- Task 1 ("**Specification of the ontology language**") and Task 2 ("**Reasoning support to aid users in specifying queries**") will be merged into a single new task entitled "**Ontological reasoning support**" and described as follows:

  > The aim of this task is to develop an appropriate syntax and a semantics for a logical language for reasoning over ontologies relevant to living-environment monitoring. It will accommodate the specific nature of constraints and data dependencies that are typically relevant for this class of ontologies. This will consist in analyzing the state of the art, identify missing capabilities, and design a knowledge processing language capable of providing adequate representation and reasoning.

- Task 4 ("**Method and algorithms for distributed query decomposition and evaluation**") will be dropped altogether taking into account the new budget and timing.

- Task 3 ("**Method and algorithms for semantic query enrichment**") and Task 5 ("**Implementation and experiments**") will be merged into a single new task entitled "**Implementing and experimenting with a proof-of-concept ontology processing and query language**" described as follows:

  > The objective of this task is to extract terminological schemas from cleaned up monitoring raw data, express those as ontologies using the logic specified in the new Task 1/2, and use the result to experiment with a use case based on the derived encoded knowledge.

Master topics

There are three Master 2 topics we are proposing within the two new redefined tasks described above.

1. **Generation of RDF triples from raw sensor data**—The objective of this MSc topic is to implement a tool capable of processing massive raw data gathered from primary sources of all kinds, such as sensor devices, surveillance videos, manually entered inputs, *etc.*, cleaning it up into consistently uniform RDF representations. The generated RDF data is to comprise triplestores encompassing data to be analyzed and further processed into intensional knowledge characterizing the sort of specific information this data relies on.

2. **Derivation of ontologies from RDF triplestores**–This MSc topic concerns the analysis of RDF triplestores generated from raw sensor data in order to derive terminological schemas that the generated RDF triples abide by. The objective is to categorize these triplestore data using classes and attributes fitting their structure using Formal Concept Analysis.[2] The outcome is to constitute a terminological schema for this data that can be used for reasoning about such data.

3. **Use of terminological knowledge for monitoring applications**—This topic's objective is to develop a use case exploiting terminological knowledge over monitoring data with reasoning based on Order-Sorted Feature constraint logic for smart information retrieval, data analytics, and query processing.[3] The object is to demonstrate how to leverage the capabilities brought by knowledge-based processing of monitoring data for intelligent applications with a convincing use case based on actual gathered data.

[2] http://en.wikipedia.org/wiki/Formal_concept_analysis

[3] Using the technology developed as part if the CEDAR project: cedar.liris.cnrs.fr.