The ANR i-Flooding (e-Flooding) project focuses on risk management particularly in flash floods [Stolf 2019] and aims to limit the impact of floods and reduce the time needed to overcome the damage caused in the affected areas.

In this context, multiple data sources are considered to support and provide decision making. These data are of various types. They are static (land topologies, inhabited areas, population), computed from models or dynamically collected in real time (water level sensors, Vigicrue data or satellite images). These data can be analysed and interpreted from the knowledge of experts in the field (fire departments and participants in crisis meetings) as well as from knowledge from historical past floods.

Semantic web technologies have shown their interest, particularly in the context of the Internet of Things, to erase the heterogeneity of the data manipulated [Sezer 2018]. They allow the integration of knowledge representations that facilitate their automatic processing. Based on recent works such as those presented in [Sermet, 2019], one of the objectives of this post-doctoral work will be to propose an approach aimed at building and updating a knowledge graph from the data available in the two territories studied. This knowledge graph could be used to enrich the algorithm solving the routing problem of firefighters' vehicles already proposed by the team [Dubois 2020]. Another objective will be to use this knowledge graph to help the firefighters analyze the crisis situation during their first reconnaissance on the ground. It will give the opportunity to confront the relevance of automatic reasoning based on technical sensors and that of the firefighter based on his observations, thus providing guidance to the actors of the crisis in their decisions. Finally, in order to promote rapid decision-making, the possibility of proposing an infrastructure to decentralize decisions such as the one presented in [Seydoux 2020] could be explored.

Sermet, Y., & Demir, I. Towards an information centric flood ontology for information management and communication. Earth Science Informatics, 12(4), 541-551, 2019.

Seydoux, N., Drira, K., Hernandez, N., & Monteil, T. EDR: A Generic Approach for the Distribution of Rule-Based Reasoning in a Cloud-Fog continuum.Semantic Web, Volume 11, Number 4, 2020

SEZER, Omer Berat, DOGDU, Erdogan, et OZBAYOGLU, Ahmet Murat. Context-aware computing, learning, and big data in Internet of Things: a survey. IEEE Internet of Things Journal, vol. 5, no 1, p. 1-27, 2018.

Dubois, F., Renaud-Goud, R., Stolf, P. Capacitated Vehicle Routing Problem under Deadlines. International Conference on Information and Communication Technologies for Disaster Management (ICT-DM 2019), Paris, 18/12/19-20/12/19, IEEE (Eds.), 2020.

Stolf, P., Pierson, JM., Sayah, A., Da Costa, G., Renaud-Goud P. e-Flooding: Crisis Management Through Two Temporal Loops. Hawai International Conference on Systems Science (HICSS 2019), Maui, Hawai, 08/01/19-11/01/19, University of Hawaï at Manoa, p. 2985-2994, janvier 2019.

JOB REQUIREMENTS

The successful candidate will be located in IRIT, Toulouse under the supervision of Patricia Stolf and Nathalie Hernandez at the frontier of the following three areas:

1- Knowledge Representation and Reasoning

2- Semantic Web of Things

3- Machine learning

The main requirements for the positions are:

- a Ph.D. in computer science with a focus on Artificial Intelligence AND or IN either semantic web technologies, reasoning or distributed decisions.

- a good publication record,

- strong programming skills

- using either French or English as working language, with a sufficient mastering of the latter for international collaboration.

RESEARCH TASKS

The candidate will contribute to i-Nondations (e-Flooding) an ongoing research project on Flood Management. S/he will develop hypotheses, set-up experiments and write articles in collaboration with the other members involved in the project. One of his/her first tasks will be to draw up, in collaboration with the project members, a detailed work plan for her/his postdoctoral work at IRIT, based on his/her recent research experience.

ADDITIONAL INFORMATION

Gross salary: between 3000 and 4000 € per month according to experience

Duration: 12 months

Start date: no later than December 1, 2020.

TO APPLY

Please send:

* a letter of motivation

* a curriculum vitae, including a list of publications

* the names and contact information of at least two referees

to both:

Patricia Stolf (patricia.stolf@irit.fr) Nathalie Hernandez (nathalie.hernandez@irit.fr)

Application deadline: October 15th, 2020