

INFORMATION AGENTS FOR ENVIRONMENT SENSOR NETWORKS

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The ubiquitous deployment of environmental sensor networks that make their data available in real-time through the world wide web presents many opportunities. However, such systems also present a number of novel challenges. For example, in order to facilitate the use of sensor data by multiple users, self-describing data formats and standard protocols to advertise the existence and capabilities of the sensors are required. Furthermore, many of the information processing tasks that would previously have been performed off-line by the owner or single user of the network (such as detecting faulty sensors, fusing noisy measurements from several sensors, and deciding how frequently readings should be taken), must now be performed in real-time by the multiple different users of the system.

Against this background, in this talk, I will present the work of the ALADDIN project (<http://www.aladdinproject.org/>) in developing and demonstrating an information agent that uses semantic web technologies to access real-time sensor data from the web and is capable of performing a number of the information processing tasks described above. This agent uses a novel iterative formulation of a multi-output Gaussian process to build a probabilistic model of the environmental parameters being measured by the sensors. This model allows the agent to infer the accuracy of the sensor readings, to predict both the value of missing sensor readings and how the monitored environmental parameters will evolve in the near future, and to autonomously perform active sampling by automatically determining when and which sensor to acquire readings from. This prototype agent has been evaluated on a permanently installed network of weather and tide sensors located on the south coast of England, and a live implementation of this agent is available online at <http://www.aladdinproject.org/situation/>.