

Distributed Query Evaluation in Dynamic Multi-Hop Networks

Available Ph.D. position

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Context: UBIQUEST ANR-09-BLAN-0131-01 project

Research areas: Distributed query optimization techniques

Keywords: query optimization, case-based reasoning, dynamic networks

Environment

Available data in ubiquitous environments is accelerated with wireless technologies interconnecting an increasing number of heterogeneous devices such as sensors, PDA's, wearable computers, etc. that can store or produce data. Therefore, more and more devices will be interconnected temporarily in dynamic networks, and cooperate to carry on common tasks such as evaluating distributed queries on these data. The constraints of the participants, such as their limited energy, their communication capabilities, their mobility, as well as the distribution of the resources, make data and network management very challenging.

Objectives

In ubiquitous environments, meta-information on data such as its location and distribution, cardinalities or data value distribution, are not always available due to the dynamicity of the environment and to the heterogeneity of devices. This invalidates classical distributed query evaluation techniques relying on meta-information.

The objective of this thesis is to design new distributed optimization approaches for these environments. These approaches may rely on distributed algorithms (i.e. protocols) that can perform efficiently in such environments (e.g. for computing aggregates) and on machine learning techniques to minimize needed meta-information.

The PhD work includes:

- the specification of an adapted distributed query language – not relying only on a global vision of the network
- the specification of corresponding execution model – involving access to local data, local computation, sub-query emitting and protocol triggering
- the development of distributed query optimization techniques based on machine learning
- experimental evaluation of the proposal.

Prerequisites

- Database management systems and query languages
- Query optimization techniques
- Machine-learning techniques
- Good programming skills (java, C++)

Agenda

- Year 1
 - State of the art on in-network query evaluation techniques
 - New approach proposition
- Year 2
 - Development of the approach
- Year 3
 - Implementation and experimental evaluation of the proposal