Chapter 5

The Event Search Engine

Takeshi Okadome  
Kwansei Gakuin University, Japan

Yasue Kishino  
NTT Communication Science Laboratories, Japan

Takuya Maekawa  
NTT Communication Science Laboratories, Japan

Koji Kamei  
Advanced Telecommunications Research Institute International, Japan

Yutaka Yanagisawa  
NTT West, Japan

Yasushi Sakurai  
NTT Communication Science Laboratories, Japan

ABSTRACT

In a remote or local environment in which a sensor network always collects data produced by sensors attached to physical objects, the engine presented here saves the data sent through the Internet and searches for data segments that correspond to real-world events by using natural language (NL) words in a query that are input in a web browser. The engine translates each query into a physical quantity representation searches for a sensor data segment that satisfies the representation, and sends back the event occurrence time, place, or related objects as a reply to the query to the remote or local environment in which the web browser displays them. The engine, which we expect to be one of the upcoming Internet services, exemplifies the concept of symbiosis that bridges the gaps between the real space and the digital space.

INTRODUCTION

Background

Many surveillance applications based on sensor networks monitor the physical world and detect events that occur in the world on the basis of sensor data. In the applications, events are named according to attributes that have scalar values or ranges of scalar values, such as temperature and light levels. These events, which are described by SQL-like languages (Madden et al., 2003; Bonnet, Gehrke, & Seshadri, 2000; Xue & Luo, 2005; Jiao, Son, & Stankovic, 2005; Li et al., 2002), depend on the value of a particular sensor reading. For example, Li et al. (2002) designed a distributed index that scalably supports multidimensional range queries such as “List all events that have temperatures between 50 and 60°C, and light levels between 10 and...”
The Event Search Engine

Figure 1. The event search engine—overview

Overview of the Event Search Engine

Figure 1 shows an overview of this engine, which consists of two modules: a query module and a search engine that refers to the sensor data grounder. Assuming a remote or local environment in which a sensor network always collects data produced by sensors attached to physical objects, the engine saves the data sent through the Internet and returns information about an event that matches an intuitive interpretation of a set of NL words in a query. A web browser in the remote or local environment displays the returned information. Using a simple Google-like interface, users input queries in a word set that may contain a preposition and/or an adverb such as “drop,” “what hide,” “book move:horizontally,” or “who drop vase on:2006.12.31.” The engine returns the event occurrence time, place, or related objects as a reply to the query. Also it answers by, for example, displaying a video image recorded by video cameras.

Before describing the event search engine, the next section summarizes an event representation...
Related Content

IPML: Structuring Distributed Multimedia Presentations in Ambient Intelligent Environments
[www.igi-global.com/article/ipml-structuring-distributed-multimedia-presentations/1586?camid=4v1a](www.igi-global.com/article/ipml-structuring-distributed-multimedia-presentations/1586?camid=4v1a)

Neuroinformatics Models of Human Memory: Mapping the Cognitive Functions of Memory onto Neurophysiological Structures of the Brain
[www.igi-global.com/article/neuroinformatics-models-of-human-memory/87178?camid=4v1a](www.igi-global.com/article/neuroinformatics-models-of-human-memory/87178?camid=4v1a)

Swarm-Based Wayfinding Support in Open and Distance Learning
[www.igi-global.com/chapter/swarm-based-wayfinding-support-open/6627?camid=4v1a](www.igi-global.com/chapter/swarm-based-wayfinding-support-open/6627?camid=4v1a)

On Concept Algebra: A Denotational Mathematical Structure for Knowledge and Software Modeling
[www.igi-global.com/chapter/concept-algebra-denotational-mathematical-structure/39263?camid=4v1a](www.igi-global.com/chapter/concept-algebra-denotational-mathematical-structure/39263?camid=4v1a)