Deductive Analysis of Large Data Streams: A New Perspective for View Technology

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Abstract

Monitoring streams of data generated by sensor nets is currently perceived as one of the great challenges for the DB world. Many classical DB concepts and methods are pushed to, or even beyond their limits by the sheer size of the sensor data and by the high frequency of their arrival. Once sensor data have been monitored, pre-processed and temporarily stored using DB technology, their further analysis, however, is at present left to specialized, domain-dependent software residing outside the DBMS. Evaluation algorithms for sensor data communicate with the DB hosting the data via declarative languages like SQL for retrieval purposes only, but are themselves entirely coded in traditional imperative and object-oriented languages.

This kind of reduction of DB technology to a subordinate role as pure data producer and its exclusion from the much more interesting and rewarding field of data analysis is regretful, and should be challenged by our research community. We claim that declarative DB languages and their associated efficient evaluation methods are well suited for a knowledge-based, deductive analysis of monitoring data. In particular, we think that view hierarchies are a powerful means for expressing sophisticated domain-knowledge necessarily needed for data analysis. In the context of rapidly changing raw data (resulting from the constantly flowing stream), techniques of incremental update propagation through views, originally developed for adapting materialized views and checking constraints, may prove to be very useful for detecting high-level "logical" events hidden in the stream data. In our talk, we will motivate the usefulness of view-based technology for monitoring applications and introduce into the idea of using update propagation for event detection over streams.

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