

ABSTRACT

INCREMENTAL QUERY PROCESSING IN INFORMATION FUSION SYSTEMS

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This dissertation studies the methodology and techniques of information retrieval in fusion systems where information referring to same objects is assessed on the basis of data from multiple heterogeneous data sources. A wide range of important applications can be categorized as information fusion systems e.g. multisensor surveillance system, local search system, multisource medical diagnose system, and so on. Up to the time of this dissertation, most information retrieval methods in fusion systems are highly domain specific, and most query systems do not address fusion problem with enough efforts.

In this dissertation, I describe *a broadly applicable query based information retrieval approach* in general fusion systems: user information needs are interpreted as fusion queries, and the query processing techniques e.g. source dependence graph (SDG), query refinement and optimization are described. Aiming to remove the query building bottleneck, a *novel incremental query method* is proposed, which can eliminate the accumulated complexity in query building as well as in query execution. Query pattern is defined to capture and reuse repeated structures in the incremental queries. Several *new techniques for query pattern matching and learning* are described in detail. Some *important experiments* in a real-world multisensor fusion system, i.e. the intelligent vehicle tracking (IVET) system, have been presented to validate the proposed methodology and techniques.