

Experimental Evaluation of a Dynamic Cubing System: Workflow, Metrics, and Prototype

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Abstract. This article originates in the efforts we made in the prototyping stage of a project conducted in the field of new agile BI applications. In this earlier work, we defined a model and algorithms for handling dynamic cubes that are updated as single fact comes in. The proposal includes the definition of a tree structure, called DyTree, used to store these cubes. A comprehensive experimental evaluation was conducted to observe the behavior of the proposal under some varying circumstances or settings, to help in understanding its working and to provide feedback to improve the solution. In this paper, we describe the workflow which has been used for this experimental evaluation. Performance metrics and behavioral metrics are defined as output of the experimental evaluation workflow. Different types of data sets and parameters for algorithms are the input used to configure the experiments. Using this environment and the prototype, some examples of experimental studies are presented. This shows how different scenarios can be simply constructed and how the experimental results can be used to understand the behavior of our proposal and to evaluate performance.

1 Motivation and Positioning

This article addresses the issue of experimental evaluations related to a research work in OLAP. It originates in the efforts we made in the prototyping stage of a project conducted in the field of new agile BI applications operating in fast evolving environment. In this work, a solution is discussed in order to provide better data freshness and reduce analysis latency (Ahmed et al. (2010)). This solution allows on-the-fly insertions of facts and members by means of frequent atomic insertions, thus leading to fast aggregate updates. We provided the definition of a Dynamic Cube based on a multidimensional un-ordered and multi-level data space, enabling its evolution. A tree structure incrementally stores detailed data and aggregates for the densest regions of the data space thanks to a split strategy that promotes refinement of aggregates at increasing lower level. This proposal was implemented in a prototype. This prototype consists of a suite of tools starting from facts loading to OLAP navigation in the dynamic cube. This prototype aims at functional testing and helps us to demonstrate the feasibility of the solution. However, it is also a means for evaluating the performance of the proposal and studying its