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Building Textual OLAP Cubes Using Real-Time Intelligent Heterogeneous Approach

by: Alzeini, H (Alzeini, Haytham H.)^[1]; Hameed, SA (Hameed, Shihab A.)^[2]; Habaebi, MH (Habaebi, Mohamed Hadi)^[2]

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Abstract

This article describes how the ever-growing amount of data entails introducing innovative solutions in order to capture, process, and store the information. OLAP has been considered a powerful analytical technology that enables analysts to gain insight into data and project information from diversified points of view. Thereupon, OLAP has been utilized in a broad spectrum of sensitive applications in the industry. The technology has occupied its place at the forefront of the vibrant information technology landscape of research in order to meet the evolving needs. One of these needs that has enticed the researchers' attention is providing real-time answers which suggests, in particular cases, processing billions of records in few seconds or less. The limited processing capacities have arisen as a major hurdle in the way of achieving such an aim. Although numerous improvements have been suggested, few have considered the heterogeneous computing approach, whereby quantum leap in terms of the response time has been achieved, albeit in most cases, only numerical data have been utilized. In this article, the authors introduce a novel heterogeneous OLAP approach targets textual OLAP cubes aggregation and can be utilized efficiently in OLAP-based pattern recognition problems. In this context, the approach (a) exploits the GPU along with the CPU in order to process textual data. (b) Stores the queries aggregations' hash table in the global memory such that the higher aggregations levels are being answered in a shorter time (c) Introduces an intelligent self-evaluating mechanism (ISEM), that evaluates the resource efficiency on query-basis by deciding which resource (CPU or GPU+CPU) is more reliable to process each query. The authors' empirical results have shown the achieved gain is up to thirty-two folds over the parallel CPU-based counterpart solution. Furthermore, their approach has demonstrated that adopting aggregation-memory optimization significantly improves the performance of high-level textual aggregations.

Keywords

Author Keywords: Data Mining; Heterogeneous Computing; OLAP; Pattern Recognition; Rabin-Karp

Author Information

Reprint Address: Alzeini, H (reprint author)

+ IIUM, Kuala Lumpur, Malaysia.

Addresses:

+ [1] IIUM, Kuala Lumpur, Malaysia

+ [2] IIUM, Elect & Comp Engn, Comp & Informat Engn, Kuala Lumpur, Malaysia

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