Title: Preference Top-k Search Based on Multidimensional B-Tree
Author: RNDr. Matúš Ondrejčka
Department: Department of Software Engineering
Faculty of Mathematics and Physics
Charles University in Prague
Supervisor: Prof. RNDr. Jaroslav Pokorný, CSc.
Author’s e-mail address: ondreicka@ksi.mff.cuni.cz
Supervisor’s e-mail address: pokorny@ksi.mff.cuni.cz

Abstract: In this thesis, we focus on the top-k search according to user preferences by using B+-trees and the multidimensional B-tree (MDB-tree). We use model of user preferences based on fuzzy functions, which enable us to search according to a non-monotone ranking function. We propose model of sorted list based on the B+-tree, which enables Fagin’s algorithms to search for the top-k objects according to a non-monotone ranking function. We apply this model in the Internet environment with data on different remote servers. Furthermore, we designed novel dynamic tree-based data structures, namely, MDB-tree composed of B+-trees, MDB-tree with lists, MDB-tree with groups of B+-trees and multiple-ordered MDB-tree. Concurrently, we have developed novel top-k algorithms, namely, the MD algorithm, the MXT algorithm and their variants which are able search for the top-k objects according to a non-monotone ranking function. These top-k algorithms are efficient because they are able to find the top-k objects without the need to obtain the majority of the objects stored in the designed tree-based data structures.

Keywords: top-k search, multidimensional B-tree, user preferences, non-monotone ranking, MD algorithm, MXT algorithm.