Multidimensional skylines

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Recently, skyline analysis has attracted a lot of interest due to its importance in multi-criteria decision making applications. In a multidimensional space where a preference is defined for each dimension, a point A dominates another point B if A is better (i.e., more preferred) than B on at least one dimension, and A is not worse than B on every dimension. For example, a skyline analysis may answer a customer's query who whishes to buy a flight ticket from Singapore to Paris with a preference for low prices, short travel time and few transits. Given a set of points, the skyline set contains the points that are not dominated by any other points. Traditional skyline computation has always been restricted to the data embedding space of a fixed dimensionality. Recently, the subspace skyline problem has attracted a fast growing amount of interest. Given a set of points in an n-dimensional space, users may be interested in different skyline queries in different subspaces of different dimensions. In this talk we will present the problem of efficient skycube computation. We introduce a novel approach significantly reducing domination tests for a given subspace and the number of subspaces searched. Technically, we identify two types of skyline points that can be directly derived without using any domination tests. Moreover, based on formal concept analysis, we introduce two closure operators that enable a concise representation of skyline cubes. We show that this concise representation is easy to compute and develop an efficient algorithm which only needs to search a small portion of the huge search space.