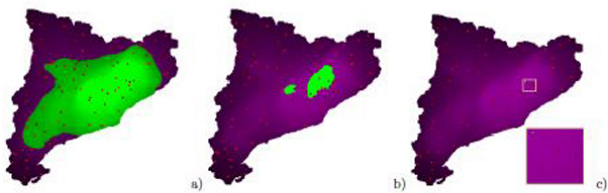


Solving the k-influence region problem with the GPU

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In this paper we study a problem that arises in the competitive facility location field. Facilities and customers are represented by points of a planar Euclidean domain. We associate a weighted distance to each facility to reflect that customers select facilities depending on distance and importance. We define, by considering weighted distances, the k-influence region of a facility as the set of points of the domain that has the given facility among their k-nearest/farthest neighbors. On the other hand, we partition the domain into subregions so that each subregion has a non-negative weight associated to it which

measures a characteristic related to the area of the subregion. Given a weighted partition of the domain, the k-influence region problem finds the points of the domain where a new facility should be opened. This is done considering the known weight associated to the new facility and ensuring a minimum weighted area of its k-influence region. We present a GPU parallel approach, designed under CUDA architecture, for approximately solving the k-influence region problem. In addition, we describe how to visualize the solutions, which improves the understanding of the problem and reveals complicated structures that would be hard to capture otherwise. Integration of computation and visualization facilitates decision makers with an iterative what-if analysis process, to acquire more information to obtain an approximate optimal location. Finally, we provide and discuss experimental results showing the efficiency and scalability of our approach.