In this paper we introduce an optimization problem, that arises in the competitive facility location area, which involves the maximization of the weighted area of the region where a new facility has influence. We consider a finite set of points \( S \) in a bounded polygonal region domain \( D \) subdivided into several non-negative weighted regions according to a weighted domain partition \( P \). For each point in \( S \) we define its \( k \)-nearest/farthest neighbor influence region as the region containing all the points of \( D \) having the considered point as one of their \( k \)-nearest/farthest neighbors in \( S \). We want to find a new point \( s \) in \( D \) whose \( k \)-influence region is maximal in terms of weighted area according to the weighted partition \( P \). We present a GPU parallel approach, designed under CUDA architecture, for approximately solving the problem and we also provide experimental results showing the efficiency and scalability of the approach.