Given a graph $G$, and a non-negative integer $a$, a function $f : V(G) \to \{a, a+1, \ldots, b\}$ is an $[a, b]$-ranking of $G$ if for $u, v \in V(G)$, $f(u) = f(v)$ implies that every $uv$ path contains a vertex $w$ such that $f(w) > f(u)$. That is, $f$ is an $[a, b]$-ranking of $G$ if and only if the function defined by $g(v) = f(v) - a + 1$ is a $k$-ranking of $G$.

We use this generalization of $k$-rankings to explore $l_p$ norm optimality for all positive integers $p$ and for $p = \infty$. The $l_\infty$ optimality produces the rank number of a graph when $a = 1$. We will discuss the effect of different $l_p$ norms on optimal rankings of graphs. (Received September 21, 2011)