Algorithm KNN-MIPS

Input: a KNN graph $G = (D, E)$; a query point $\overrightarrow{q}$; the number of required nearest neighbors K; the number of random restarts R; distance function ρ; the number of greedy steps T; the number of expansions E.

$S \leftarrow \{\}$ {Set of MIPS candidates}
$U \leftarrow \{\}$ {Set of to be expanded candidates}
for $r = 1, ..., R$ **do**
  $\overrightarrow{x}_0$ a point drawn randomly from a uniform distribution over D
  for $t = 1, ..., T$ **do**
    $\overrightarrow{x}_t = \text{argmin}_{\overrightarrow{x} \in N(\overrightarrow{x}_{t-1}, E, G)} \rho(\overrightarrow{q}^T \overrightarrow{x})$
    $S \leftarrow N(\overrightarrow{x}_{t-1}, E, G)$ {N is a function that returns neighbors}
    $U \leftarrow \{\rho(\overrightarrow{q}^T \overrightarrow{x}) : \overrightarrow{x} \in N(\overrightarrow{x}_{t-1}, E, G)\}$.
  end for
end for

Output: Sort U, pick the first K elements, and return the corresponding indices in S.