Algorithm 1 Embedding Procedure - General

Input: L sized, vectorized n-dimensional dataset
Input: number of centers per dimension - C
Output: $emb-set$: L sized set, embedded, sparsed vectors

Find centers vectors
V shall be a set of centers vectors
for all dim in n **do**
  $V_{dim} \leftarrow centers \quad vector \quad per \quad dim$
end for
Find embedded coefficients for all dataset
$\overrightarrow{\phi} = C^n$ length empty $emb-set$ embedded vectors
for all vec in L **do**
  find vec bounding hypercube
  find vec bounding simplex (permutation method)
  $\overrightarrow{\lambda} \leftarrow$ find vec barycentric coefficients
  $\hat{\overrightarrow{\lambda}} \leftarrow \text{normalize}(\overrightarrow{\lambda})$
end for
Assign
for all $\overrightarrow{evec}$ in $emb-set$ **do**
  $inds \leftarrow$ find vertices from hypercube and simplex locations
  for all i in $inds$ **do**
    $\overrightarrow{evec}(i) \leftarrow \hat{\overrightarrow{\lambda}}(j(i))$ – j is the assigning function between the coef. vector and embedding vector
  end for
end for
return $\overrightarrow{\phi}$

$$ID(\overrightarrow{x_1}, \overrightarrow{x_2}; S) = [\quad ID(\overrightarrow{x_1}[S_1]; \overrightarrow{x_2}[S_1]) \quad \dots \quad , \quad \dots \quad ID(\overrightarrow{x_1}[S_g]; \overrightarrow{x_2}[S_g]) \quad]$$

Algorithm 2 Embedding Procedure - pairs embedding

Input: L sized, set of pairs of n-dimensional vectors
Input: number of centers per dimension - C
Output: $emb-set$: L sized set, embedded, sparsed vectors

Find centers vectors
V shall be a set of centers vectors
for all dim in $2n$ **do**
  $V_{dim} \leftarrow centers \quad vector \quad per \quad dim$
end for
Find embedded coefficients for all dataset
$\overrightarrow{\phi} = C^{2n}$ length empty $emb-set$ embedded vectors
for all vec in L **do**
  find vec bounding hypercube
  find vec bounding simplex (permutation method)
  $\overrightarrow{\lambda} \leftarrow$ find vec barycentric coefficients
  $\hat{\overrightarrow{\lambda}} \leftarrow$ normalize($\overrightarrow{\lambda}$)
end for
Assign
for all $\overrightarrow{evec}$ in $emb-set$ **do**
  $inds \leftarrow$ find vertices from hypercube and simplex locations
  for all i in $inds$ **do**
    $\overrightarrow{evec}(i) \leftarrow \hat{\overrightarrow{\lambda}}(j(i))$ – j is the assigning function between the coef. vector and embbeding vector
  end for
end for
return $\overrightarrow{\phi}$