Algorithm 1: CCC algorithm

Function `get_partitions`($\mathbf{v}$, $k_{\max}$)**:**

Input:

$\mathbf{v}$: feature values on n objects

$k_{\max}$: maximum number of clusters

Output:

Π: a set of partitions over n objects

if $\mathbf{v} \in \mathbb{R}^n$ **then**

  for $k \leftarrow 2$ **to** $\min\{k_{\max}, n-1\}$ **do**

    $\boldsymbol{\rho} \leftarrow (\rho_\ell \mid \Pr(v_i < \rho_\ell) \leq (\ell-1)/k), \forall \ell \in [1, k+1]$

    $\pi_\ell \leftarrow \{i \mid \rho_\ell < v_i \leq \rho_{\ell+1}\}, \forall \ell \in [1, k]$

    $\Pi_k \leftarrow \pi$

else

  $\mathcal{C} \leftarrow \{c_1, c_2, \ldots, c_m\}$ (set of m unique categorical values in $\mathbf{v}$)

  $\pi_\ell \leftarrow \{i \mid v_i = \mathcal{C}_\ell\}, \forall \ell \in [1, m]$

  $\Pi_m \leftarrow \pi$

$\Pi \leftarrow \{\Pi_k \mid |\Pi_k| > 1\}, \forall k$

return Π

Function `ccc`($\mathbf{x}$, $\mathbf{y}$, $k_{\max}$)**:**

Input:

$\mathbf{x}$: feature values on n objects

$\mathbf{y}$: feature values on n objects

$k_{\max}$: maximum number of clusters

Output:

c: correlation value for $\mathbf{x}$ and $\mathbf{y}$ ($c \in [0, 1]$)

$\Pi^{\mathbf{x}}$ = get_partitions($\mathbf{x}$, $k_{\max}$)

$\Pi^{\mathbf{y}}$ = get_partitions($\mathbf{y}$, $k_{\max}$)

$c \leftarrow \max\{\text{ARI}(\pi_j, \pi_l)\}, \forall \pi_j \in \Pi^{\mathbf{x}}, \pi_l \in \Pi^{\mathbf{y}}$

return $\max(c, 0)$