Input: A set $\{p_i = (p_i^1, \ldots, p_i^d)\}_{i\in[n]}$ of n categorical distributions belonging to the $(d-1)$-dimensional probability simplex Δ_{d-1}. T: The number of CCCP iterations

Output: An approximation ${}^{(T)}\bar{p}$ of the Jensen–Shannon centroid $\bar{p}$ minimizing $\frac{1}{n}\sum_{i=1}^{n} D_{\mathrm{JS}}(c, p_i)$

```
/* Convert the categorical distributions to their natural parameters by dropping
   the last coordinate                                                        */
```
$\theta_i^j = p_i^j$ for $j \in \{1, \ldots, d-1\}$;
```
/* Initialize the Jensen--Shannon centroid                                    */
```
$t \leftarrow 0$;

${}^{(0)}\bar{\theta} = \frac{1}{n}\sum_{i=1}\theta_i$;
```
/* Convert the initial natural parameter of the JS centroid to a categorical
   distribution                                                               */
```
${}^{(0)}\bar{p}^j = {}^{(0)}\bar{\theta}^j$ for $j \in \{1, \ldots, d-1\}$; ${}^{(0)}\bar{p}^d = 1 - \sum_{i=1}^{d} {}^{(0)}\bar{p}^j$;
```
/* Perform the ConCave-Convex Procedure (CCCP)                                */
```
while $t \leq T$ **do**

/* Use $\nabla F(\theta) = \left[\log \frac{\theta_i}{1-\sum_{j=1}^{D}\theta_j}\right]_i$ and $\nabla F^{-1}(\eta) = \frac{1}{1+\sum_{j=1}^{D}\exp(\eta_j)}[\exp(\eta_i)]_i$ */

${}^{(t+1)}\theta = (\nabla F)^{-1}\left(\frac{1}{n}\sum_i \nabla F\left(\frac{\theta_i + {}^{(t)}\theta}{2}\right)\right)$;

$t \leftarrow t+1$;

end
```
/* Convert back the natural parameter to the categorical distribution of the
   approximated Jensen-Shannon centroid                                       */
```
${}^{(T)}\bar{p}^j = {}^{(T)}\bar{\theta}^j$ for $j \in \{1, \ldots, d-1\}$; ${}^{(T)}\bar{p}^d = 1 - \sum_{i=1}^{d} {}^{(T)}\bar{p}^j$;

return ${}^{(T)}\bar{p}$;