

Below is pseudocode for the setup algorithm for the alias method adapted from *Non-Uniform Random Variate Generation* by Luc Devroye, available free from <http://luc.devroye.org/rnbookindex.html>.

Note that at least one entry of the  $\mathbf{J}$  table is left undefined even after the setup algorithm terminates, but any such undefined entries will always correspond to entries in  $\mathbf{q}$  that equal 1.

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**Algorithm 1** Setup algorithm for the alias method

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**Input:** discrete probability distribution  $\pi = (\pi_0, \dots, \pi_{K-1})$

**Output:** tables  $\mathbf{J} = (J_0, \dots, J_{K-1})$  and  $\mathbf{q} = (q_0, \dots, q_{K-1})$

**Postcondition:**  $\frac{1}{K} \left( q_i + \sum_{J_m=i} 1 - q_m \right) = p_i$  for all  $i = 0 \dots K - 1$

$S \leftarrow \emptyset$

$L \leftarrow \emptyset$

**for**  $i$  from 0 to  $K - 1$  **do**

$q_i \leftarrow K\pi_i$

**if**  $q_i < 1$  **then**

$S \leftarrow S \cup \{i\}$

**else**

$L \leftarrow L \cup \{i\}$

**end if**

**end for**

**while**  $S$  is not empty **do**

pick  $l \in L$  and  $s \in S$  arbitrarily

$J_s \leftarrow l$

$q_l \leftarrow q_l - (1 - q_s)$

$S \leftarrow S \setminus \{s\}$

**if**  $q_l < 1$  **then**

$L \leftarrow L \setminus \{l\}$

$S \leftarrow S \cup \{l\}$

**end if**

**end while**

**return**  $\mathbf{J}, \mathbf{q}$

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