

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.

Algorithm 1 Setup algorithm for the alias method

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: $\frac{1}{K} \left(q_i + \sum_{J_m=i} 1 - q_m \right) = \pi_i$ 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}
