Viterbi algorithm

Input: observations of length T, state-graph of length N
Output: best-path

for each state s from 1 to N do

$q[1, s] \leftarrow p(s|s_0) \cdot p(o_1|s)$

backpointers$[1, s] \leftarrow 0$

for each time step t from 2 to T do
    for each state s from 1 to N do

$$q[t, s] \leftarrow \max_{s'=1}^{N} q[t-1, s'] \cdot p(s|s') \cdot p(o_t|s)$$

backpointers $[t, s] \leftarrow \text{argmax}_{s'=1}^{N} q[t-1, s'] \cdot p(s|s')$

$s \leftarrow \text{argmax}_{s'=1}^{N} q[T, s']$

return the backtrace path from backpointers $[T, s]$