Algorithm 1 Algorithm for generate sequence based on HMM (Coding in Python)

```
l = the length of sequence that user want to generate

c1, c2, c3, c4 = probability (given by user) of generating A, T, C, G on Coding State
if c1 + c2 + c3 + c4 != 1.0 then
    Ask user to enter again
end if

n1, n2, n3, n4 = probability (given by user) of generating A, T, C, G on Non-Coding State
if n1 + n2 + n3 + n4 != 1.0 then
    Ask user to enter again
end if

t1, t2, t3, t4 = transition probability for Coding State and Noncoding State (Order: Coding to Coding,
Coding to Noncoding, Noncoding to Coding, Noncoding to Noncoding)
if t1 + t2 != 1.0 or t3 + t4 != 1.0 then
    Ask user to enter again
end if

curState = the initial state (either ’Coding’ or ’Noncoding’) given by the user
define global variable sequence = ”

for i from 0 to l
if curState = ’Noncoding’ then
    randomChar = the random character generated based on distribution of n1, n2, n3, n4
    sequence = sequence.append(randomChar)
    nextState = the random state generated based on distribution of t1, t2, t3, t4
    curState = nextState
else
    randomChar = the random character generated based on distribution of c1, c2, c3, c4
    sequence = sequence.append(randomChar)
    nextState = the random state generated based on distribution of t1, t2, t3, t4
    curState = nextState
end if

Output sequence
```

Algorithm 2: Circular Plasmid BLAST Algorithm (Language: R)

1. generate circular query sequence and liner database.

Using the random liner sequence generated from HMM model, we add head and tail to random sequence to get query circular sequence. We got five queries (length 10bp, 20bp, 50bp,100bp, 150bp). The database is liner random sequence which has fixed head for each circular query BLAST. A nbp (n=10bp, 20bp, 50bp, 100bp,150bp) query will roll on nine nbp databases.

2. First rolling at head base pair on query and first base pair on database.
3. Rolling BLAST at (head+1) base pair on query.
4. Rolling till (head+1) > n (n: length of query). (Record n scores for n^{th} rollings)
5. 2-4 steps on rest eight database. (Record n^{th} rolling and n^{th} database matrix)