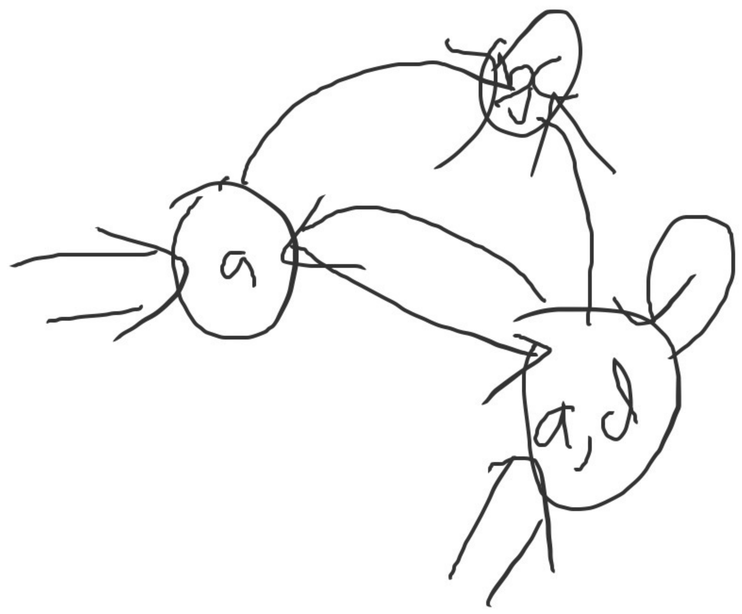
NFA



set of initial states
set of next states
set of output symbols

HMM

distribution
initial states b_i
distribution
next states a_{ij}
distribution
output symbols c_{jk}

NFA

language
set of strings

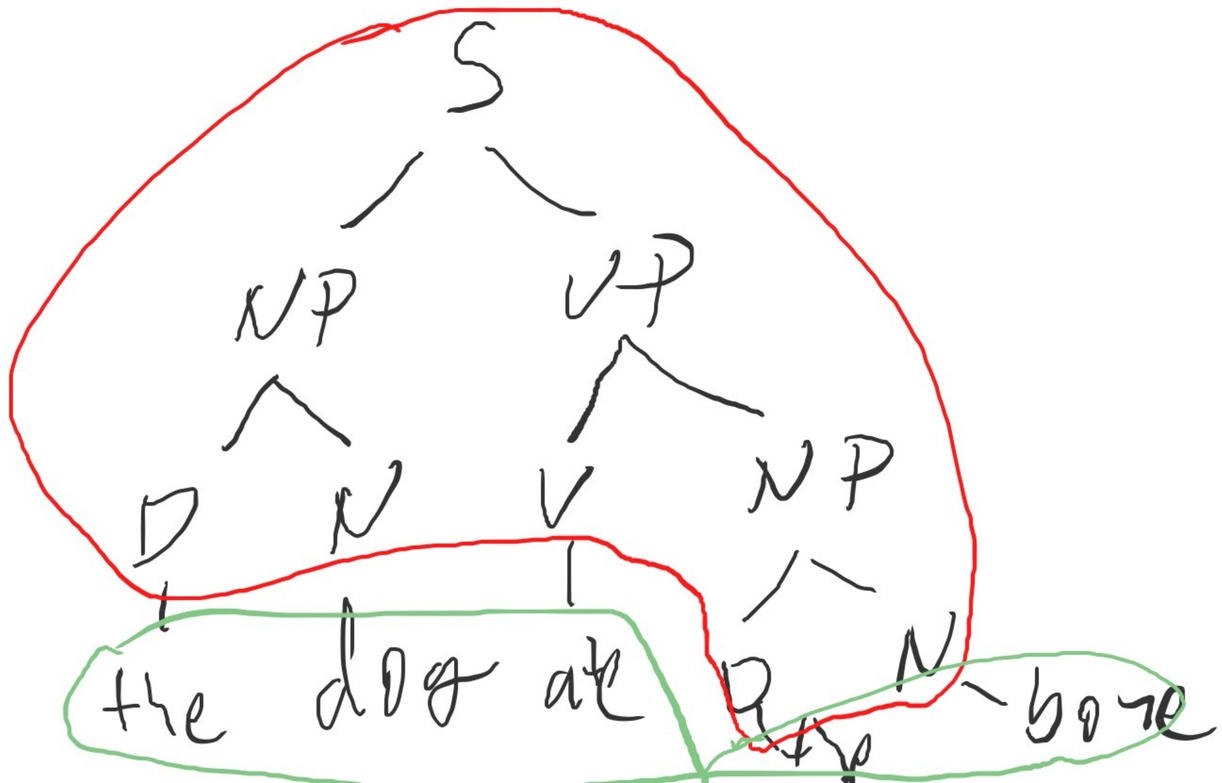
HMM

distribution over strings

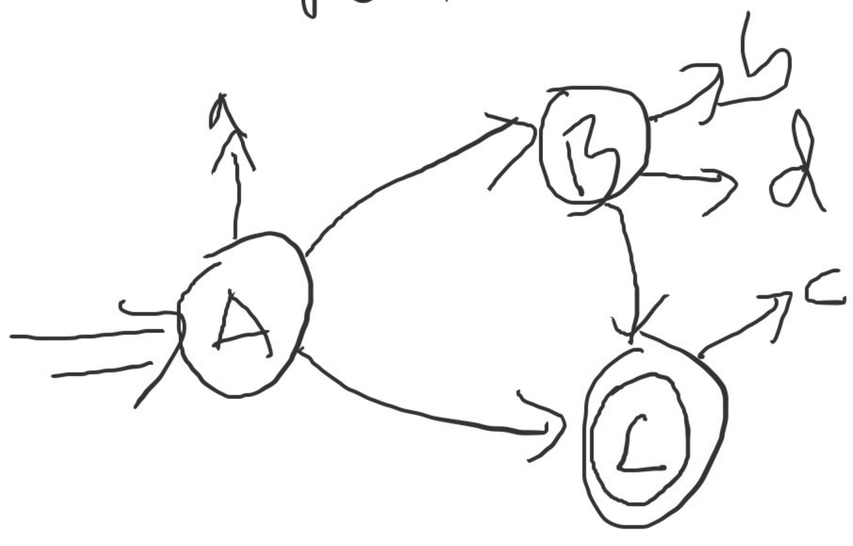
CFG CNF

$A \to BC$ nonterminals

$A \to a$ terminals



NFA



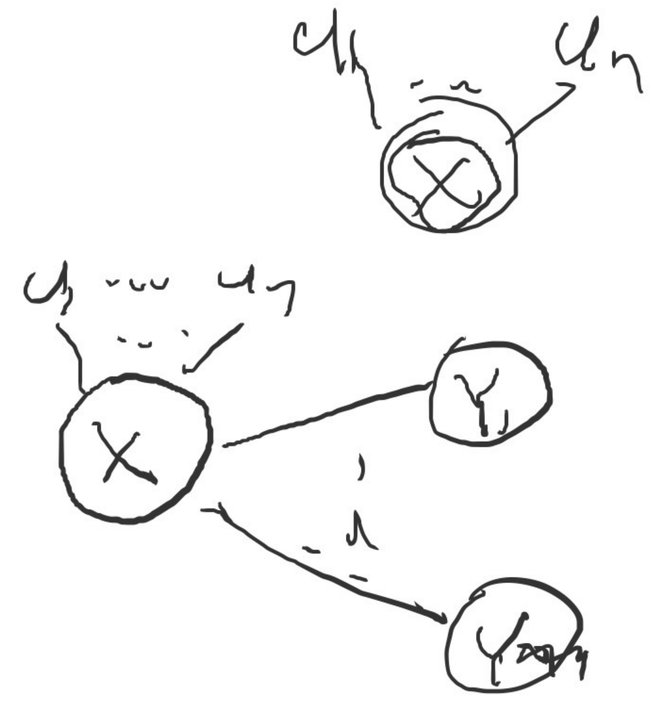
$A \to aB$

$A \to aC$

$B \to bC$

$B \to dC$

$C \to c$



$X \to u_i Y_j$

$X \to u_i$

$A \to aB$

$A \to a$

] regular grammar

$A \to BC$

$A \to a$

] CFG / CNF

NFA

generator

recognizer

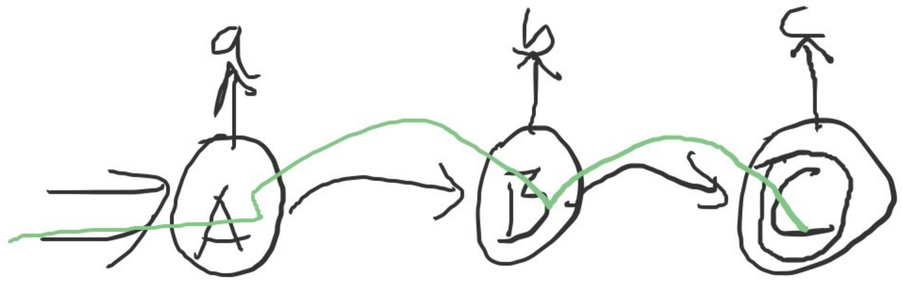
state sequence

CFG

generator

recognizer

parser



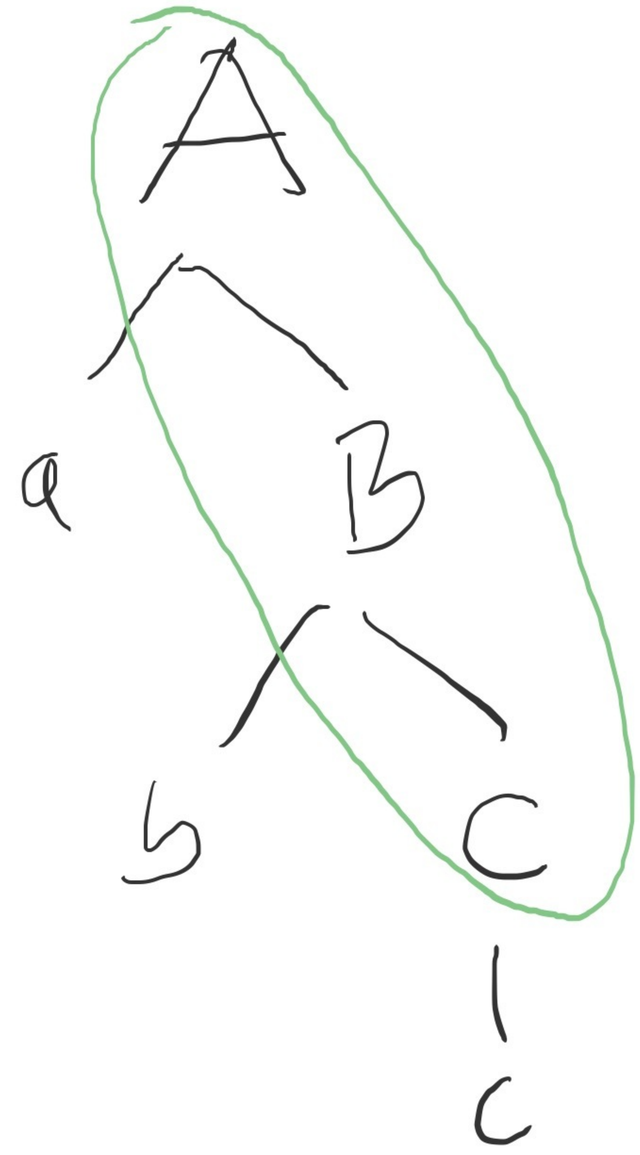
ABC

$A \rightarrow aB$

$B \rightarrow bC$

$C \rightarrow c$

abc



NFA

generator

recognizer

parser (CFG)

state sequence (NFA)

HMM

Sampling

likelihood estimation

Viterbi Algorithm

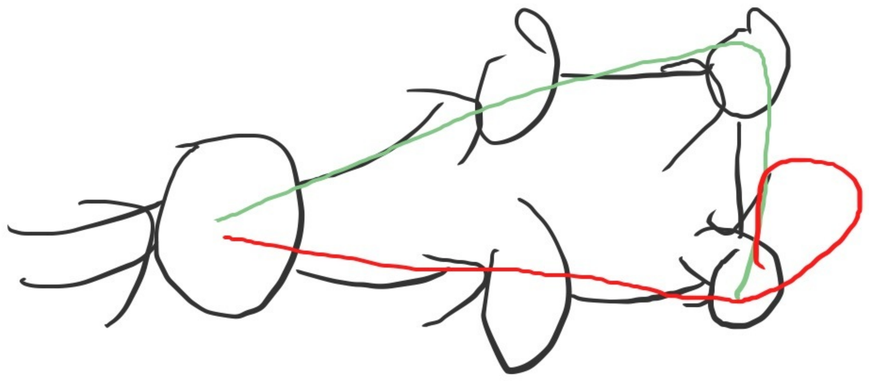
(MAP estimation)

maximum

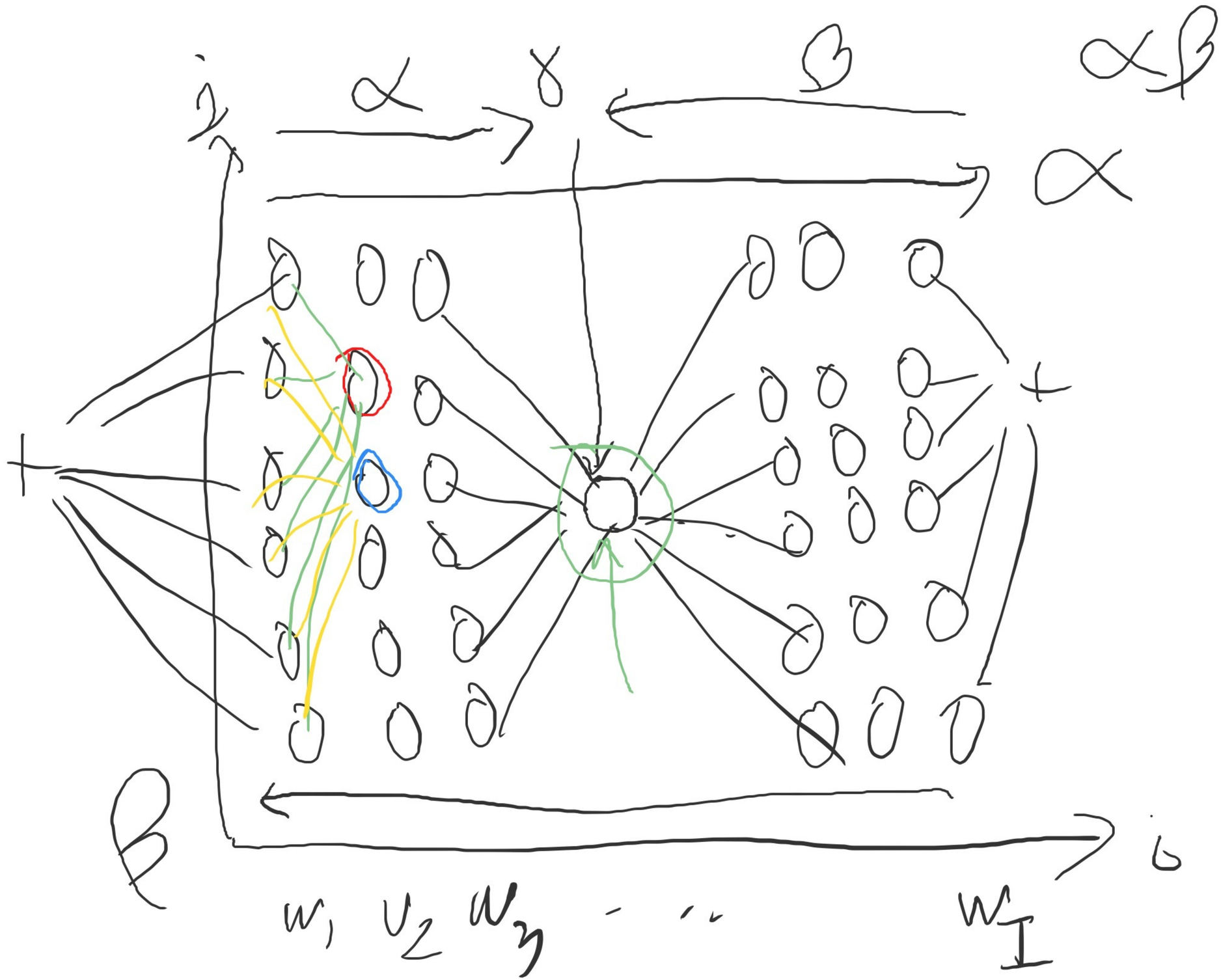
a posteriori

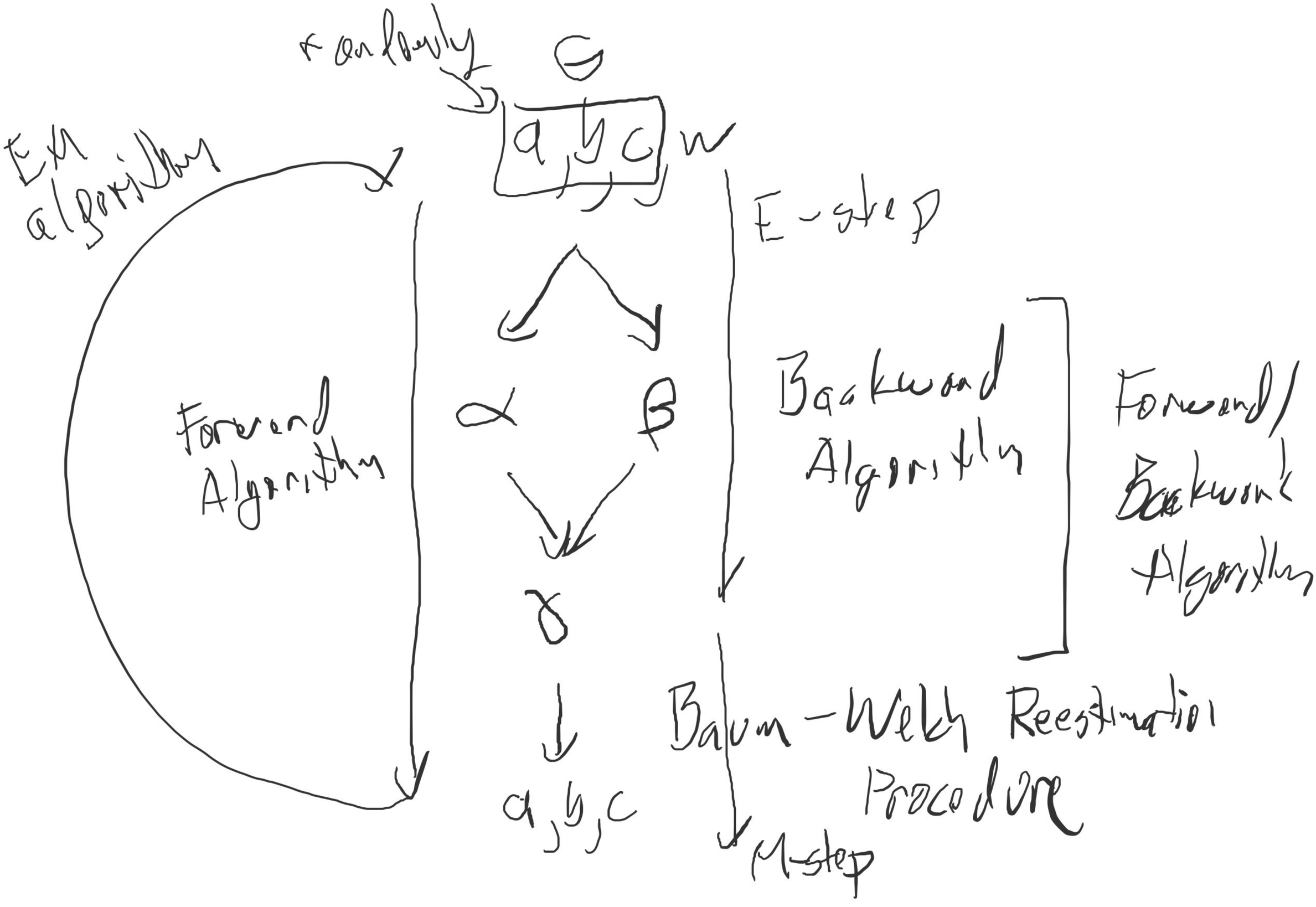
probability

Baum-Welch Reestimation



$w_1\ w_2\ w_3\ \ w_4$


α
γ
β
αβ
α
+
+
β
δ
w_1 w_2 w_3 . . .
w_I


random
EM algorithm
a, b, c
Forward Algorithm
α
β
γ
a, b, c
E-step
Backward Algorithm
Forward/ Backward Algorithm
Baum-Welch Reestimation Procedure
M-step