Question 1:

Baum-Welch algorithm is an example of

A) Forward-backward algorithm

B) Special case of the Expectation-maximisation algorithm

C) Both A and B

D) None

C)

Question 2:

Once a day (e.g. at noon), the weather is observed as one of state 1: rainy state 2: cloudy state 3: sunny The state transition probabilities are :

0.4	0.3	0.3
0.2	0.6	0.2
0.1	0.1	0.8

Given that the weather on day 1 (t = 1) is sunny (state 3), what is the probability that the weather for the next 7 days will be "sun-sun-rain-rain-sun-cloudy-sun"?

A) $1.54 * 10^{-4}$

B) $8.9 * 10^{-2}$

C) $7.1 * 10^{-7}$

D) $2.5 * 10^{-10}$

Question 3:

In the question 2, the expected number of consecutive days of sunny weather is:

A) 2

B) 3

C) 4

D) 5

Question 4:

You are building a model distribution for an infinite stream of word tokens. You know that the source of this stream has a vocabulary of size 1200. Out of these 1200 words you know of 200 words to be stop words each of which has a probability of 0.001. With only this knowledge what is the maximum possible entropy of the modelled distribution. (Use log base 10 for entropy calculation)

A) 2.079
B) 4.5084
C) 2.984
D) 3.0775

Question 5:

Suppose you have the input sentence "Sachin Tendulkar is a great player". And you know the possible tags each of the words in the sentence can take.

- Sachin: NN, NNS, NNP, NNPS
- Tendulkar: NN, NNS, NNP, NNPS
- is: VB
- a: DT
- great: ADJ
- player: NN, NNS, NNP

How many possible hidden state sequences are possible for the above sentence and States?

A) $4 \times 3 \times 3$
B) $4^{3^{\wedge}3}$
C) $2^4 \times 2^3 \times 2^3$
D) 3×4^2

4 X 4 X 3 last option

Question 6:

What are the space and time complexity order of the Viterbi algorithm? K is the number of states and N number of time steps.

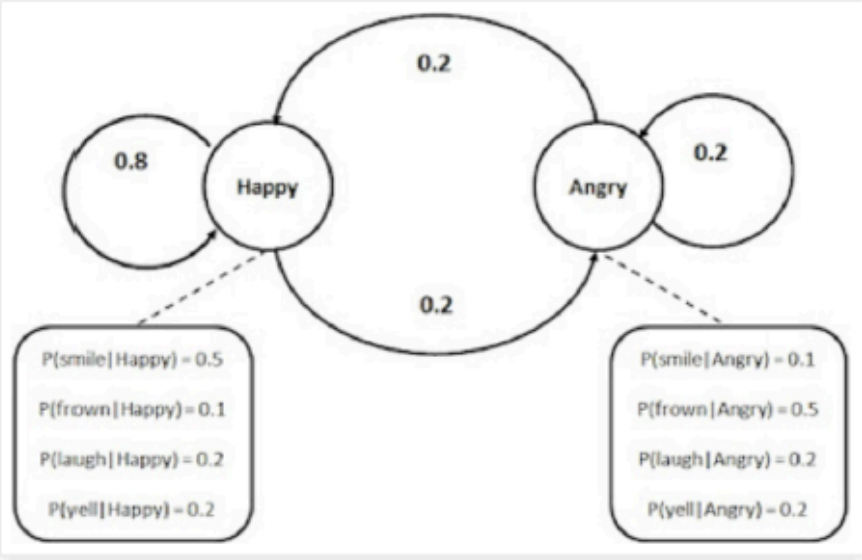
A) KN, K^2N
B) K^2N, KN
C) K^2N, K^2N
D) KN, KN

Viterbi algorithm? A)

Question 7:

Mr. X is happy someday and angry on other days. We can only observe when he smiles, frowns, laughs, or yells but not his actual emotional state. Let us start on day 1 in a happy state. There can be only one state transition per day. It can be either a happy state or an angry state. The HMM is shown below-

Assume that q_t is the state on day t and o_t is the observation on day t. Answer the following questions;



What is $P(o_2 = frown)$?

A) 0.56
B) 0.18
C) 0.03
D) 0.78