Machine Learning

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Discussion Set 12 | University of Southern California

# HMM-2

# Problem 1

Both GMM and HMM can be learned by applying the EM algorithm.

(A) True

(B) False

# Problem 2

Given a sequence of observations and a learned HMM, we can infer the real corresponding path of hidden states.

(A) True

(B) False

# Problem 3

Which of the following statements of hidden Markov model (HMM) is true?

(A) We can infer the backward message at time t from the backward message at time t + 1 using the backward algorithm.

(B) We can learn a HMM using the forward algorithm.

(C) We can infer the likelihood of two consecutive states at a given time using the Viterbi algorithm.

(D) None of the above.

# Problem 4

Which of the following is not a task for Hidden Markov Models?

(A) Compute the probability that the observations are generated by the model.

(B) Represent dependencies between hidden states.

(C) Compute the most likely state sequence in the model that produced the observations.

(D) Adjust parameters for prediction optimization.

# Problem 5

Suppose we observe a sequence of outcomes

$$O_1, \ldots, O_{t-1}, O_{t+1}, \ldots, O_T$$

with the outcome at time t missing ($2 \leq t \leq T - 1$). Derive the conditional probability of the state at time t being some s, that is,

$$P(X_t = s \mid O_{1:t-1}, O_{t+1:T})$$