Latent Variable Models and EM algorithm

5/5 points (100%)

Quiz, 5 questions

✔ Congratulations! You passed!

Next Item

✔ 1 / 1 points

1.
From the list below select Latent Variable Models (LVM) for which the proposed latent variable is suitable for the problem.

- [x] You measure coordinates of a plane with radar. Observed data is a noisy version of airplane coordinates. You introduce real, noise-free coordinates as latent variables.

Correct
For other examples of latent variable models see Applications and Examples module (week 2)

- [x] You want to perform dimensionality reduction. You observe some data and introduce the coordinates of your data points in the lower dimensional manifold as latent variables.

Correct
For other examples of latent variable models see Applications and Examples module (week 2)

- [x] You want to model your data with a mixture of Bernoulli distributions. You observed some data and introduce the index of the mixture component as the latent variable.

Correct
For other examples of latent variable models see Applications and Examples module (week 2)

- [x]

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You have a dataset with missing data. You declare the values that are present to be observed variables and missing positions to be latent variables.

Correct

For other examples of latent variable models see Applications and Examples module (week 2)

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1 / 1 points

2.

Suppose you are tracking an airplane and at each time step you observe a noisy version of its coordinates. Does it make sense to add latent variables in this model?

- [ ] No, we should not use latent variables here since coordinates at the next time step can be computed as the mean of previous coordinates.

Un-selected is correct

- [ ] Yes, it makes sense to add pilot's mood as a latent variable here.

Un-selected is correct

- [ ] Yes, it makes sense to add exact coordinates (without noise) as latent variables here.

Correct

$x = t + \epsilon,$

where x - noisy observation of coordinates, t - exact coordinates(latent variable) and ϵ is some noise.

- [ ] No, we should not use latent variables here since there is no way to meaningfully introduce them.

Un-selected is correct

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1 / 1 points

3.
Select real-world problems which can be modeled using Gaussian Mixture Model (GMM)

- [x] Amount of time till the next bus arrival

Un-selected is correct

- [x] Blood type distribution of people of different ethnicities

Un-selected is correct

- [x] Rainfall measurement within 4 different seasons

Correct
For each season rainfall measurement can be modeled using Gaussian distribution.

- [x] Height distribution of people of different ethnicities

Correct
For each ethnicity we can model height using Gaussian distribution.

1 / 1 points

4.
Choose reasonable criteriums for stopping EM iterations

- [x] Constraints of the original optimization problem (e.g. the prior probability weights in GMM should be non-negative and sum up to one) become satisfied

Un-selected is correct

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- [ ] Log-likelihood lower bound reached the predefined constant value

Un-selected is correct

- [ ] Log-likelihood lower bound stabilized (changed less than the predefines epsilon in the last iteration)

Correct

- [ ] Parameter values stabilized (changed less than the predefines epsilon in the last iteration)

Correct

✔ 1 / 1 points

5.
Select correct statements about Probabilistic Principle Component Analysis (PPCA)

- [ ] PPCA is a linear dimensionality reduction

Correct
Revise Probabilistic PCA video

- [ ] PPCA can be used to visialize multidimensional data

Correct
Revise Probabilistic PCA video

- [ ] After training the model we can sample new data from the resulting distribution

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Quiz, 5 questions

- [x] PPCA can be computationally more efficient than naive version of its deterministic analog (PCA)

Correct
Revise Probabilistic PCA video

Correct
Revise Probabilistic PCA video