

Question Paper

Exam Date & Time: 20-Mar-2024 (09:30 AM - 11:00 AM)



MANIPAL ACADEMY OF HIGHER EDUCATION

Machine Learning Principles and Applications [AML 5203]

Marks: 50

Duration: 90 mins.

Keep answers short and precise

Answer all the questions.

1) [CO1, L5] Say true or false and justify your answer: (10)

1. Naive Bayes classifier assumes that features are conditionally dependent given the class label.
2. Naive Bayes classifier is a discriminative model used for classification tasks.
3. Laplace smoothing is typically used in Naive Bayes classifiers to handle the issue of zero probabilities for unseen features.
4. Gaussian Naive Bayes is appropriate for datasets where the features are categorical or discrete.
5. Multinomial Naive Bayes classifier is suitable for text classification tasks where features represent counts or frequencies of words.

2) [CO2, L3] Apply Naive Bayes classifier to determine whether or not someone with excellent attendance, poor GPA, and lots of effort should be hired or not. (10)

Attendance	GPA	Effort	Hireable
Average	Poor	Lots	Yes
Poor	Average	Some	No
Average	Poor	Some	No
Excellent	Average	Lots	Yes
Excellent	Excellent	Lots	Yes
Poor	Excellent	Lots	No
Average	Excellent	Lots	No
Excellent	Poor	Some	No

3) [CO3, L2] (10)

1. Explain the concepts of Gaussian Naive Bayes and Multinomial Naive Bayes classifiers. Provide examples explaining when each classifier is commonly used.
2. What is Laplace smoothing and why is it performed? Explain the effect of the "alpha" parameter.

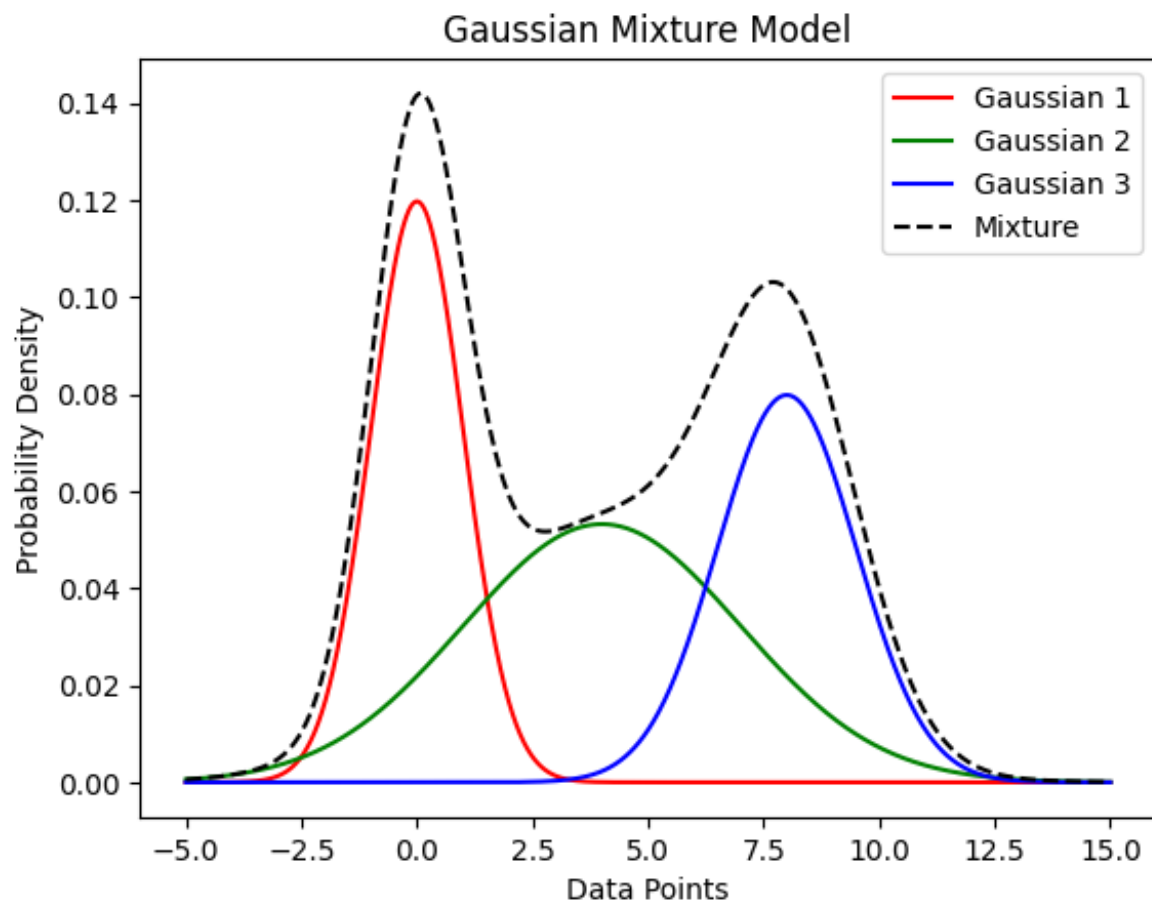
4) [CO3, L5] Say true or false and justify your answer: (10)

1. Gaussian Mixture Models assume that the data is generated from a single Gaussian distribution.
2. GMMs require the number of components (Gaussian distributions) to be decided in advance.
3. Every cluster in a GMM has its own covariance matrix, which allows for clusters to have different shapes and orientations.
4. GMMs are discriminative models hence can only be used for clustering tasks.

5. GMMs perform well with high-dimensional data without any modifications.

5) [CO2, L4] Analyze the diagram below and answer the following with brief justification:

(10)



1. Which gaussian has the most variance and least variance?
2. What will be the area under the mixture curve?

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