SNS COLLEGE OF TECHNOLOGY

Coimbatore – 35

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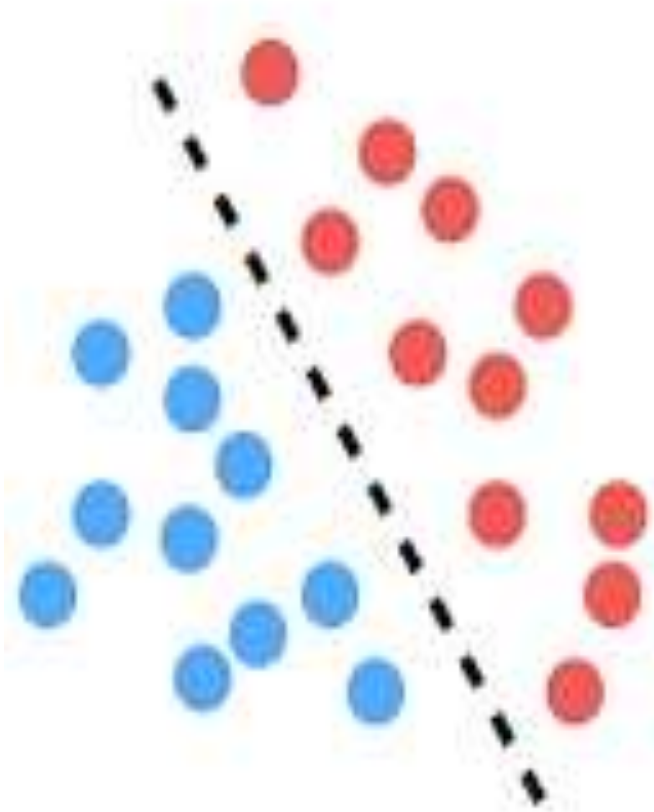
MACHINE LEARNING

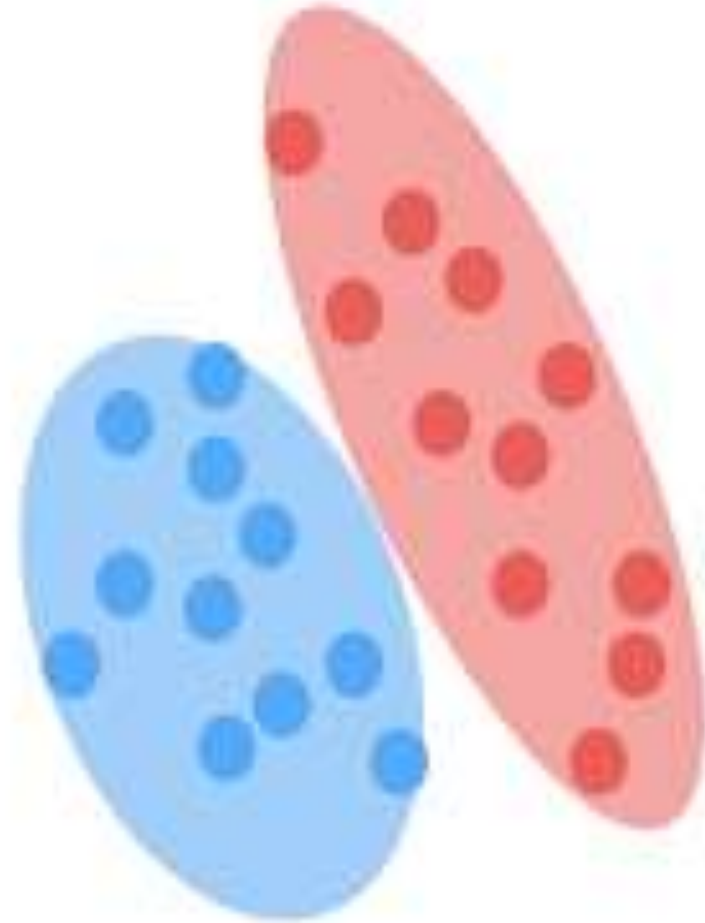## Probabilistic generative and discriminative model

Introduction to machine learning /Rajarajeswari.S/AP/AIML/SNSCT

Discriminative | Generative

Generative model

- The mathematics of generative model

- Training generative classifiers involves estimating a function f:x –y pr probability p(x\y):

- Assume dome functional from the probabilites such as p(y),p(x|y)

- With the help of training data ,we estimate the parameters of p(x|y),p(y)

- Use the bayes theorem to calculate the posterior probability p(y|x)

Discriminative model

- The mathematics of discriminative models :

- Training discriminative classifiers or discriminant analysis involves estimating f:x-y,orprobability p(y|x)

- Assume some functional from for the probability such as p(y|x)

- With the help of training data we estimate the parameters of p(y|x)

Generative model

- Generative model are those that center on the distribution of the classes with in the data set . The machine learning algorithms typically model the distribution of the data points .

- generative models rely on finding of joint probability creating points where a given input feature and desired output/label exist concurrently

- Generative models are typically employed to estimate probabilities and likelihood ,modeling data points and discrimination between classes based on these probabilities .Because the models learns the probabilities for the dataset ,it can refer to the probability distribution to generate new dataset

- Generative model often rely on the bayes theorem to find the joint probability ,finding p(x,y).Essentially ,generate models how the data was generated answer the following question :

- "what the likelihood that the class or another class generate this data point/instance?"

- Ex of generative machine learning model including linear discriminant analysis (LdA),HIDDEN MARKOV models, and Bayesian network like naive bayes

Discriminative models

- While generative models learn about the diistribution of the data set ,discriminative models learn about the boundary between classes within the dataset .

- with a discriminative model , the goal is identify the decision boundary between classes to apply reliable class label to data instance .

- Discriminative model separate the classes in the dataset by using conditional probability not making any assumptions about individual data points .

- Discriminative model set out to answer the following question

- "what side of the decision boundary is the instance found in"?

- Ex of discriminative models in machine learning include support vector machines decision tress, and random forests .

Generative models:

- Generative models aims to capture the actual distribution of the classes in the dataset .

- Generative model predict the joint probability distribution –p(x,y)- utilizing bayes theorem.

- Generative modes are computationally expensive compared to discriminative model.

- Generative model are useful for unsupervised machine learning tasks .

- Generative models are impacted by the presences of outliers more than discriminative models

Discriminative model

- Discriminative models model the decision boundary for the data set classes.

- Discriminative model learns the conditional probability-$p(y|x)$

- Discriminative model are computationally cheap compared to generative model

- Discriminative model are useful for supervised machine learning task

- Discriminative models have the advantage of being more robust to outliers, unlike the generative model.

- Its more robust to outliers compared to generative model