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PREDICTIVE MODELING- WEEK-3

LEARNING OBJECTIVE OF THIS MODULE

- Linear Regression

- Logistic Regression

- Linear Discriminant Analysis

LEARNING OBJECTIVES OF THIS SESSION
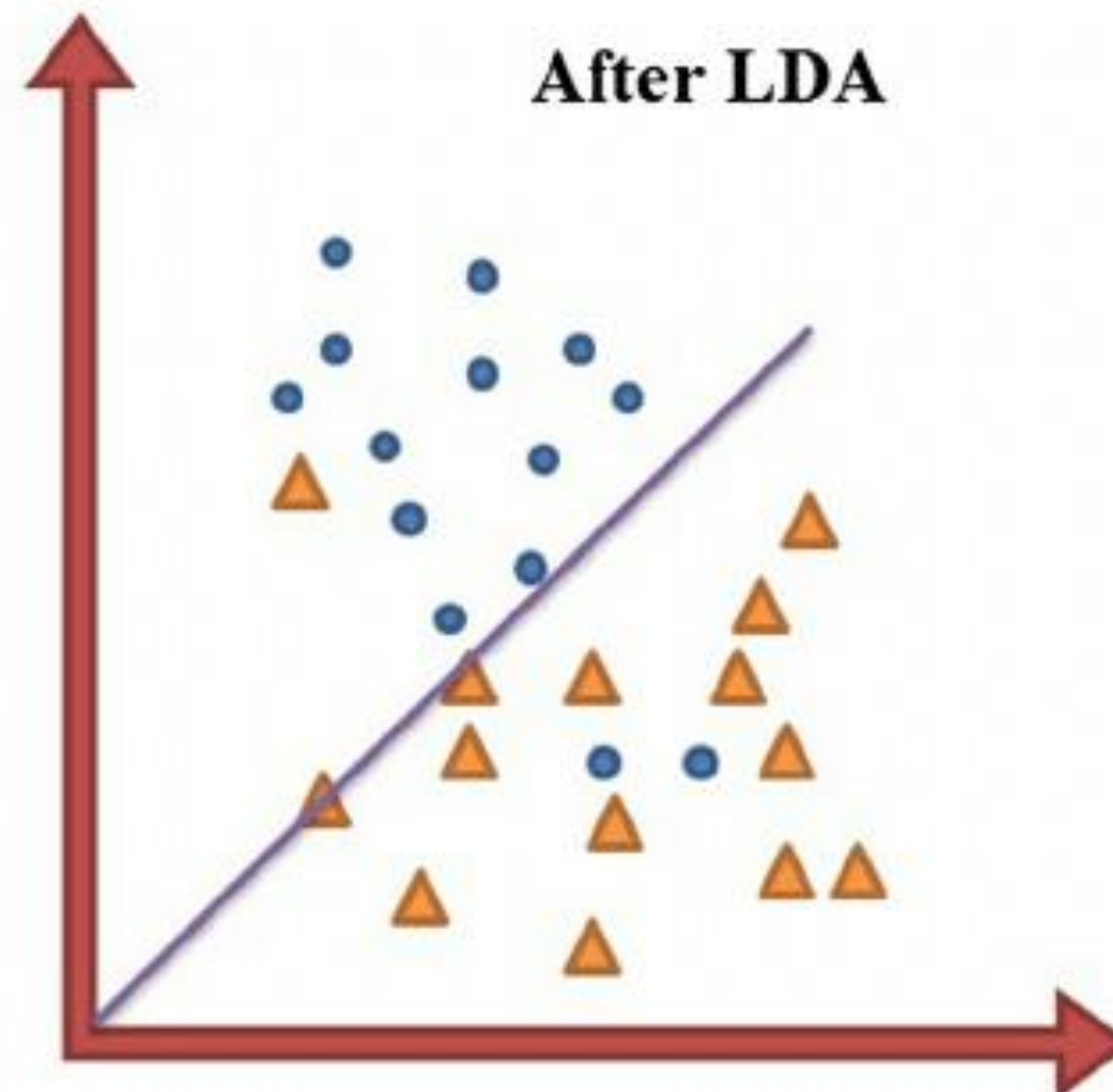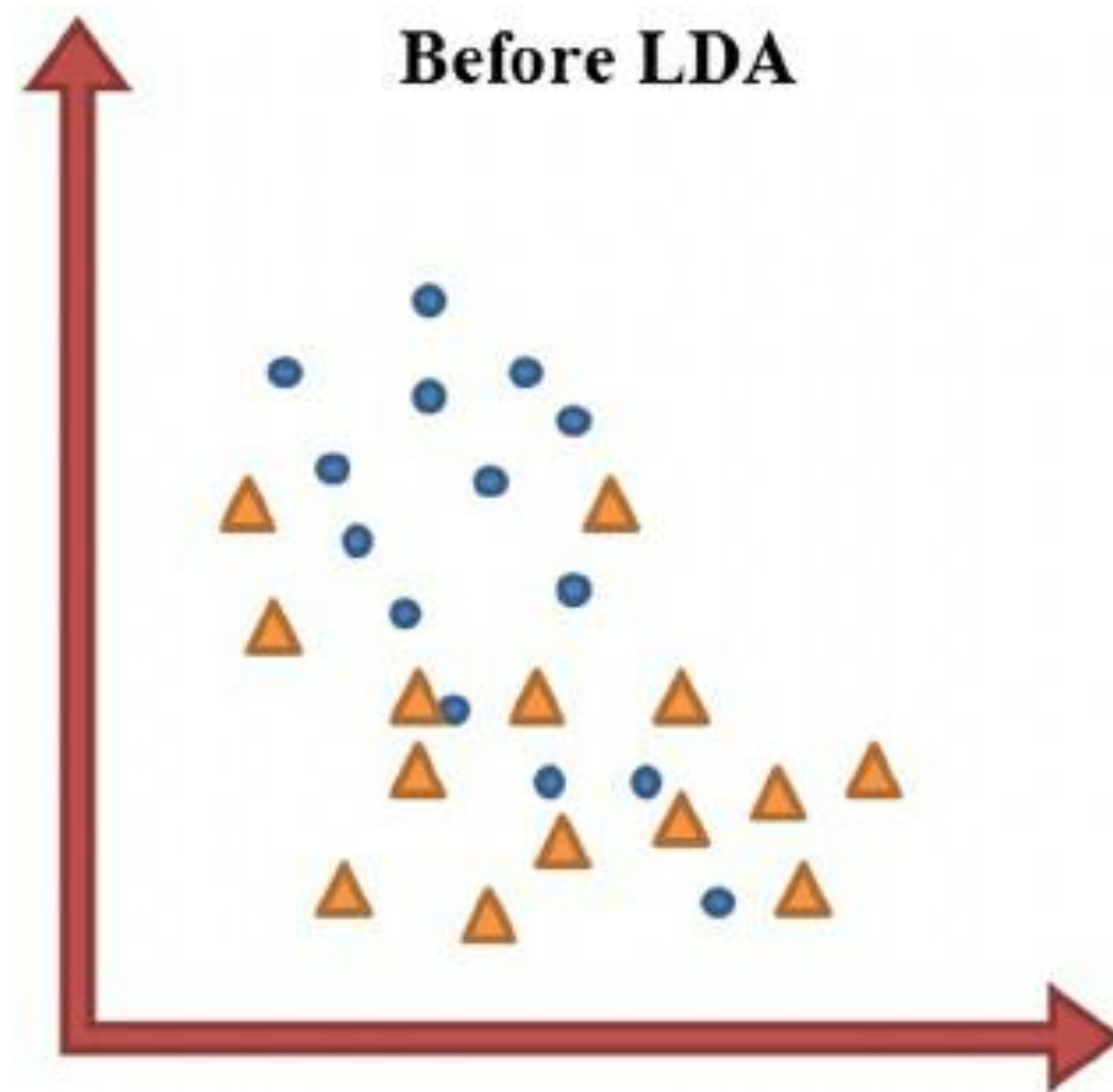
- How a Linear Discriminant Analysis uses Bayes' rule to make predictions?

- Changing custom cut-off probability values to get optimum predictions

TRY ANSWERING THE FOLLOWING

- Linear Discriminant Analysis uses a version or form of Bayes' rule for computing the posterior probabilities. True or False? – Discuss.

- Name two types of Discriminant Analysis.
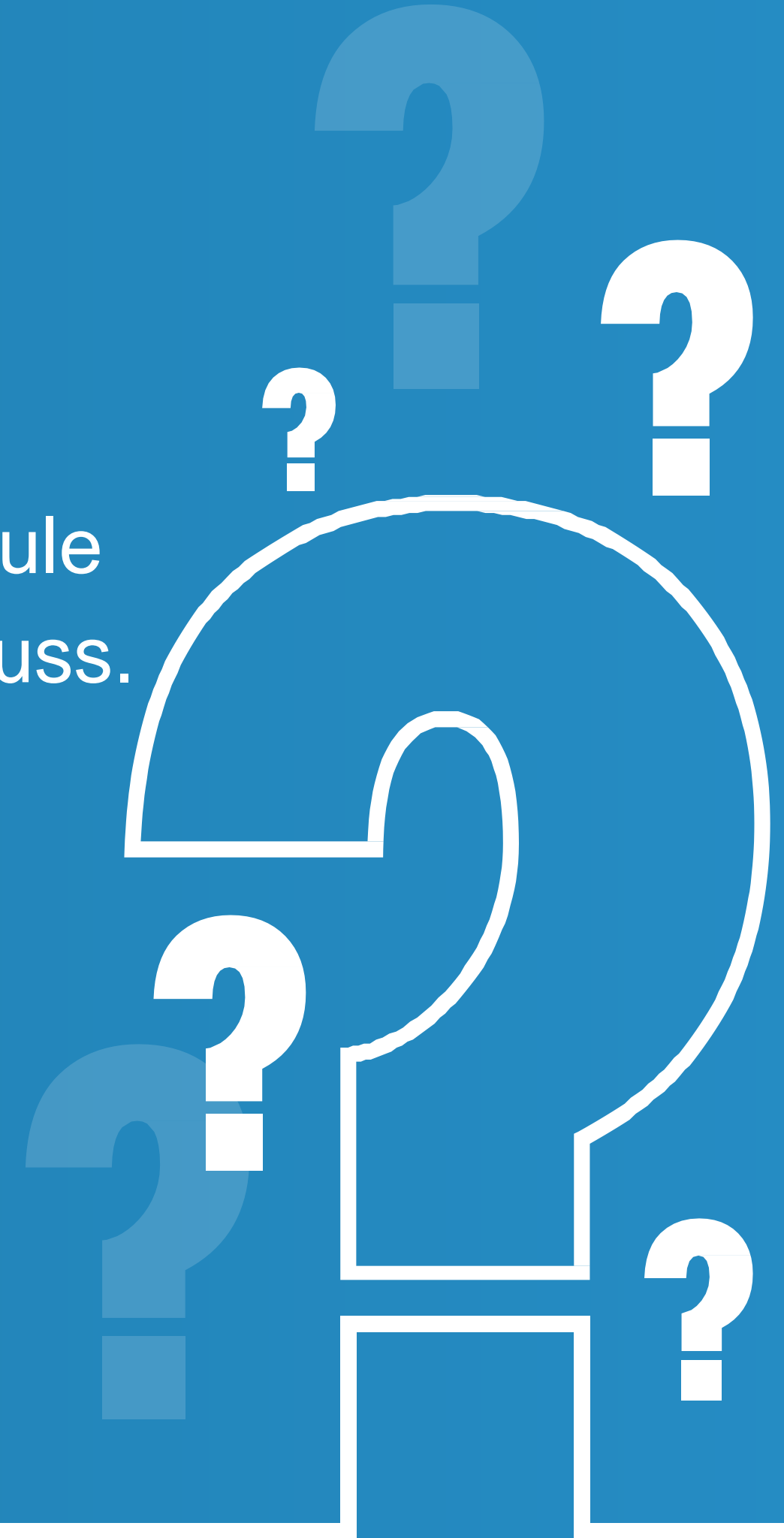
BROAD OVERVIEW

BROAD OVERVIEW – Usage of Bayes' Rule for Prediction

Linear Discriminant Analysis (LDA) takes the help of prior probabilities to predict the corresponding target probabilities. Prior probabilities is the probability of y (say equal to 1) without taking into account any other data or variables.

The corresponding updated probabilities when the covariates (Xs) are available is called the posterior probabilities.

We want to find P(Y=1|X).

Thus, a Linear Discriminant Analysis (LDA) discriminates between the two classes by looking at the features (Xs)

Custom Probability Cut-off for predicting the Target Variable

A lot of software programs have default cut-off values for predicting the target classes from the probability outputs for different algorithms. Sometimes, it might be necessary to change the default probability cut-off values for class predictions keeping in mind the desired model evaluation parameters like accuracy, precision, recall etc.

Industry Application - LDA helps when the decision isn't binary

Many a times the decision to be made is not limited to two choices e.g. we may be working on computer vision where there are many different object classes to be identified in a given image e.g. children, cars, traffic signals, other vehicles etc. Essentially this is a multiclass classification problem.

Likewise in computerized face recognition, each face image is represented by a large number of pixel values. Linear Discriminant Analysis (LDA) has been successfully applied to face recognition which is based on a linear projection from the image space to a low dimensional space by maximizing the between class scatter and minimizing the within-class scatter. LDA allows objective evaluation of the significance of visual information in different features of the face for identifying the human face.

Reference:https://ieeexplore.ieee.org/document/5256630

More Industry Application of LDA

Identification- To identify type of customers that is likely to buy certain product in a store. Using simple questionnaires survey, we can get the features of customers. Discriminant analysis will help us to select which features can describe the group membership of buy or not buy the product.

Decision Making- Doctor diagnosing illness may be seen as which disease the patient has. However, we can transform this problem into classification problem by assigning the patient to a number of possible groups of disease based on the observation on the symptoms.

Pattern Recognition- For Autonomous Cars, to distinguish pedestrian from vehicles and animals using captured image sequence is a classification problem

CASE STUDY

Customer Churn is a burning problem for Telecom companies. Almost every telecom company pays a premium to get a customer on-board. Customer churn is a directly impacts company's revenue.

In this case-study, we simulate one such case of customer churn where we work on a data of post-paid customers with a contract. The data has information about customer usage behaviour, contract details, and payment details. The data also indicates which were the customers who cancelled their service.

Based on this past data, Perform an EDA and build a model which can predict whether a customer will cancel their service in the future or not.

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ANY QUESTIONS

HAPPY LEARNING