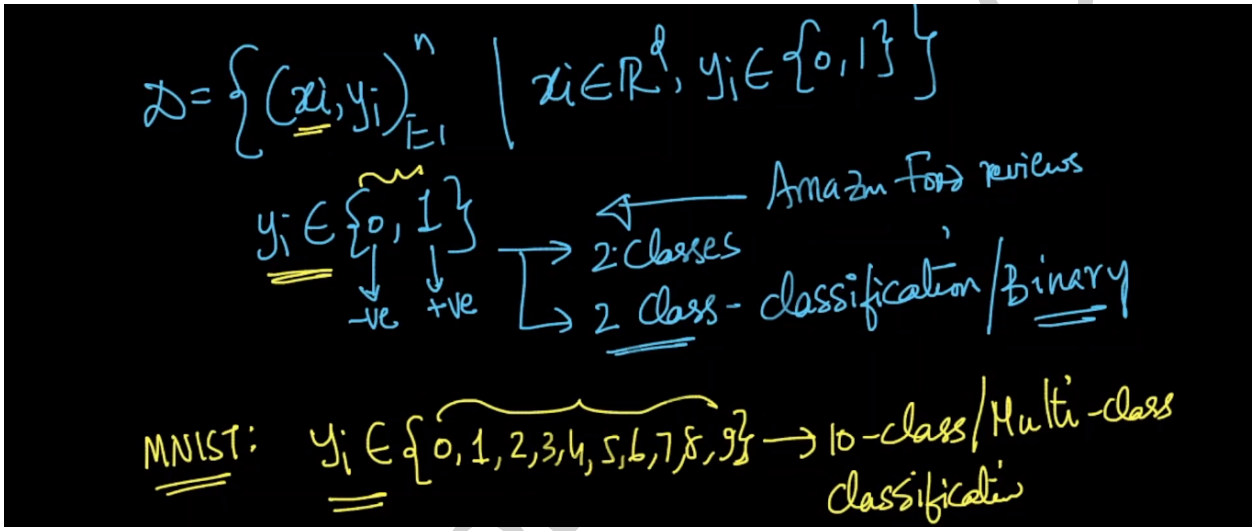
29.3 Classification vs Regression

Classification - Definition

Classification is the problem of identifying to which of a set of categories a new observation belongs to, on the basis of a training set of data containing observations whose category is already known.

Classification deals with predicting a qualitative (or) categorical response.

Below are the examples of Classification problems that were discussed starting from the timestamp 0.03.



In the dataset of Amazon Fine Food Reviews, the class labels are 0 and 1. If any query point is given, its label would be either 0 or 1. As it has only 2 classes, such a classification problem is called a **binary classification** problem.

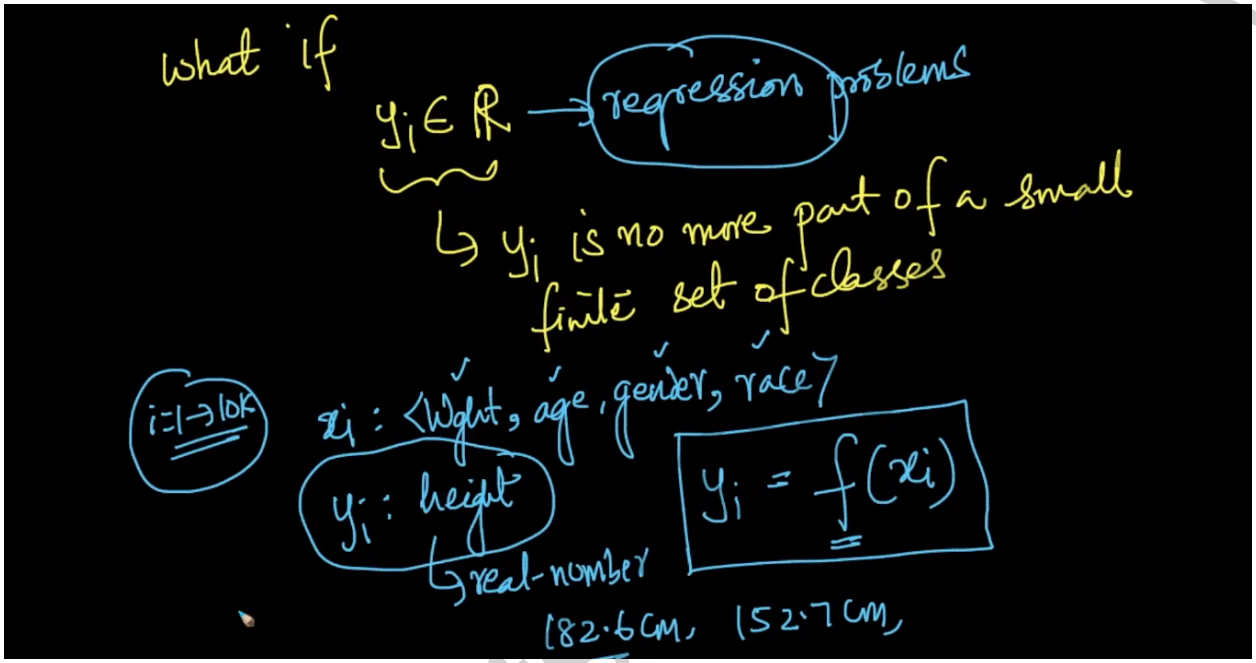
Similarly in the MNIST dataset, the class labels are the numbers from 0 to 9. If any query point is given, its label would be any one value from 0 to 9. As it has only 10 classes, such a classification problem is called a **10-class classification** problem (or) **multi-class classification** problem.

In both the examples mentioned above, the output class label comes from a finite set of values. Hence we call the problem of predicting such an output, a classification problem.

Regression - Definition

Regression is the problem of predicting a value for a new observation, on the basis of a functional relationship between two variables and on the basis of the training set of data containing observations whose value is already known.

Regression deals with predicting a quantitative (or) numerical response.



In the above example, we are predicting the height of an individual. The height value doesn't come from a finite set of values, but it comes from an infinite set of numerical values. As the output comes from an infinite set of numerical values, we call this problem a Regression problem.

Note: As the output of a regression problem comes from an infinite set of numerical values, we denote it as $\mathbf{y_i \in R}$.