

The X matrix, the y vector, what are the samples, and the classes, define a set of features, define the dimensions of X and y and indicate what they mean.

Q1. A classification model for the detection of electric vehicles while on the road.

X Matrix:

Sample size: the percentage of electric cars in the United States is approximately 6%. So, to classify at least 100 cars as electric vehicle we need a sample size of 1667.

Features: (10) vehicle license plate, brand name, model name, vehicle exhaust sound, vehicle shape, vehicle lights, features, driver posture, hand position, and fuel intake location picture.

Y Matrix:

Sample Size: remains the same as X Matrix. i.e. 1667.

Output: Binary Result(1/0) => Electric Vehicle and Not Electric Vehicle

Sample: Vehicles on the road.

Classes: 2(Electric, Not-Electric)

X-Dimensions: [1667, 10]

y-Dimensions: [1667, 1]

Q2. A model for predicting the age and breed of pets in a veterinary clinic.

X Matrix:

Sample Size: The average count of pets coming to the vet is somewhere around 40 each day. The types of animals which go to the vet are dogs, cats, birds, and small mammals. To have a rough estimate for each type of animal at least 3 days i.e. 120 samples are required.

Features: (15) body size, hair size, x-ray, face shape, number of legs, ear shape, ear size, wings or not?, jaw structure, mouth size, tail shape, tail size, nail size, paw shape, voice.

Y Matrix:

Sample Size: 120 Animals

Output: Age - Range[0,500], Breed - Set{Husky Dog, Alaskan Dog, Arabian Cat, White Pigeon etc.}

Sample: Animals/Pets

Classes: The output for age is more of a regression rather than a classification, while Breeds can be classified based on their features.

X-Dimensions: [120, 15]

Y-Dimensions: [120, 2]

Q3. A model that identifies if a patient in the ER is having a stroke.

X Matrix:

Sample Size: The probability of a patient coming with a stroke is 12.5% in the US. To classify at least 100 patients with stroke, we need a sample size of 800 patients.

Features: (10) numbness, confusion, vision, balance, headache, breath rate, heart rate, Electrocardiogram, blood pressure, medication history

Y Matrix:

Sample Size: 800 sample patients.

Output: Binary(0/1) => Having a stroke and not having a stroke

Sample: Patients of the ER

Classes: 2 (Stroke, Not Stroke)

X-Dimensions: [800,10]

Y-Dimensions: [800,1]