Hypothesis space

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Here are some examples of binary classification, multi-class classification and regression tasks.

1 Binary classification tasks

Examples of binary classification tasks can be all those that are related to say if something belongs to a category or if not, for instance we can take a task where we have to classify if given an image of a fruit, that fruit is a peach or not. In this case we will assign the value $+1$, if in the image there is a peach, or -1 if there isn't. Another significant example can be the spam detection, where we have to classify if an email is spam or not.

As a hypothesis space, in this case, we can consider hyperplanes in R^2, circles, rectangles and D2 forms, where points inside that specific form are classified in a way and points outside in another way.

2 Multi-class classification tasks

As regarding multi-class classification tasks, we can take as an example the classification of animals in an image or, to be more specific, the exact species of each animal. Furthermore, we can think about weather forecasts and the classification of what kind of day is, so through some data about humidity, wind and temperature, the task is to classify if it's going to be a rainy, sunny or cloudy day.

One possible hypothesis space for multi-class classification tasks could be hyperplanes in R^k, where k is the number of classes that can be used during the classification problem.

3 Regression tasks

To stick with the weather forecast example, a possible regression task could be the prediction of how much humidity there will be a day in the future given a certain wind speed, by analyzing old data on wind speed in relation to humidity.

The hypothesis space for regression tasks depends on the type of regression that you are going to use, because for linear regression it's limited to linear function and for polynomial regression it's limited to all possible polynomial functions of degree K (degree that you have chosen).