CIS 678 – Machine Learning

Predictive modeling: Classification

Regression vs Classification

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  - **Character recognition (10 classes)**
  - Yes/No (or Binary) questions:
    - Accept/reject loan application
    - Positive vs negative sentiment
  - Dog vs cat (2 classes), still binary class

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- Regression examples:
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- We have learned about regression (not complete yet; will continue ..)

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- We will start our classification predictive modeling journey today

Classification

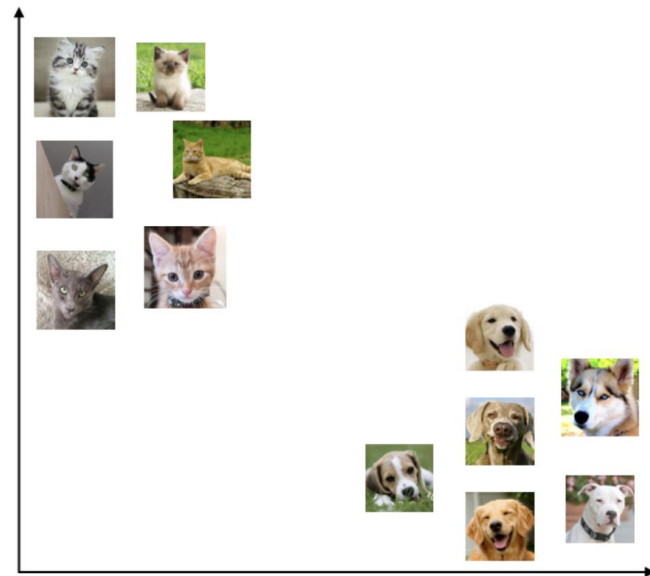- Here we are seeing some examples of **Dog** and **Cat** images
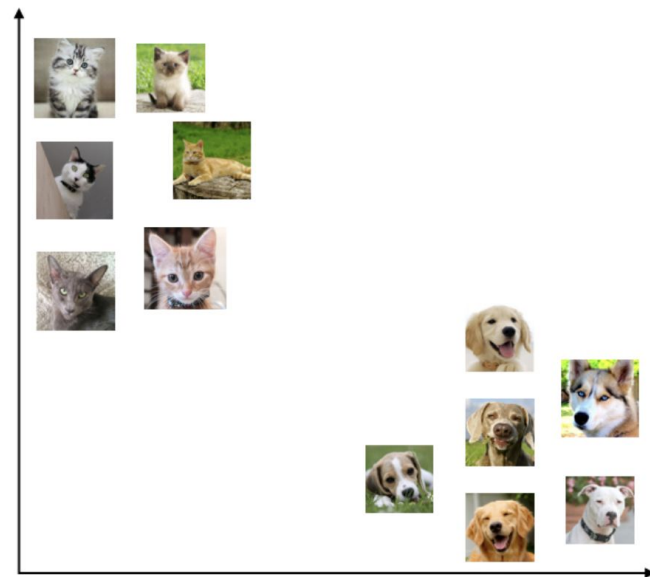
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- Here we are seeing some examples of **Dog** and **Cat** images
- **Both animals have features such as size, color, weight, etc.**
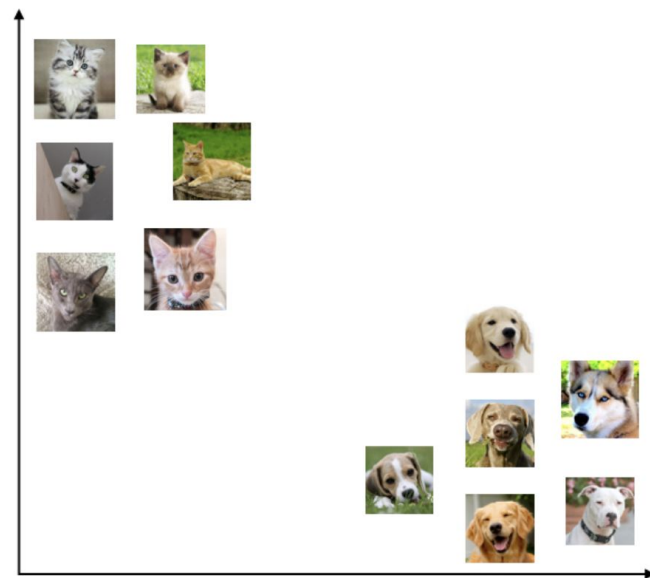
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Classification

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- Both animals have features such as size, color, weight, etc.
- We are just plotting their images on 2D plane for easy understanding.
- We can separate the instances by simply using a liner straight line (**a linear classifier**):
  - On left top we have **Cats**
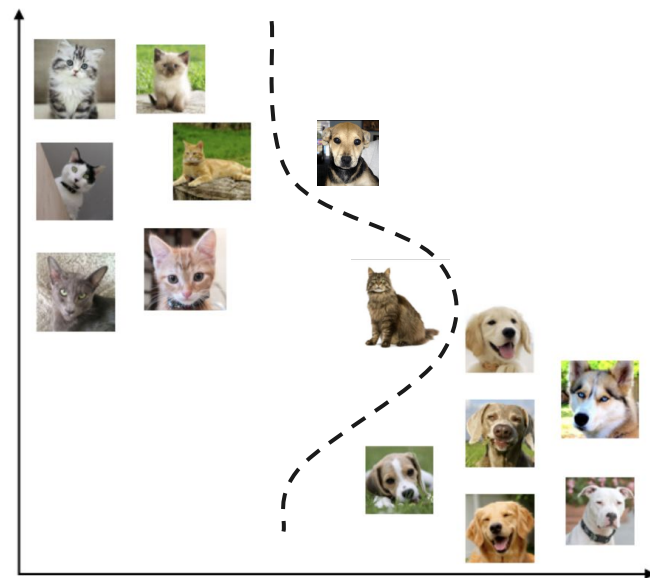 - And right bottom we have **Dogs**
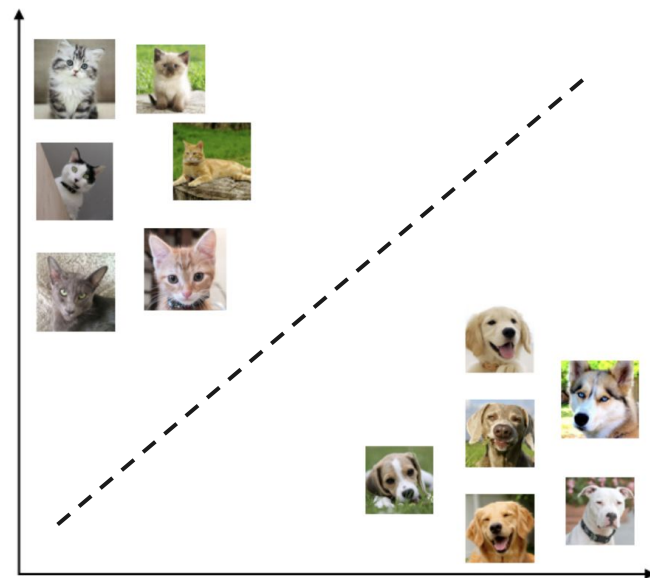
Classification

- **A simple Linear (2D) classifier doesn't work for this setup**
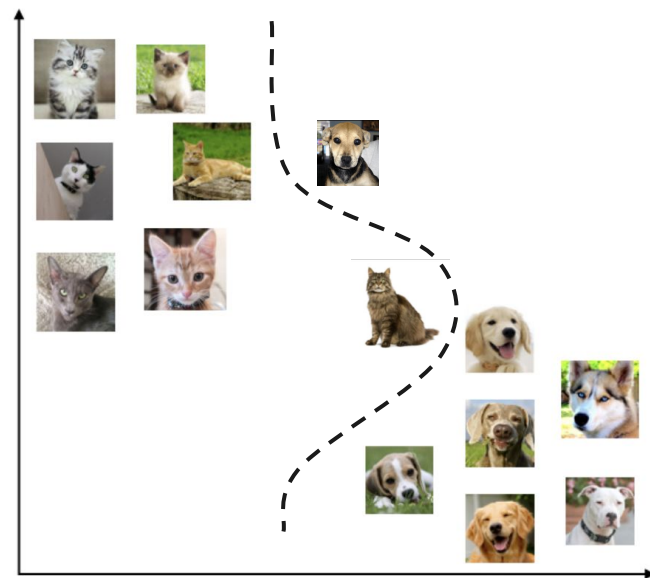
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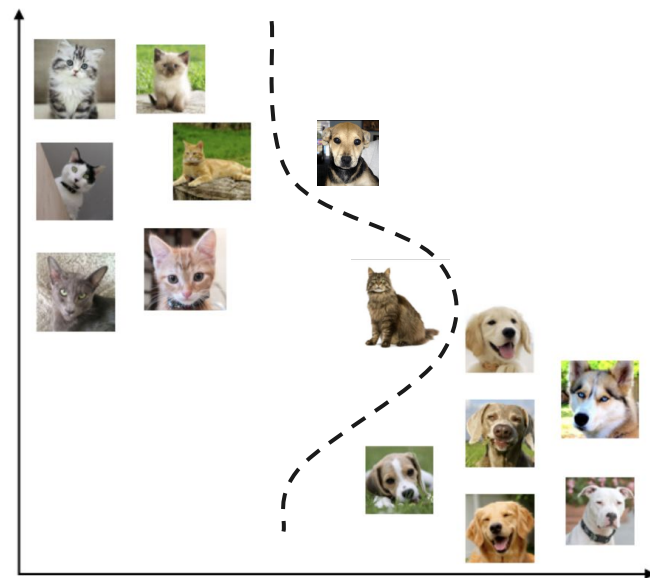 - Chose a non-linear classifier

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Classification Models

- Logistic Regression
- Random Forest Classifier
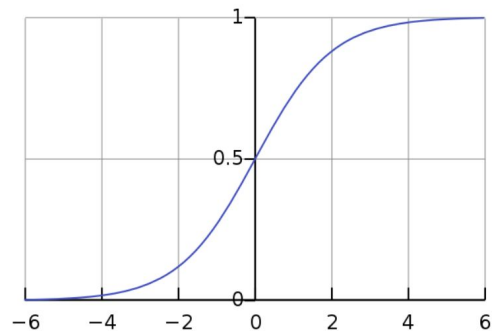- Support Vector Machines (SVMs)
- Boosting Classifiers
- Naive Bayes
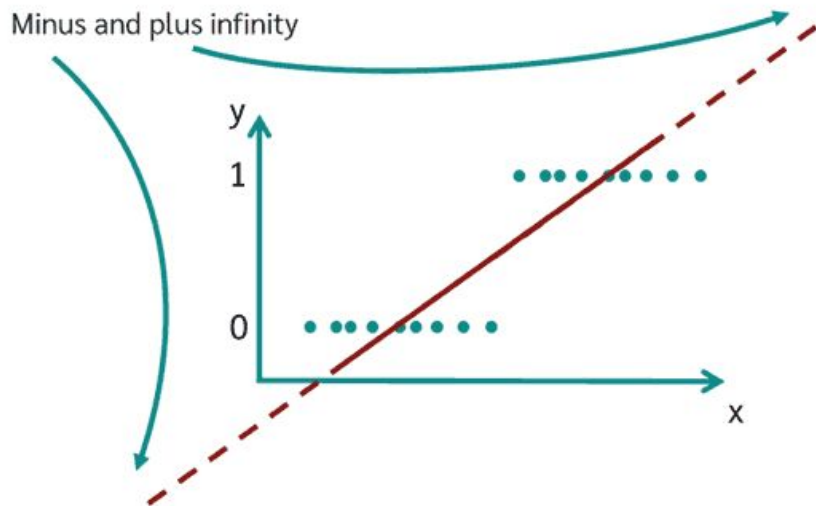
Logistic Regression

- Probabilistic classifier

    [Sigmoid function characteristic](#)
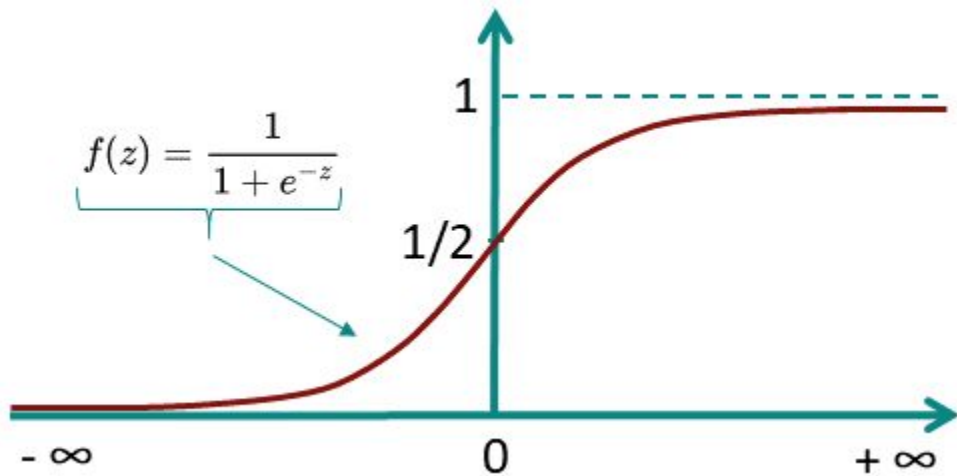
$$p(x) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x)}}$$

- Sigmoid function

Logistic Regression

Logistic Regression

$$f(z) = \frac{1}{1 + e^{-z}}$$

src

Logistic Regression