CIS 635 Knowledge Discovery & Data Mining

Predictive modeling: Classification

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  - **Character recognition (10 classes)**
  - Yes/No (or Binary) questions:
    - Accept/reject loan application
    - Positive vs negative sentiment
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- Regression examples:
  - Diabetes scores
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- We have learned about regression (not complete yet; will continue ..)

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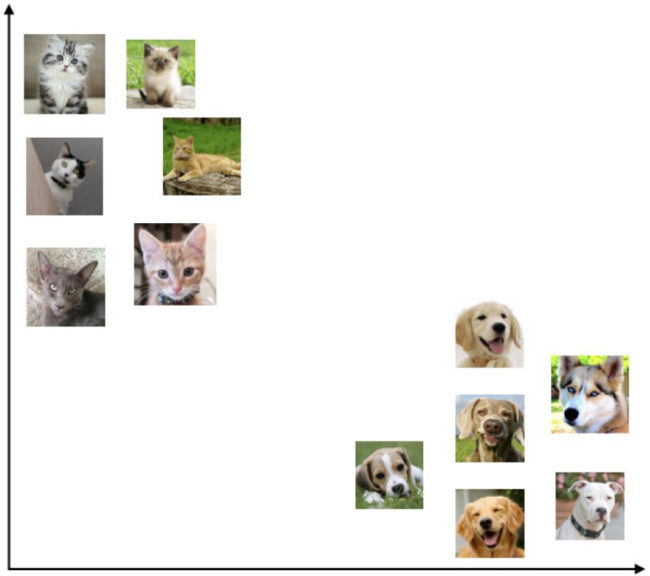
- We will start our classification predictive modeling journey today

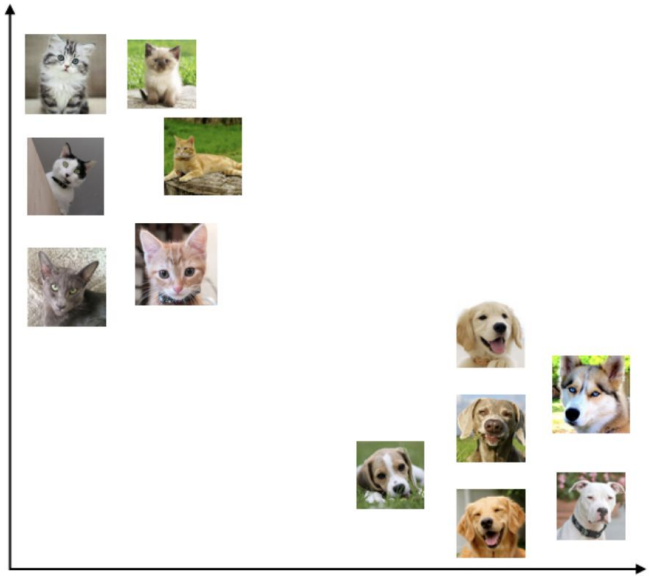
Classification

- Here we are seeing some examples of **Dog** and **Cat** images



Classification

- 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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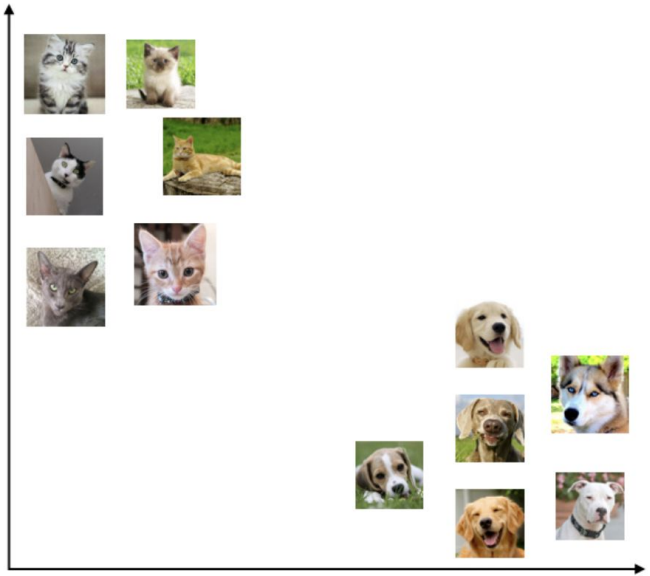

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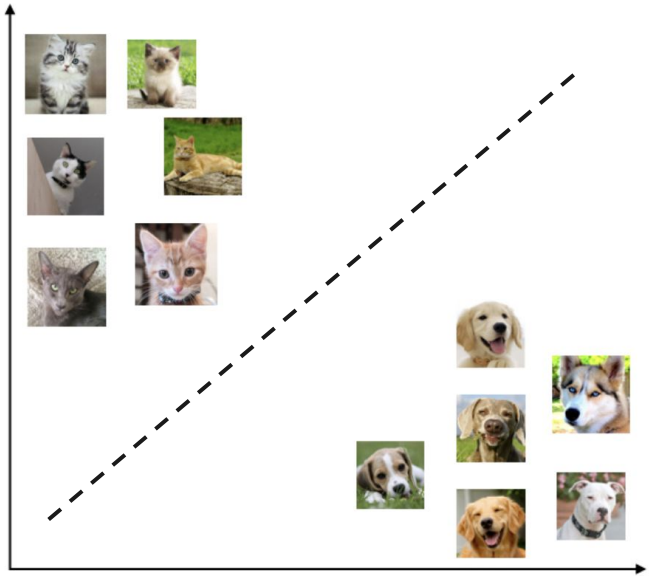
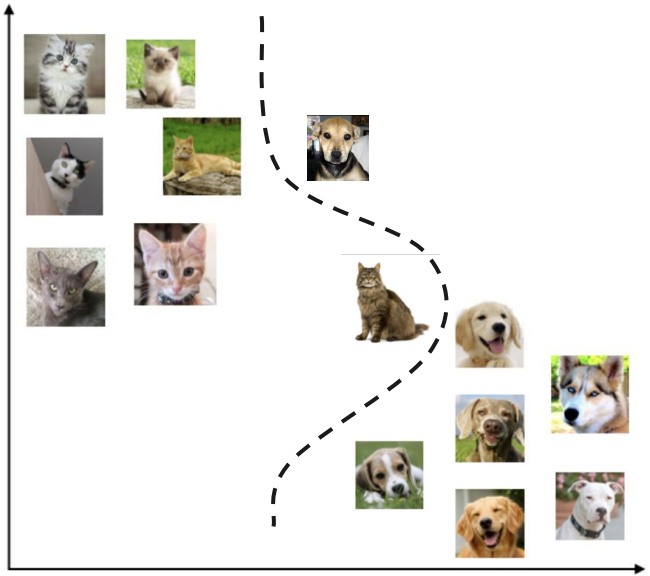
- Both animals have features such as size, color, weight, etc.
- We are just plotting their images on 2D plane for easy understanding.
- We can separate the instances by simply using a liner straight line (**a linear classifier**):
    - On left top we have **Cats**
    - And right bottom we have **Dogs**



Classification

- A simple Linear (2D) classifier doesn't work for this setup



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- **We require**
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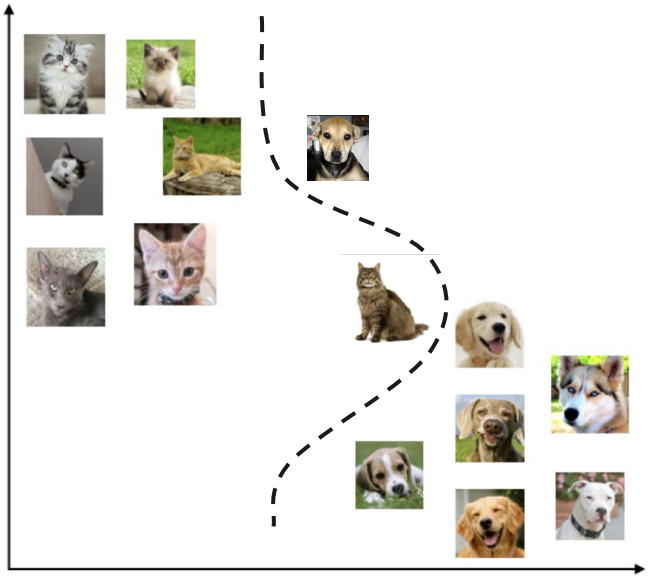

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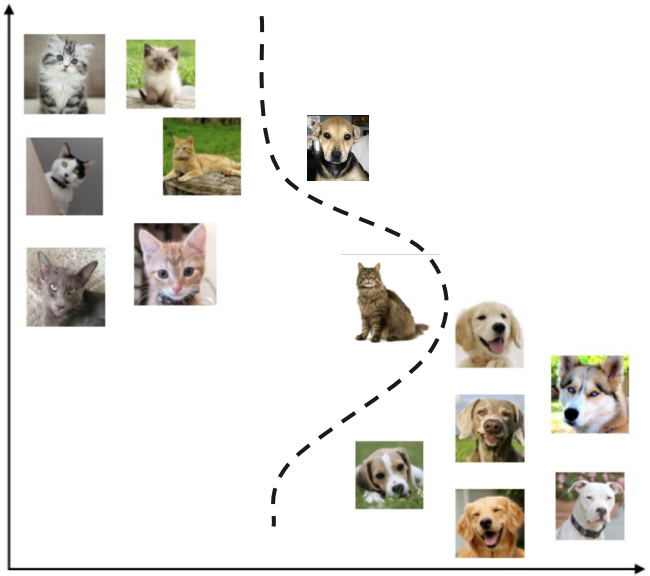


Classification Models

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

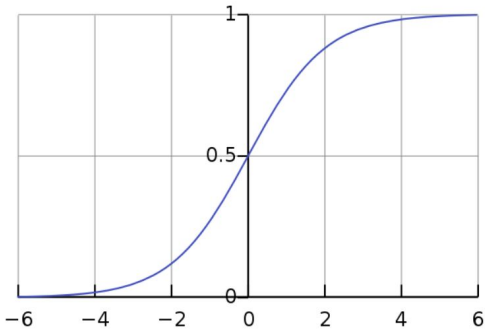
Logistic Regression

- Probabilistic classifier

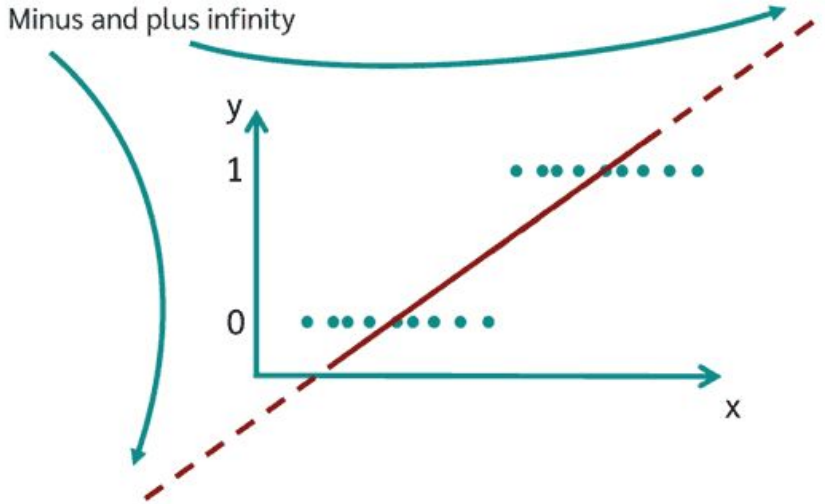
Sigmoid function characteristic

$$p(x) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x)}}$$

- Sigmoid function



Logistic Regression



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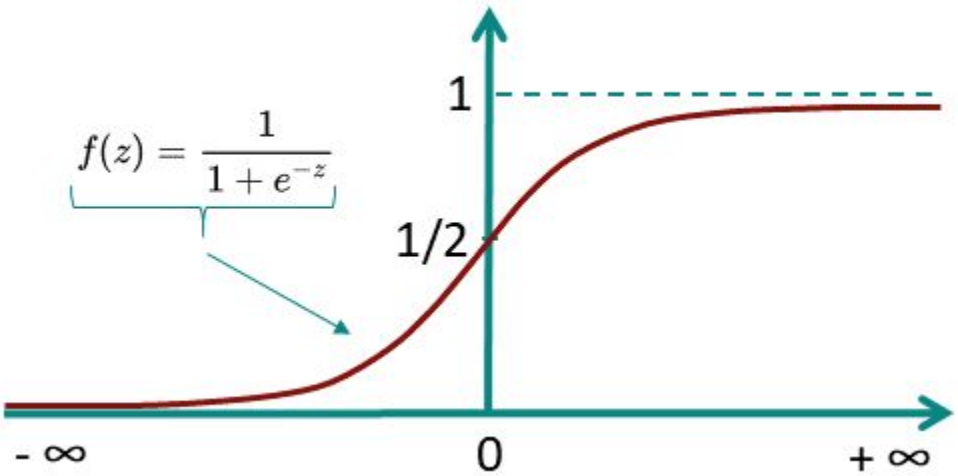

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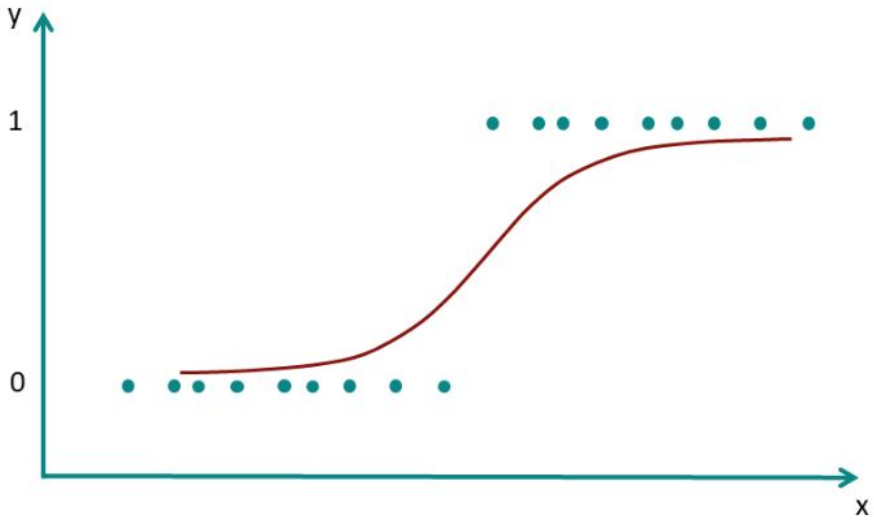

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