# Naïve Bayes

Wednesday, September 8, 2021 11:11 AM

- Overview
  - Learn $f(x)$ $\quad X \to Y$
    - ↳ $P(Y|X)$
      - Using $P(X,Y)$
      - Via Bayes $\Rightarrow$ $P(X|Y)P(Y)$

* Bayes classifier: $\hat{y} = \underset{y}{\arg\max}\, P(Y=y \mid X=x)$

* Simple framework $\rightarrow$ $Y$ is $K$ classes
  all $X_p$ are binary (BOW)

↳ parameters from data: $K(2^p - 1)$

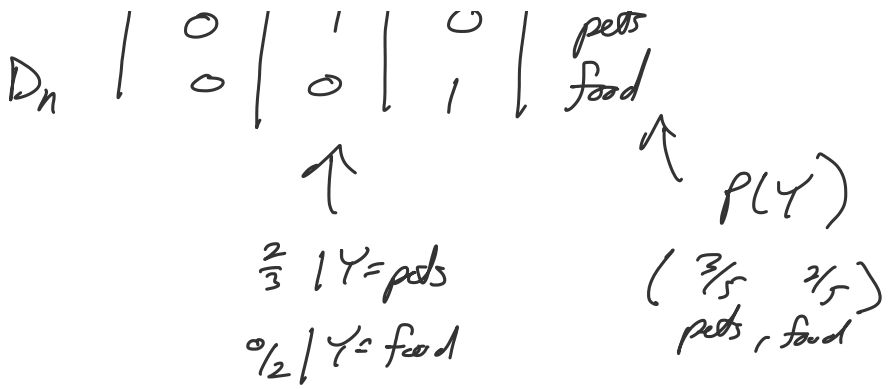
* Assumption:
  - Features are independent given the class $Y=y$ !

$$P(X_1, \dots X_p | Y) = \prod_{i=1}^{p} P(X_i | Y)$$

↳ parameters $K \times p$

Ex

| | dog | cat | mouse | class |
|---|---|---|---|---|
| $D_1$ | 1 | 0 | 0 | pets |
| $D_2$ | 0 | 0 | 0 | food |
| ⋮ | 0 | 1 | 1 | pets |




* Laplacian Smoothing