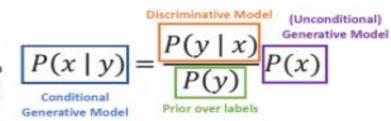# Discriminative ve Generative Models

Discriminative Model:
- ✓ Learn a probability distribution P(y|x)
- ✓ The possible labels for each input compete for probability mass
- ✓ Assign labels to data → Feature engineering (Supervised)
- ✓ No way for the model to handle unreasonable inputs, it must give label distributions for all inputs

Bayes' Rule:

Conditional Generative Model:
- ✓ Learn p(x|y)
- ✓ Generate new data conditioned on input labels
- ✓ Each possible label induces a competition among all input
- ✓ Assign labels while rejecting outliers
- ✓ Build Conditional generative model from other components

$$P(x \mid y) = \frac{P(y \mid x)}{P(y)} P(x)$$

Conditional Generative Model

Discriminative Model

Prior over labels

(Unconditional) Generative Model

Generative Model:
- ✓ Learn Probability distribution p(x)
- ✓ All possible input data compete with each other for probability mass
- ✓ Detect Outliers → Feature Learning (unsupervised)
- ✓ Sample to generate new data
- ✓ Model can reject unreasonable inputs by assigning them small values