Object recognition key points

- Classification by comparing the probability of a shape belonging to different classes
- Properties in a feature vector
- Use Bayes rule to calculate the class probabilities
- Class model is multivariate Gaussian distribution
- Estimate the distribution parameters from the data

The story so far ...

Pre-processing:
1. Capture image
2. Threshold to isolate object
3. Measure properties: \( \bar{x} = (f_1, f_2, \ldots, f_n)' \)

Probabilistic Object Recognition

\[ p(c|\bar{x}) \] is the probability that \( c \) was the class given that we observed \( \bar{x} \)

We select most probable class \( c \) (i.e. \( p(c|\bar{x}) \) is the highest) or perhaps none if the probability for all classes is too low.
Computing $\text{prob}(c|x)$? Bayes Classifier

$p(c)$ is the probability of observing class $c$ (before any observations)

$p(x|c)$ is the probability that evidence $x$ would have been observed if $c$ was the class

Bayes rule:

$$p(c|x) = \frac{p(x|c)p(c)}{p(x)} = \frac{p(x|c)p(c)}{\sum_k p(x|k)p(k)}$$

Advantage: we learn $p(c)$ and $p(x|c)$ from examples

Lecture Overview

1. Probabilistic model based on estimating the class probabilities

2. Use $\ldots$ to estimate probability