WEEK 2

# The generative approach to classification

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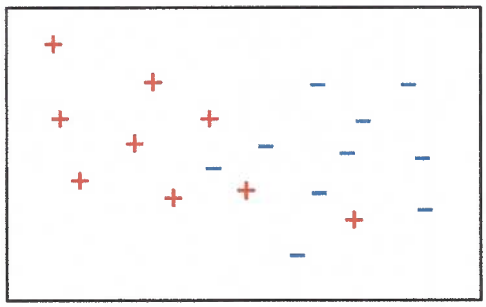
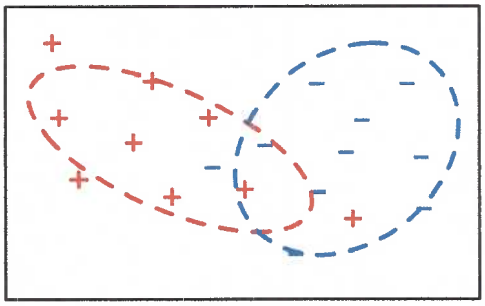




The learning process:

- Fit a probability distribution to each class, individually

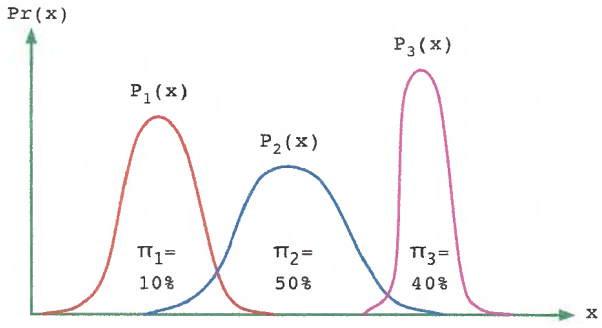
GENERATIVE APPROACH
MAIN IDEA:
FIT A DISTRIBUTION

To classify a new point:

- Which of these distributions was it most likely to have come from?

# Generative models

Example:
Data space $\mathcal{X} = \mathbb{R}$
Classes/labels $\mathcal{Y} = \{1, 2, 3\}$




For each class $j$, we have:

- the probability of that class, $\pi_j = \Pr(y = j)$
- the distribution of data in that class, $P_j(x)$

Overall **joint distribution**: $\Pr(x, y) = \Pr(y)\Pr(x|y) = \pi_y P_y(x)$.

To classify a new $x$: pick the label $y$ with largest $\Pr(x, y)$

$\pi_1 P_1(x)$ , $\pi_2 P_2(x)$ $\pi_3 P_3(x)$

largest