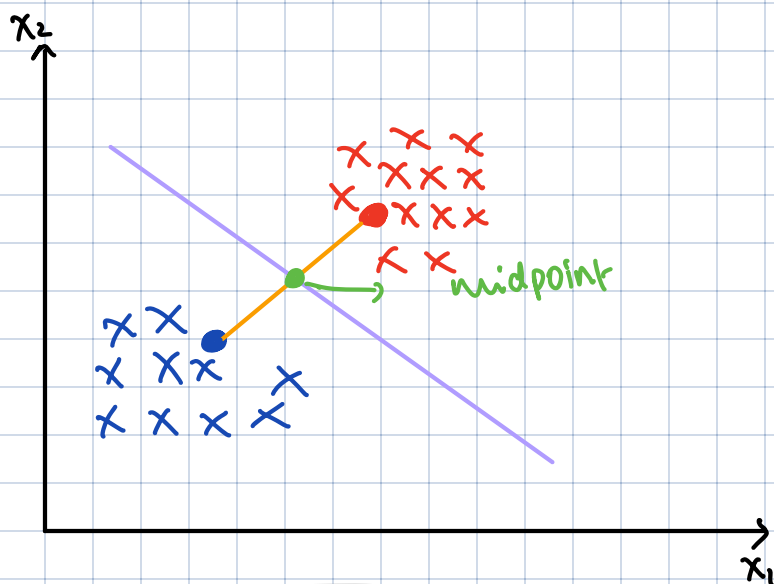


# CENTROID METHOD



- $x \rightarrow$  points belonging to class 1 [class  $c$ ]
- $\bullet \rightarrow$  mean of class 1 ( $\mu_c$ )
- $x \rightarrow$  points belonging to class 2 [class  $x$ ]
- $\bullet \rightarrow$  mean of class 2 ( $\mu_x$ )
- $- \rightarrow$  weight vector
- $- \rightarrow$  decision boundary

## DECISION BOUNDARY:

$$f(x) = \underbrace{(\mu_x - \mu_c)}_{\text{weight vector}} \cdot x - \underbrace{(\mu_c - \mu_x) \cdot \left(\frac{\mu_c + \mu_x}{2}\right)}_{\text{midpoint}}$$

$\underbrace{\hspace{10em}}_{\text{Bias term } d}$

When  $x$  is the midpoint, we want the decision function to return 0 as that is where our decision boundary is.

$$f\left(x = \frac{\mu_c + \mu_x}{2}\right) = (\mu_x - \mu_c) \cdot \left(\frac{\mu_c + \mu_x}{2}\right) - (\mu_c - \mu_x) \left(\frac{\mu_c + \mu_x}{2}\right) = 0$$

$$f(x) > 0 \rightarrow \text{class 1}$$

$$f(x) < 0 \rightarrow \text{class 2}$$