

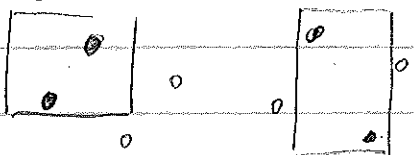
0.1

For such an arrangement below 3 points: $\bullet +1, \bullet -1$, an axis-parallel can shatter every possible labels.



Thus, its VC-dimension is at least 3

For such an arrangement below 4 points, an axis-parallel can shatter every possible labels



Thus, its VC-dimension is at least 4

As for the similar hypothesis, it's easy to see, for the set above can be shattered, so its VC-dimension is at least 4

0.2 As discussed in class, it's equivalent to a line classifier, thus

$$VC(H) = 3, \quad 1 - \eta = 0.9 \Rightarrow \eta = 0.1$$

$$\left(\frac{\sqrt{h(\log(2R/h) + 1)} - \log(\eta/4)}{R} = 0.05 \right)$$

$$3 \left[\log(2R/3) + 1 \right] - \log \frac{0.1}{4} = 0.05^2 \cdot R \quad \text{solve } R?$$

QR from slides online, we have such a formula, ϵ is true error $1-\delta$ is the confidence

$$m = \frac{1}{\epsilon} 4 \log_2 \frac{2}{\delta} + 8 VC(H) \log_2 \frac{13}{\epsilon}$$

$$= \frac{1}{0.05} 4 \log_2 \frac{2}{0.1} + 8 \times 3 \log_2 \frac{13}{0.05} \approx 538.29$$

539 sample size