VC Dimension of other hypothesis spaces

Machine Learning Course A.A. 22/23

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1 Exercise

Find the VC-Dimension of other hypothesis spaces, e.g. intervals in $\mathbb{R}$.

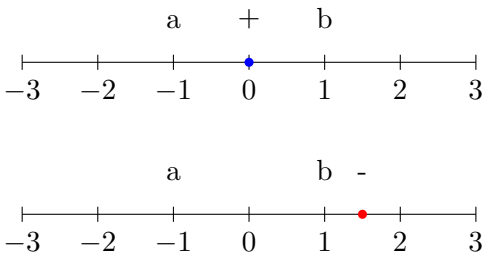
1.1 VC-Dimension of $\mathbb{R}$

Let's define the function $h : \mathbb{R} \to \mathbb{R}$ by cases:

$$h(x) = \begin{cases} 1 & \text{if } x \in [a, b], \text{ where } a, b \in \mathbb{R} \\ 0 & \text{otherwise} \end{cases}$$

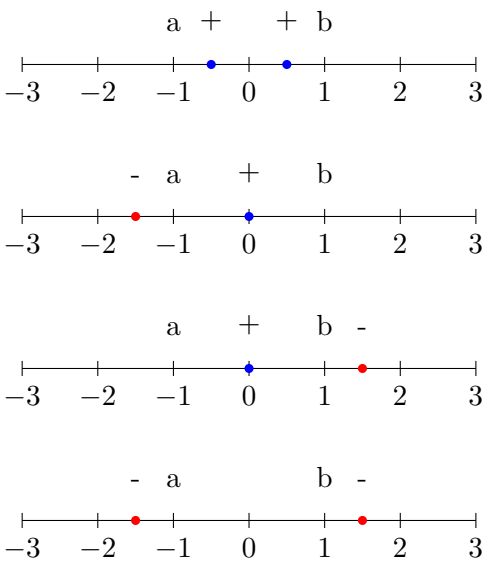
Let's assume $a = -1$ and $b = 1$ and a point p is blue when it's in the interval $[a, b]$ and red when it's not in it.

- (1 point)



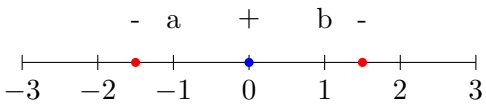
  I can shatter 1 point, therefore $VC(\mathbb{R}) \geq 1$.

- (2 points)



I can shatter 2 points, therefore $VC(\mathbb{R}) \geq 2$.

- (3 points)



The above combination of points cannot be shattered, so I cannot shatter 3 points. I can claim $VC(\mathbb{R}) = 2$.