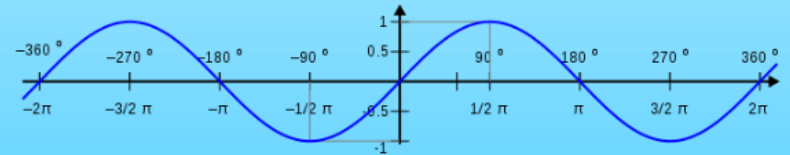


Esempio di Spazio delle Ipotesi con VC-dimensione Infinita

- Spazio delle Istanze: Numeri Reali
- Spazio delle Ipotesi:

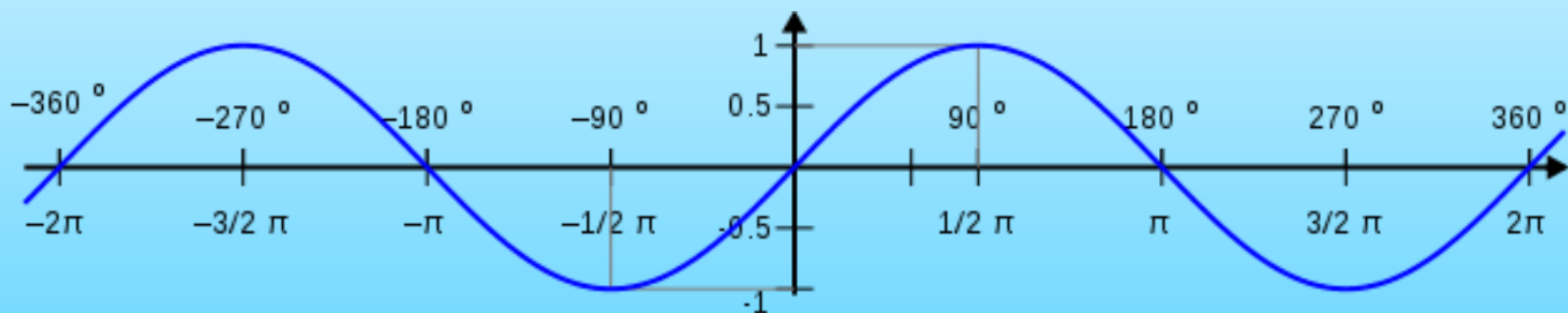
$$f(x, \alpha) \equiv \theta(\sin(\alpha x)), \quad x, \alpha \in \mathbf{R}.$$

$$\theta(x) = 1 \quad \forall x > 0; \quad \theta(x) = -1 \quad \forall x \leq 0$$



H possiede VC-dimensione infinita !

i Reali



nita!



- si considerino i punti:

$$x_i = 10^{-i}, \quad i = 1, \dots, l.$$

- si specifichi per ogni punto una etichettatura:

$$y_1, y_2, \dots, y_l, \quad y_i \in \{-1, 1\}.$$



ipotesi che realizza l'etichettatura:

$$\alpha = \pi \left(1 + \sum_{i=1}^l \frac{(1 - y_i) 10^i}{2} \right).$$

$$0 \overset{+}{\longleftrightarrow} \pi \overset{-}{\longleftrightarrow} 2\pi \overset{+}{\longleftrightarrow} 3\pi \overset{-}{\longleftrightarrow} 4\pi \overset{+}{\longleftrightarrow} 5\pi \cdots 2k\pi \overset{+}{\longleftrightarrow} 2(k+1)\pi \overset{-}{\longleftrightarrow} 2(k+2)\pi$$

0 oppure 1

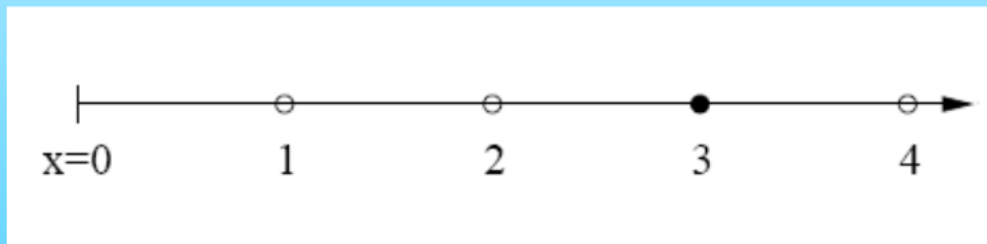
$$\alpha = \left(1 + \frac{1-y_1}{2}10 + \frac{1-y_2}{2}100 + \frac{1-y_3}{2}1000 + \frac{1-y_4}{2}10000 + \frac{1-y_5}{2}100000 + \dots\right)\pi$$

Consideriamo, ad esempio, $x = 10^{-2} = \frac{1}{100}$

$$\alpha \frac{1}{100} = \underbrace{\left[\left(1 + \frac{1-y_1}{2}10\right)/100\right]}_{<1} + \frac{1-y_2}{2} + \underbrace{\left(\frac{1-y_3}{2}10 + \frac{1-y_4}{2}100 + \frac{1-y_5}{2}1000 + \dots\right)}_{\text{numero intero pari}}\pi$$

0 oppure 1

notare che i seguenti 4 punti equidistanti



non possono essere separati!