

1. Magnitude of $[0.5, 0.5]$
 $\sqrt{0.5^2 + 0.5^2} = \sqrt{0.5} = 0.7071$

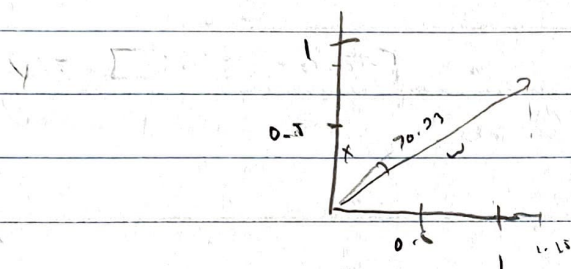
2. $[0.5, 0.5] \cdot \begin{bmatrix} 1.25 \\ 0.75 \end{bmatrix} = \langle 0.5 \cdot 0.7071 \cdot 1.25 + 0.5 \cdot 0.75 \rangle = \langle 0.625, 0.375 \rangle$

3. $\langle 0.375, 0.625 \rangle$

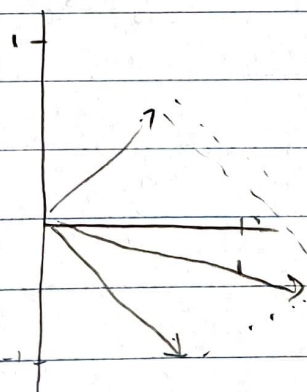
4. $[0.5, 0.5] \cdot [1.25, 0.75] = \cancel{0.625} \cdot 0.625 + 0.375 = \cancel{0.625} \cdot 1$

5. $\cos \alpha = \frac{a \cdot b}{|a| \cdot |b|} = \frac{0.775}{0.7071 \cdot \sqrt{1.25^2 + 0.75^2}} = 0.9598$

6. $\alpha = 0.35074$



6. $(0.5, 0.5) + \langle 0.75, -1 \rangle = \langle 1.25, -0.5 \rangle$



7. Prediction vs Classification

In classification, things are put into certain categories.

Prediction tries to find the correct value of an input

8.

$$w_0 = 0 \quad w_1 = 0.5 \quad w_2 = -0.5 \quad v = 0.25$$

$$x_0 = 1$$

x_1	x_2	OR	x_i
0	0	0	$g(0.1 + 0.5 \cdot 0 + -0.5 \cdot 0) = g(0) = 0 \quad \checkmark$
0	1	1	$g(0.1 + 0.5 \cdot 0 - 0.5) = g(-0.5) = 0 \quad \times$
1	0	1	$g(0 + 0.5 - 0) = g(0.5) = 1 \quad \checkmark$
1	1	1	$g(0 + 0.5 - 0.5) = g(0) = 0 \quad \times$

$$w \leftarrow w - 0.25 (y_j - \hat{y}_j) \cdot x_i$$

$$w_0 = 0 - 0.25 (-1) 1 = 0.25$$

R2 q. $w_1 = 0.5 - 0.25 (1) 0 = 0.5$ $w_2 = -0.5 - 0.25 (-1) (1) = -0.25$

R2 q. $w_1 = 0.5 - 0.25 (1) (1) = 0.25$ $w_2 = -0.25 - 0.25 (-1) (1) = 0$

$$w_0 = 0.25 \quad w_1 = 0.25 \quad w_2 = 0$$

x_1	x_2	t	
0	0	0	$g(0.5 + 0 + 0) = g(0.5) = 1 \quad \times$
0	1	1	$g(0.5 + 0 + 0) = 1 \quad \checkmark$
1	0	1	$g(0.5 + 0.25 + 0) = 1 \quad \checkmark$
1	1	1	$g(0.5 + 0.25 - 0) = 1 \quad \checkmark$

$$w_0 = 0.5 - 0.25 (1) (1) = 0.25$$

$$w_1 = 0.25 - 0.25 (0) = 0.25$$

$$w_2 = 0$$

) no changes as $\text{vals} = 0$

x_1	x_2	t	
0	0	0	1 \times
0	1	1	} same all correct
1	0	1	
1	1	1	

$$w_0 = 0.25 - 0.25 = 0$$

x_1	x_2	t	
0	0	0	0 \checkmark
0	1	1	1 \checkmark
1	0	1	1 \checkmark
1	1	1	1 \checkmark