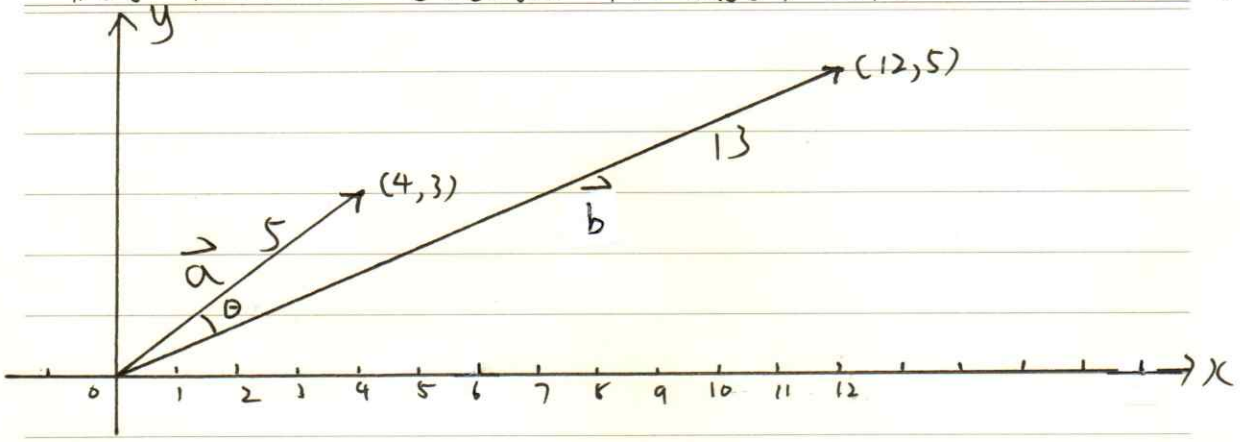
Dot Product (Scalar Product) 点积 (应用)



定义:

① $\vec{a}\cdot\vec{b} = x_a x_b + y_a y_b$ ② $\vec{a}\cdot\vec{b} = \|\vec{a}\|\cdot\|\vec{b}\|\cdot\cos\theta$

应用①: 求两向量间夹角

$\therefore \vec{a}\cdot\vec{b} = \vec{a}\cdot\vec{b}$

$4\times12+3\times5 = 5\times13\times\cos\theta$

$48+15 = 65\cos\theta$

$63 = 65\cos\theta$

$\cos\theta = \frac{63}{65}$

$\cos\theta = 0.96923$

由反余弦运得: $\theta = 14.250°$

实际测量得: $\theta \approx 14.5°$

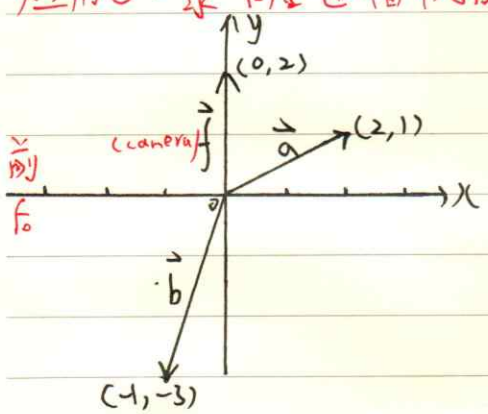
$\therefore \cos\theta = \frac{\vec{a}\cdot\vec{b}}{\|\vec{a}\|\cdot\|\vec{b}\|}$

对单位向量 (归一化后)

$\cos\theta = \hat{a}\cdot\hat{b}$

(因为 $\|\hat{a}\|, \|\hat{b}\|$ 都是 1.)

应用②: 求向量在相机前/后



① $\vec{f}\cdot\vec{a} = f_x a_x + f_y a_y$

$= 0\times2 + 2\times1$

$= 0+2 = 2 > 0$

$\therefore$ a 和 f 同样向前。

② $\vec{f}\cdot\vec{b} = f_x b_x + f_y b_y$

$= 0\times(-1) + 2\times(-3)$

$= 0 + (-6) = -6 < 0$

$\therefore$ a 和 f 一个向前, 一个向后。