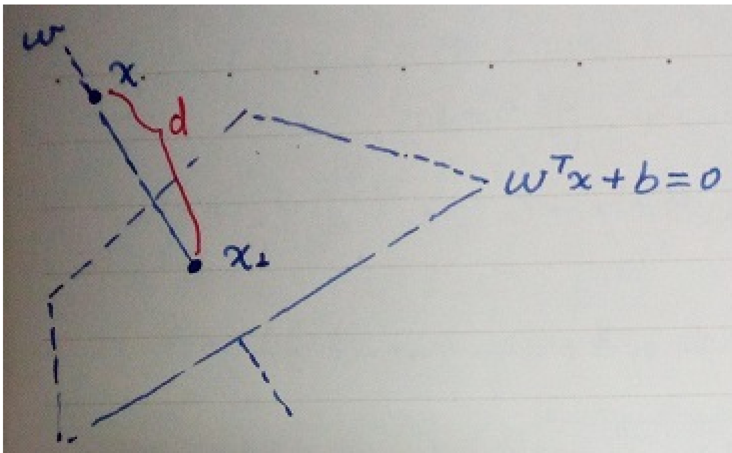

证明：设空间任意点 x 在超平面上投影为 $x_\perp$

(1) $\because \left|w^T \cdot \overrightarrow{x x_\perp}\right| = |w^T|\left|\overrightarrow{x x_\perp}\right| = \sqrt{(w^1)^2 + \cdots + (w^N)^2}\,\left|\overrightarrow{x x_\perp}\right|$

$= \|w\| d$. （此处 d 即所求距离，N为维度

(2) 又 $\because \left|w^T \cdot \overrightarrow{x x_\perp}\right| = |w^1(x^1 - x_\perp^1) + w^2(x^2 - x_\perp^2) \cdots + w^N(x^N - x$

$= |w^1 x^1 + w^2 x^2 + \cdots w^N x^N - (w^1 x_\perp^1 + \cdots + w^N x$

$= |(w^T x) - (w^T x_\perp)|$

$= |w^T x + b|$ $\quad w^T x_\perp + b = 0$（超平面）

(3) $\therefore$ 结合 (1) (2)

得 $d = \dfrac{|w^T x + b|}{\|w\|}$