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	SVM cont. >
To _	Otthogonal projection of a vector ->
-	Criven two vectors & and y we would find orthogonal projection of x onto y.
1	To do this, we project re onto y as shown:
	5 (3,5)
	(8,2) Fig (1)
•	With the world with the state of the state o
7	Free man first
	This gives us vector z as shown below:
7	S (3,5)
· Na	The state of state of the state
	O Z I I I I I I I I I I I I I I I I I I
	a lind the astrogonal projection of a vector, feret we
1	eed to calculate & cos(0).
	cos(0) = Adjacent = z Hypotaneous x
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By the definition of dat product $2 \cdot y = \|x\| \|y\| \cos(\theta)$ $\Rightarrow \cos(\theta) = \frac{x \cdot y}{\|x\| \|y\|}$

Substitute @ in (1)

1211= 11x11 · x·y

1|x11 ||y||

If we define vector u as the direction of y then

u= 4

ly norm=1

so unit vector]

then ||z|| = x·u -3

We now have a simple way to compute the norm of vector z. lince this vector is in the same direction as y, it has the direction u.

U= Z

2=11211·4 -@

Substitute @ in 1

Z= (u·x).u

so the vector $z = (u \cdot n) \cdot u$ is the orthogonal projection of re onto y.

This orthogonal projection allows is to compute the distance between x and the line which goes through y.

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to wer.

So, for the points given in fig & 1
Be norm of vector y = 182 + 22 = 168
Lets say, vector (u).
norm of vector $u = \left(\frac{8}{168}\right)^2 + \left(\frac{2}{168}\right)^2 = 1$ (unit vector)
nosm of vector $x = \sqrt{3^2 + 5^2} = 4$
A Part of the second
Z2 (4.x) u
W / S
25 (8 2). (3,5) · u
$\frac{24}{\sqrt{68}} + \frac{10}{\sqrt{68}} \cdot u = \left(\frac{34}{\sqrt{68}}\right) \cdot u$
$\frac{1}{\sqrt{568}}$ $\frac{6}{\sqrt{568}}$ $\frac{2}{\sqrt{568}}$
$= \frac{264}{68}, \frac{68}{68} = \frac{(3.88, 1)}{68} \simeq \frac{(4, 1)}{68}$

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