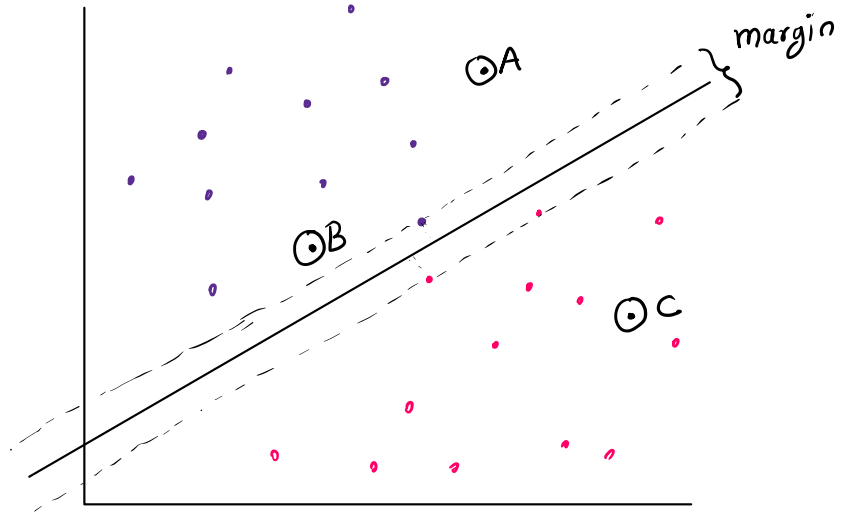


Maximum Margin Classifier

X_1	X_2	y
1	0	1
0	0	0
0	0	0
0	0	0
1	1	1
0	1	0

Test

$\odot A \rightarrow 0$
 $\odot B \rightarrow 0$
 $\odot C \rightarrow 1$



$$C \propto \frac{1}{\text{margin}}$$

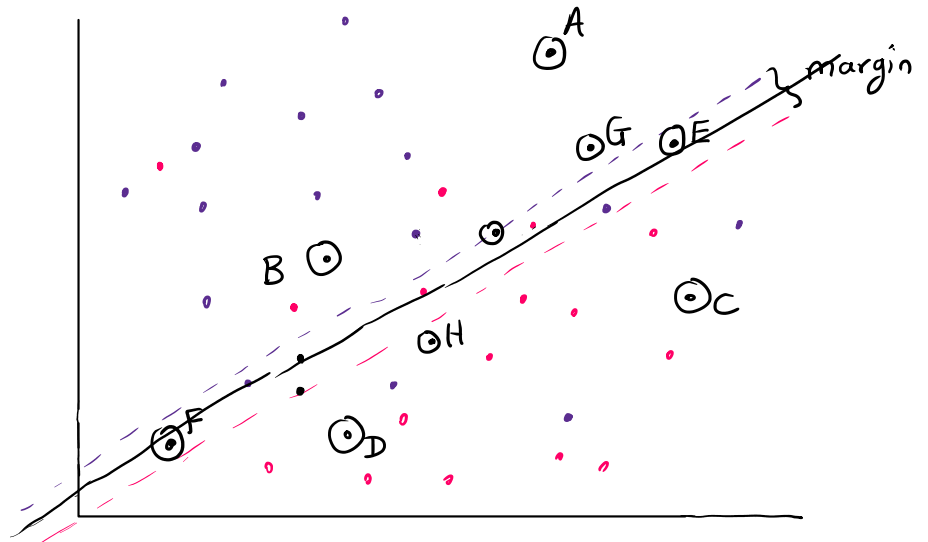
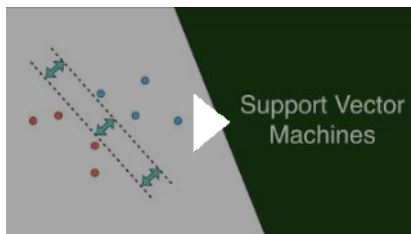
Train

Purple 0

Pink 1

Test

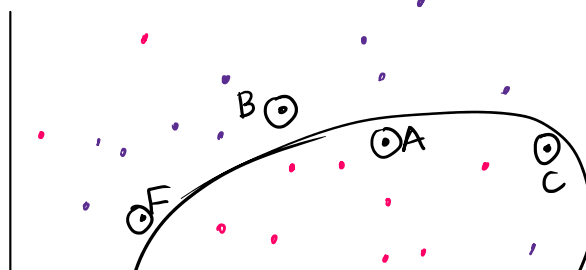
$F \rightarrow 0$
 $E \rightarrow 1$


[Support Vector Machines \(SVMs\): A friendly introduction](#)


Radial (RBF)

Test set

X_1	X	y
A	\odot	1
B	\odot	0



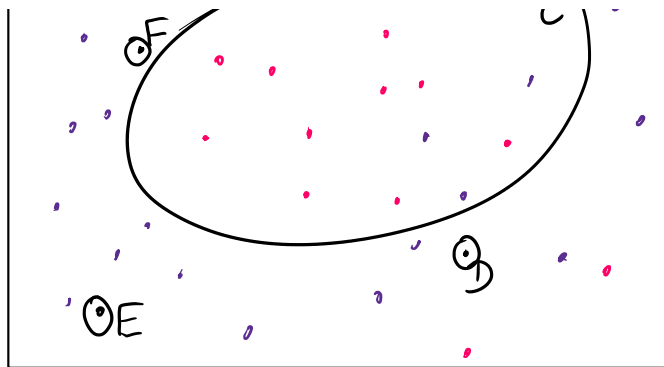
$$C \propto \frac{1}{\text{margin}}$$

$$\gamma \propto \frac{1}{\text{size}}$$

(gamma)

1 ... 10

B ⊙ 0
C ⊙ 0
D ⊙ 1
E ⊙ 0
F ⊙ 0



$$\frac{1}{2\sigma^2} \approx \gamma$$

Training

X_1, X_2, \dots, X_p

y

A → 40

or

B → 30

or

C → 35

obs

OVO

A vs B

$X_1 \dots X_p$	A → 40
	B → 30
(70)	

SVM_{AB}

A vs C

$X_1 \dots X_p$	A → 40
	B → 35
(75)	

SVM_{AC}

B vs C

$X_1 \dots X_p$	B → 30
	C → 35
(65)	

SVM_{BC}

Test

$X_1 \dots X_p$

• predict

\hat{y}_{AB}

\hat{y}_{AC}

\hat{y}_{BC}

\hat{y}_{final}

A

C

B

A

B

A

B

B

A

A

C

A

OVR

A

$X_1 \dots X_p$	A → 40
	non-A → 65

SVM_A

B

$X_1 \dots X_p$	B → 30
	non B → 75

SVM_B

C

$X_1 \dots X_p$	C → 35
	non-C → 70

SVM_C

Test set

X_1, X_2, \dots, X_p

• predict-proba

$P(y=A)$

0.87

0.5

$P(y=B)$

0.7

0.67

$P(y=C)$

0.3

0.43

\hat{y}_{final}

A

B

Training

X_1, X_2, \dots, X_p

y

A → 40

or

B → 30

or

C → 35

obs