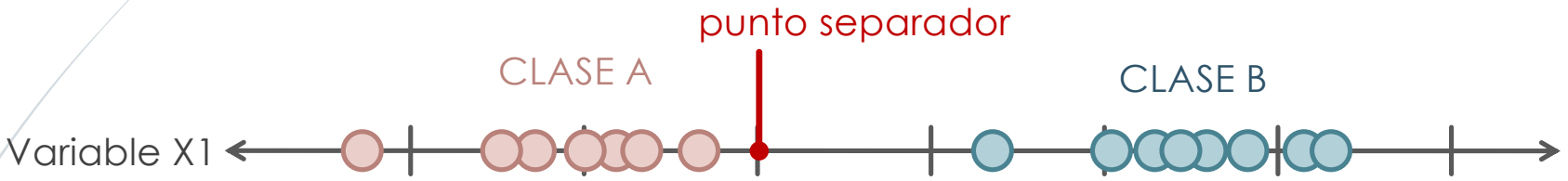
Clasificación de pacientes con enfermedad PDAC utilizando Máquinas de Soporte Vectorial (SVM)

EEA2021

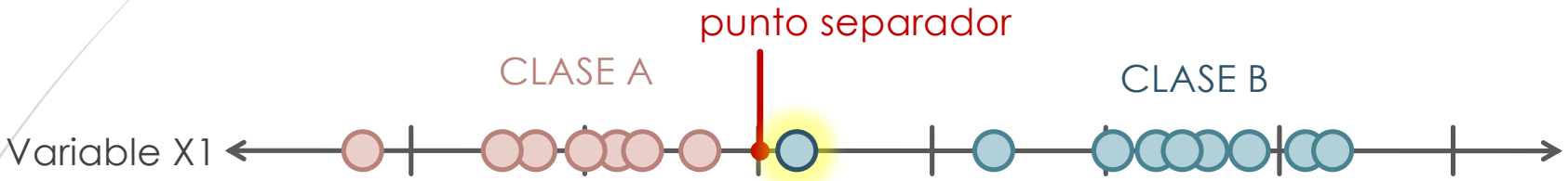
PDAC: adenocarcinoma pancreático

Fabiana Rossi y Santiago Alcaide

Clasificación por margen rígido



Clasificación por margen rígido



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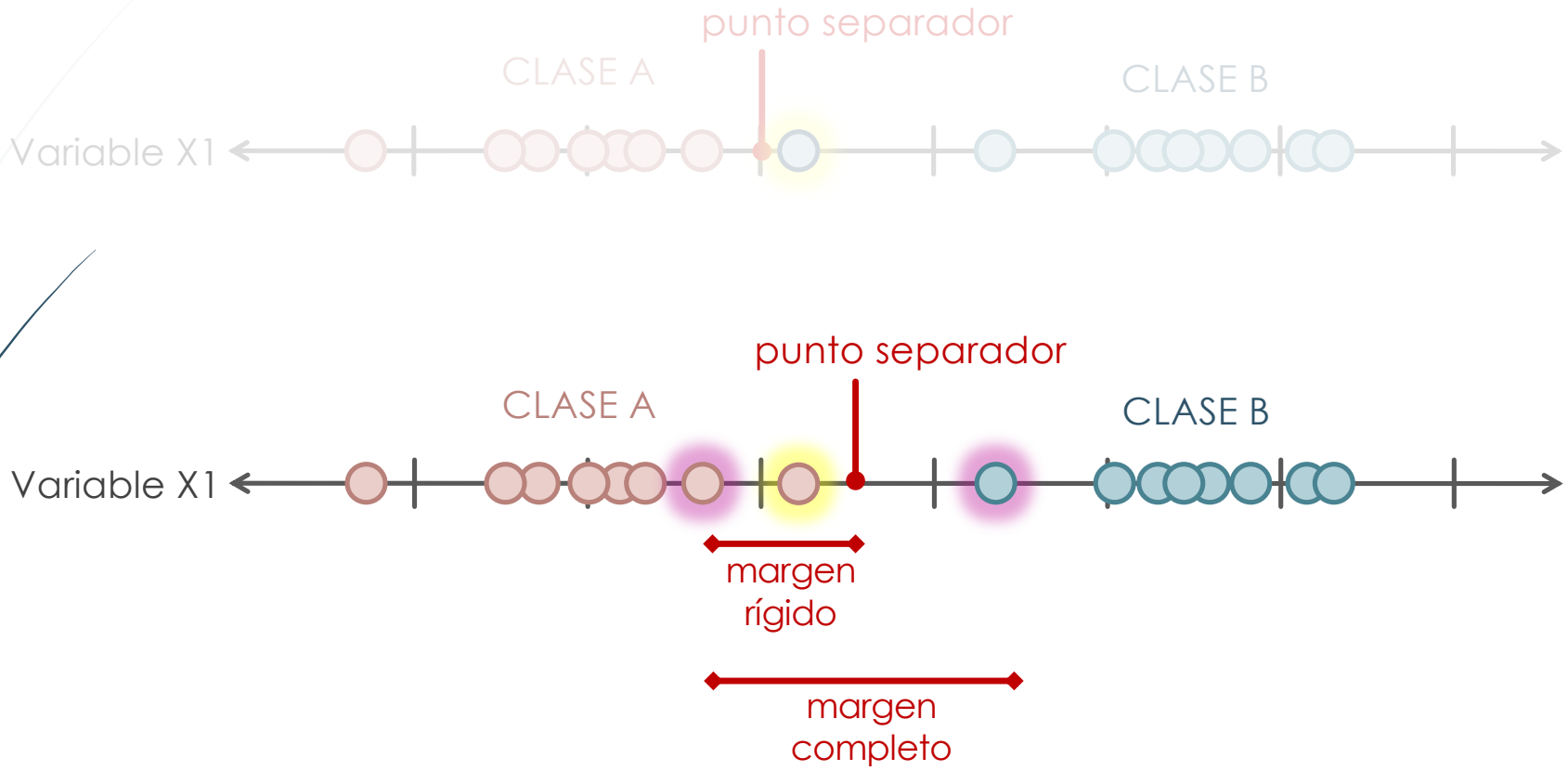

Clasificación por margen rígido

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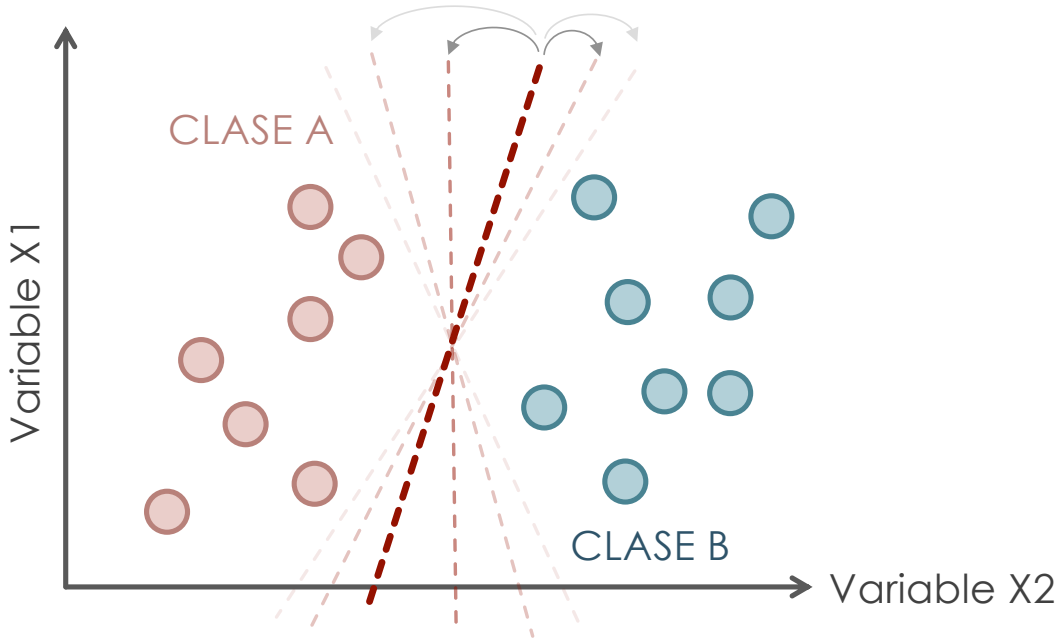

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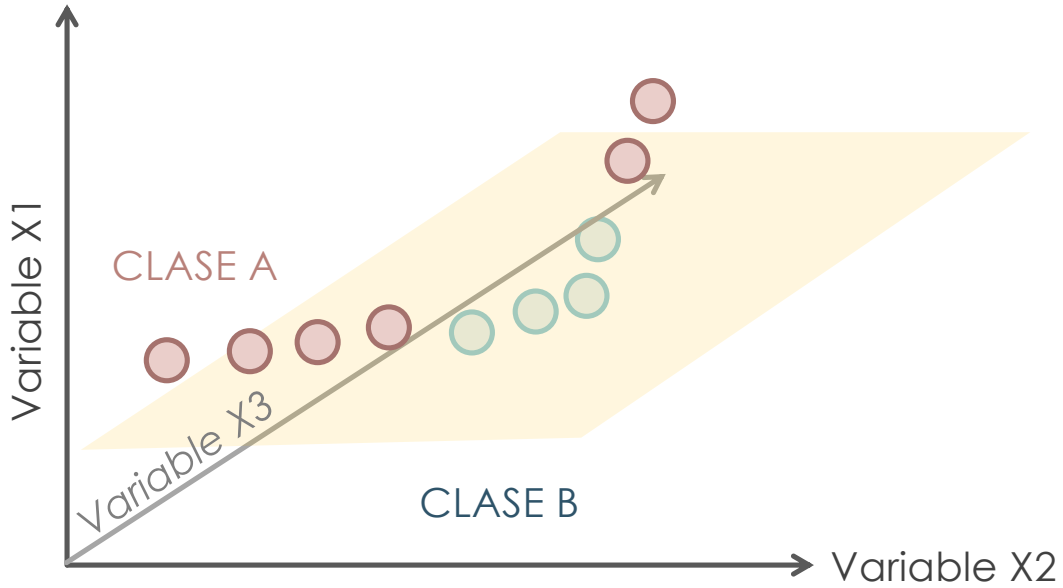

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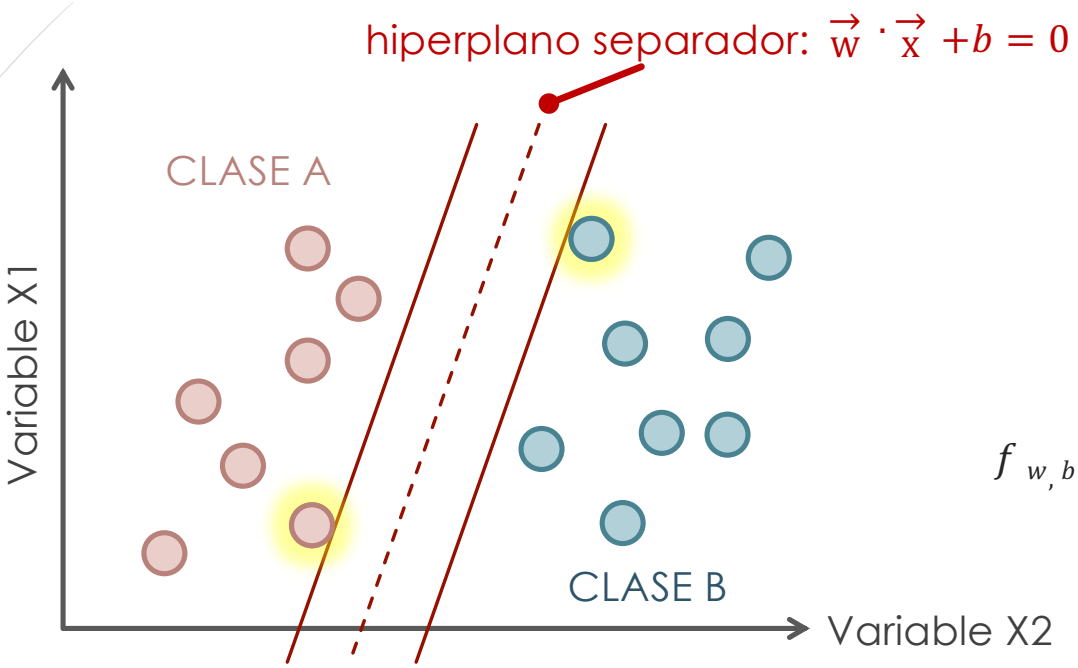

$$f_{w,b}(x) = \begin{cases} clase\ A & \vec{w} \cdot \vec{x} + b \leq -M \\ clase\ B & \vec{w} \cdot \vec{x} + b \geq M \end{cases}$$

margen completo = $2 \ / \ |\vec{w}|$

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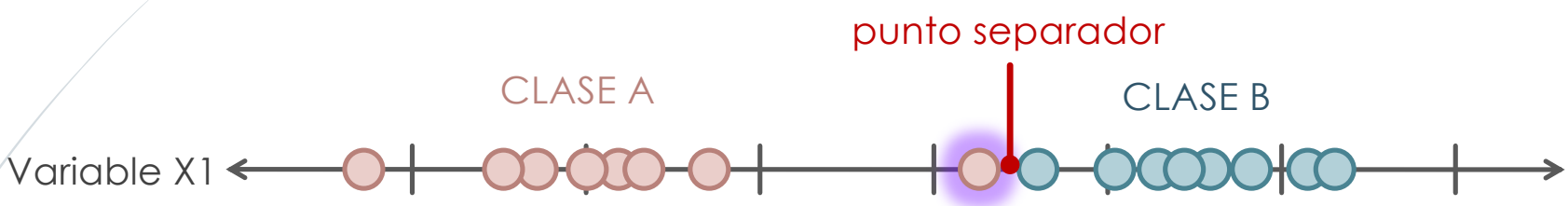
Clasificación por margen rígido



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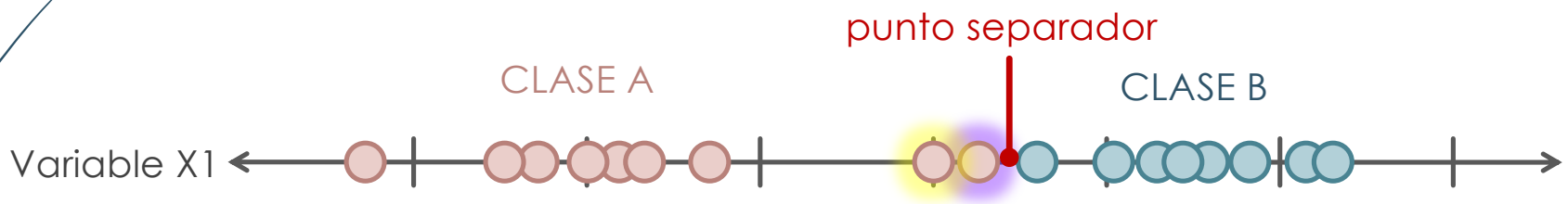

Clasificación por margen blando

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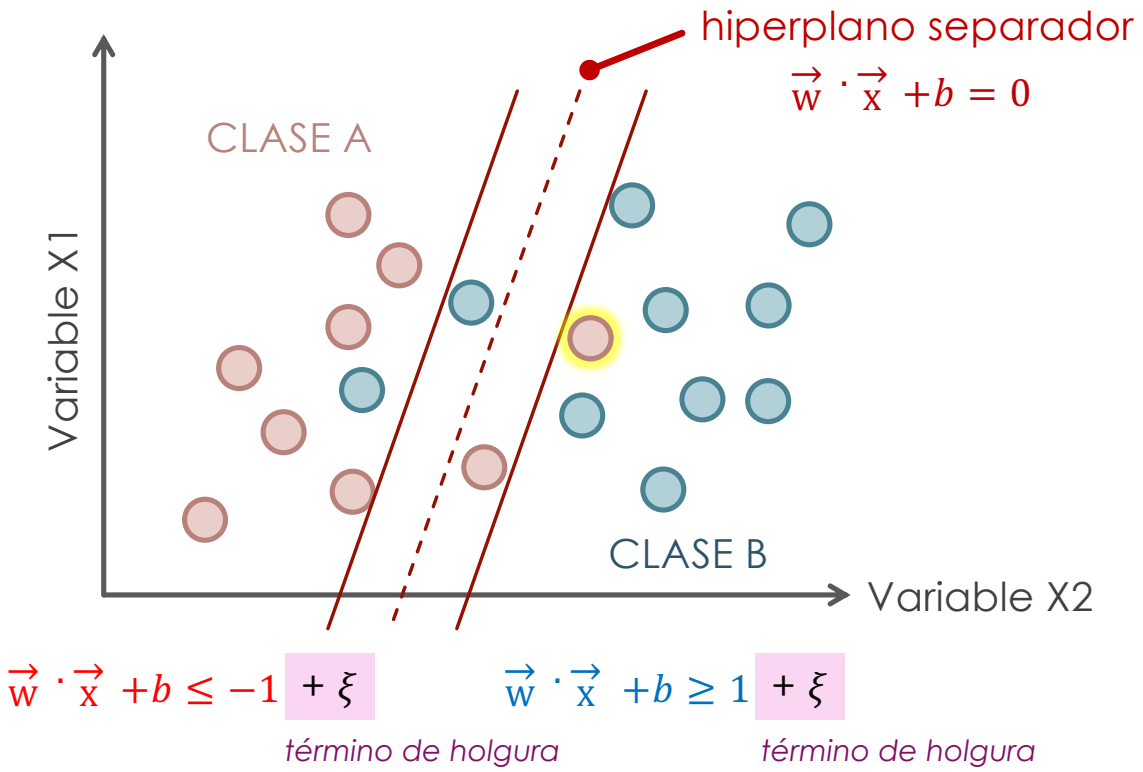

Clasificación por margen blando

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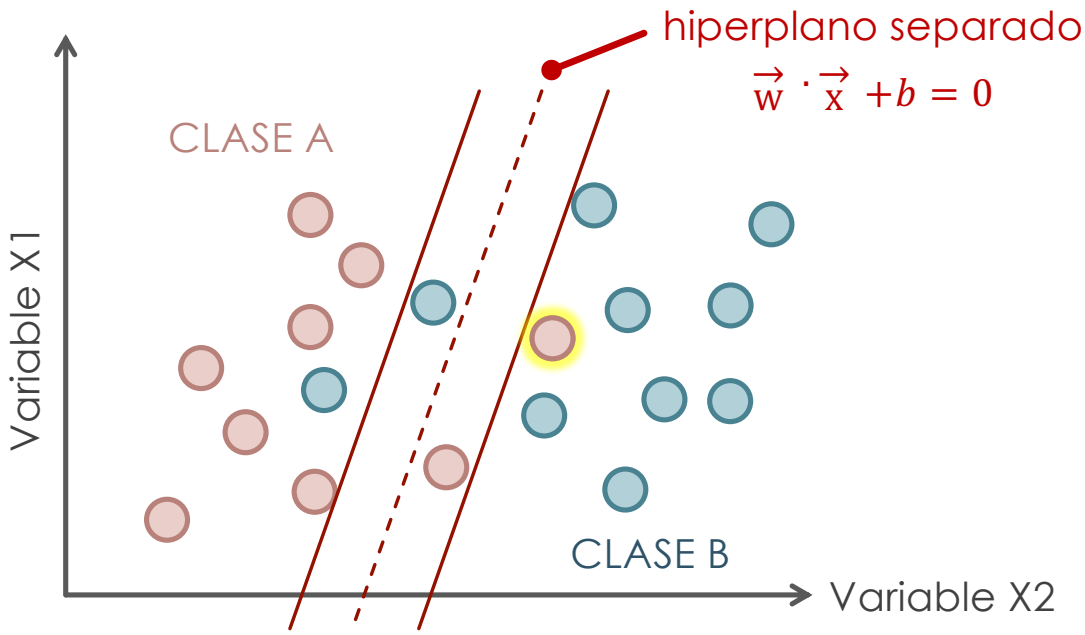

Optimización de $\vec{w}$

$$Min \ \frac{1}{2} \| \boldsymbol{w} \|^2 + C \sum_{i=1}^{n} \xi_i$$

Clasificación por margen blando

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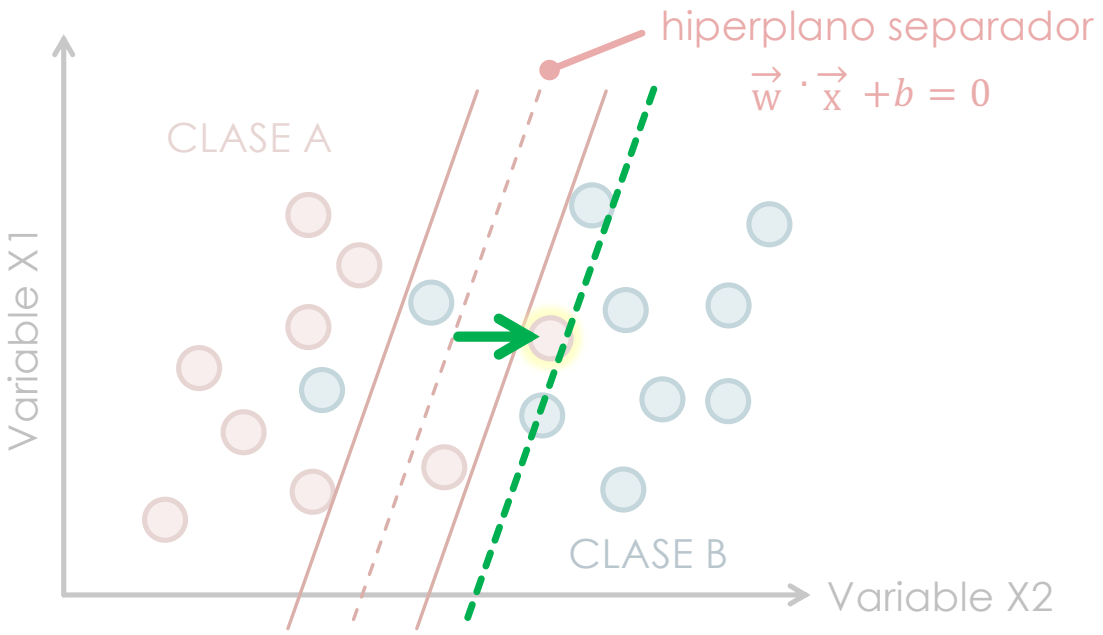
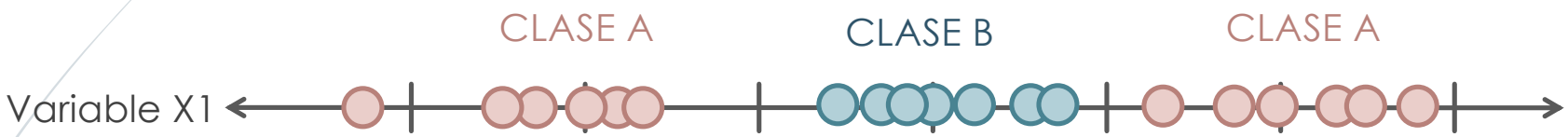


Optimización de $\vec{w}$

$$Min \ \frac{1}{2} \| \boldsymbol{w} \|^2 + C \sum_{i=1}^{n} \xi_i$$

Máquinas de soporte vectorial



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Máquinas de soporte vectorial

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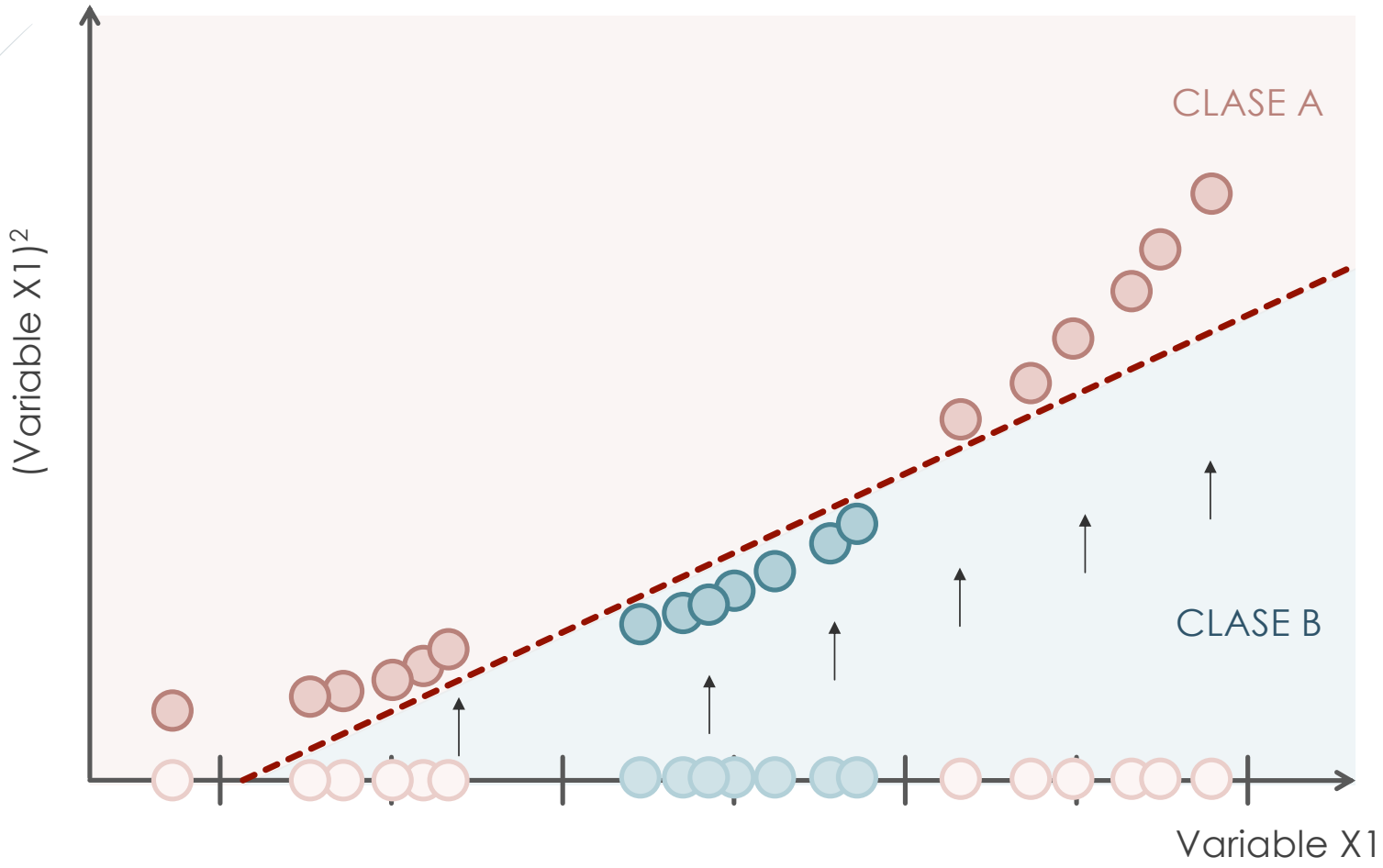
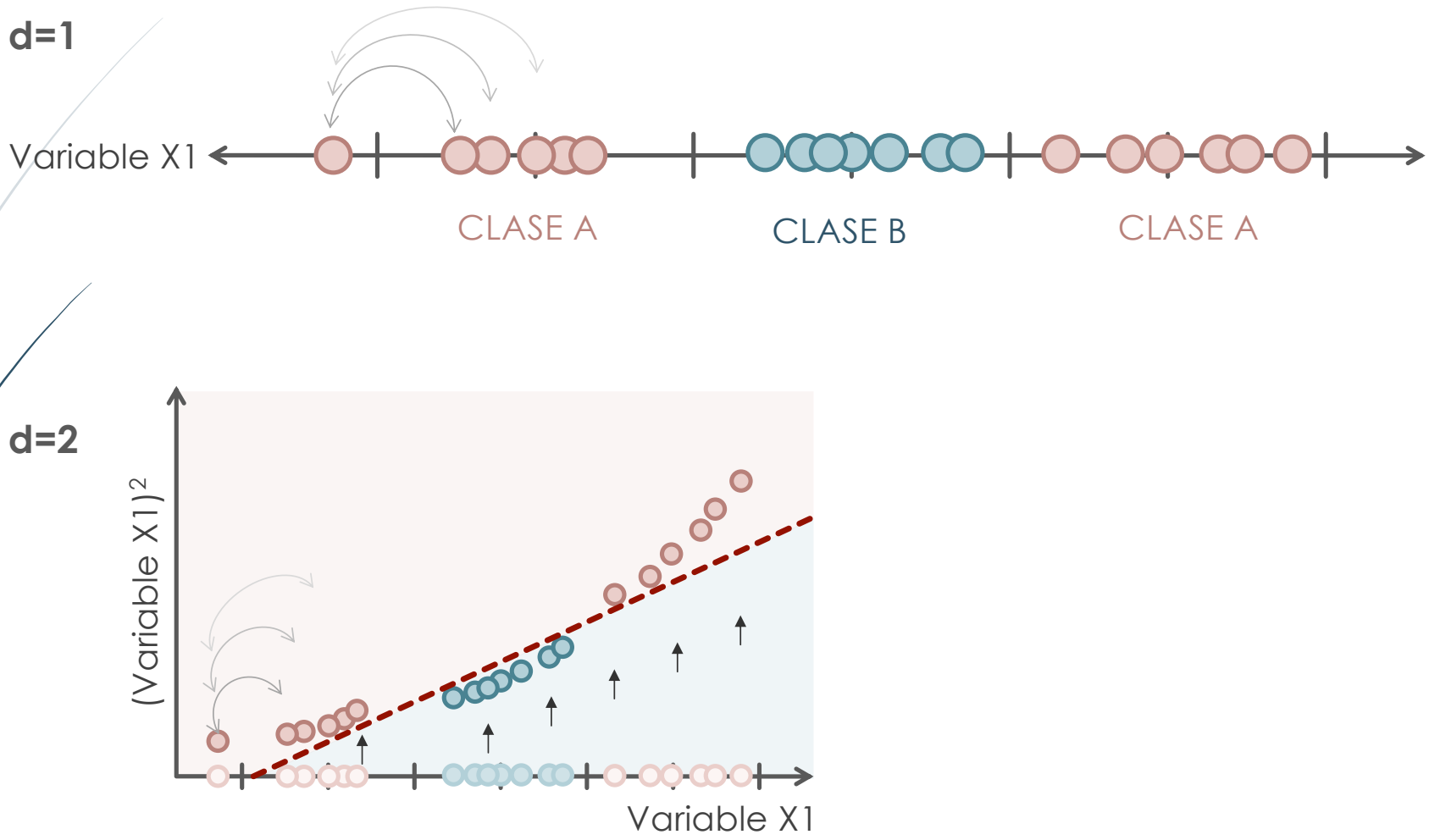
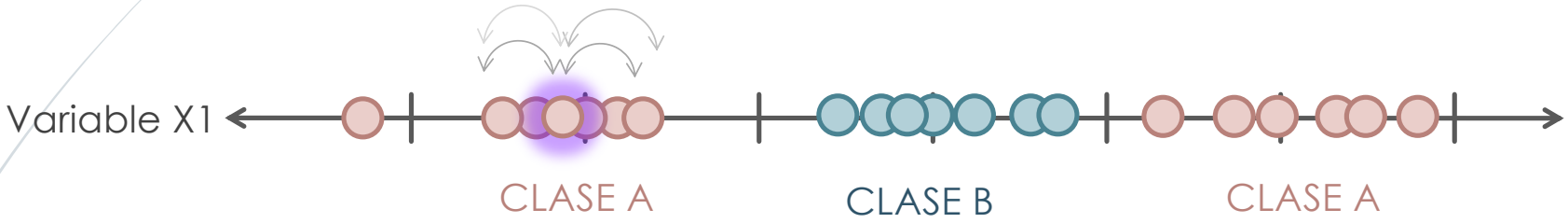


SVM: función kernel polinomial



SVM: función radial



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SVM: función kernel polinomial

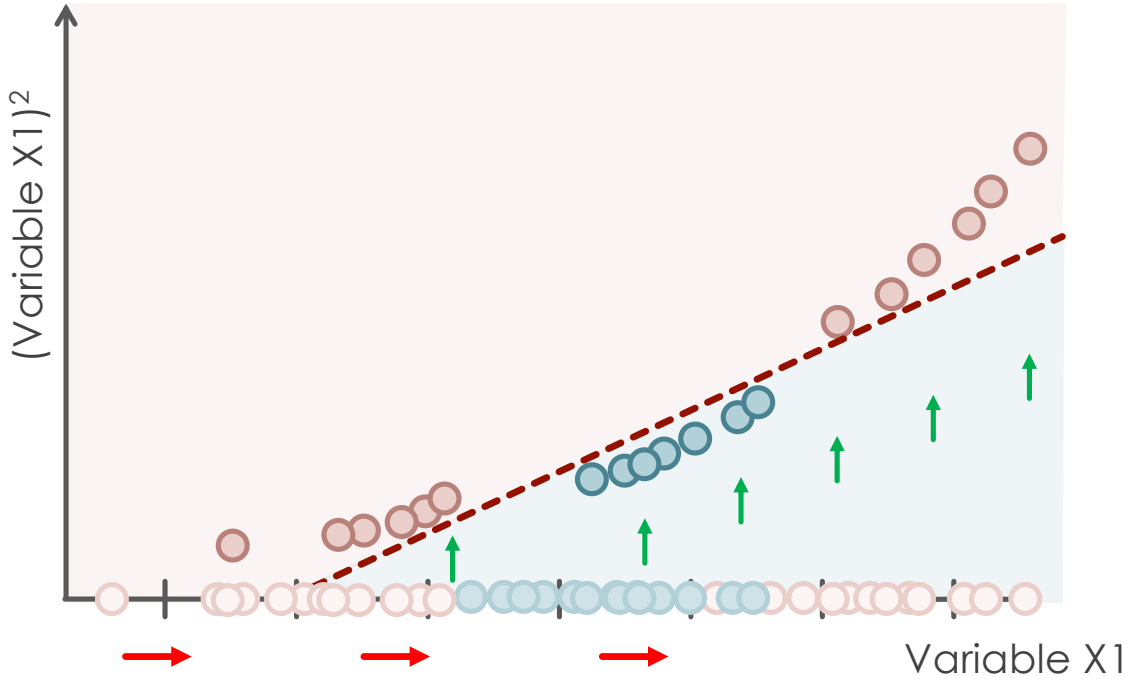
$$(x_i \times x_J + p)^d$$

$$(x_i \times x_j + 1)^2 = (x_i \times x_J + 1) (x_i \times x_J + 1)$$

$$= 2 x_i x_J + x_i^2 x_J^2 + 1$$

$$= (\sqrt{2}x_i , x_i^2 , 1) . (\sqrt{x_J} , x_J^2 , 1)$$

$$= (\sqrt{2}x_i , x_i^2) . (\sqrt{2}x_J , x_J^2)$$



SVM: función kernel radial

$$e^{-\gamma(x_i - x_J)^2}$$

Función polinomial

$$(x_i \times x_J + p)^d$$

$$(x_i \times x_J + 0)^d = (x_i \times x_J)^d$$

$$= x_i^d \, x_J^d$$

$$= (x_i^d) \cdot (x_J^d)$$

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d=1

SVM: función kernel radial

$$e^{-\gamma(x_i - x_J)^2}$$

Función polinomial

$$(x_i \times x_J + p)^d$$

$$(x_i \times x_J + 0)^d = (x_i \times x_J)^d$$

$$= x_i^{\,d}\, x_J^{\,d}$$

$$= (x_i^{\,d}) \cdot (x_J^{\,d})$$

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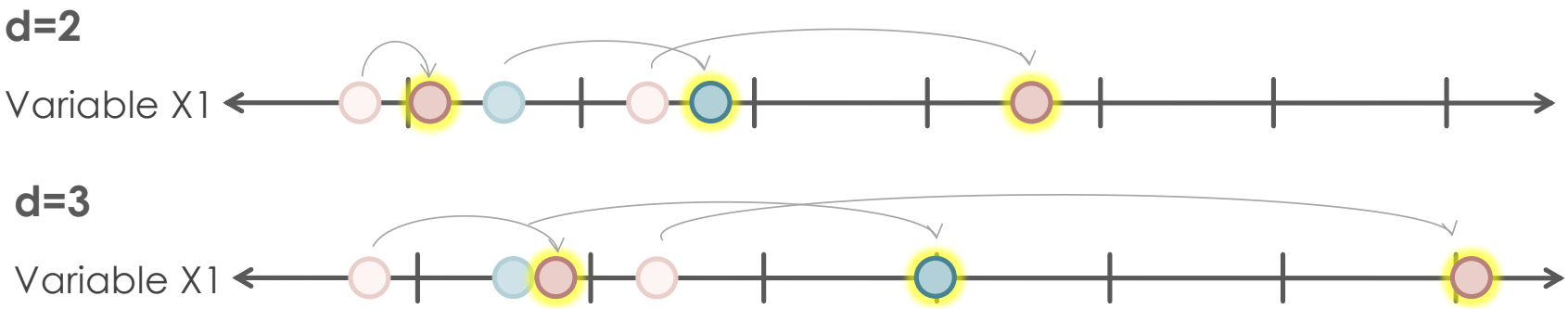
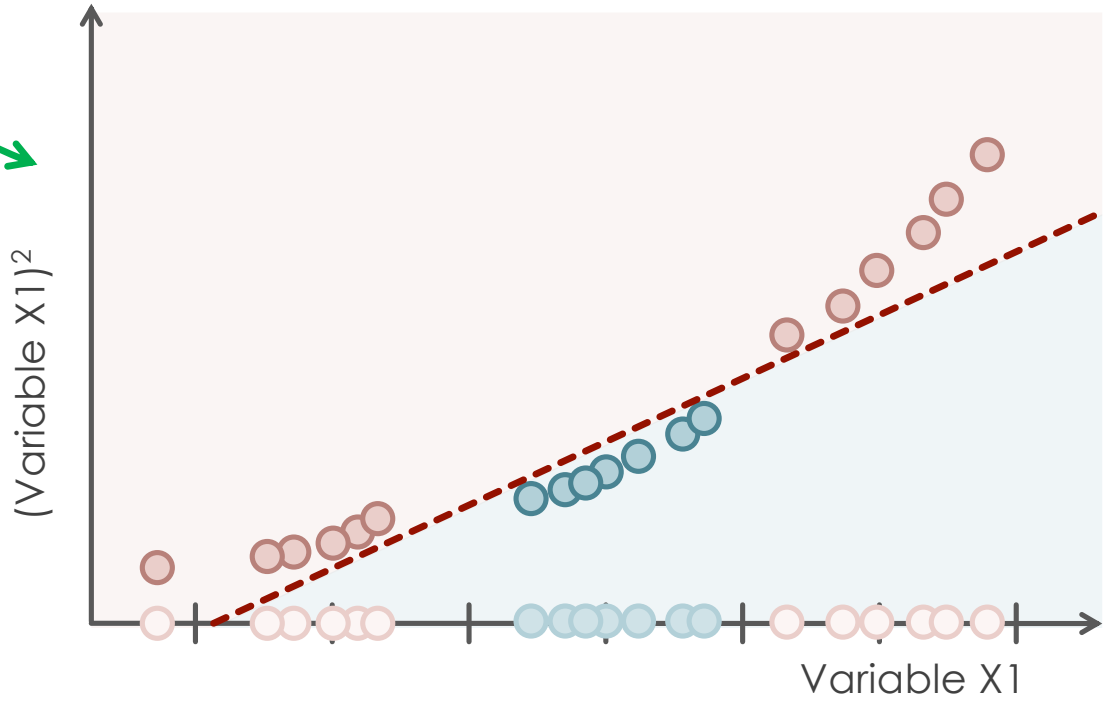


SVM: función kernel radial

$$(x_i \times x_J)^1 + (x_i \times x_J)^2 =$$

$$x_i^1 x_J^1 + x_i^2 x_J^2 =$$

$$(x_i^1, x_i^2) \cdot (x_J^1, x_J^2)$$



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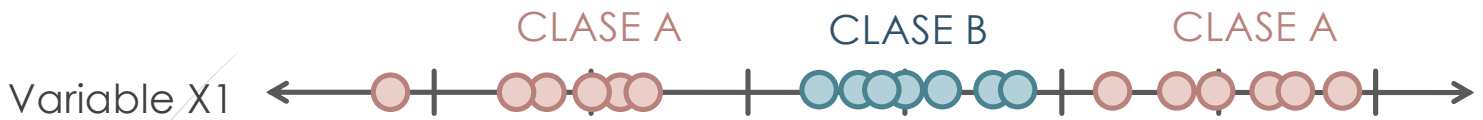
SVM: función kernel radial



$$x_i^1 x_J^1 + x_i^2 x_J^2 + x_i^3 x_J^3 =$$

$$(x_i^1, x_i^2, x_i^3) \cdot (x_J^1, x_J^2, x_J^3)$$