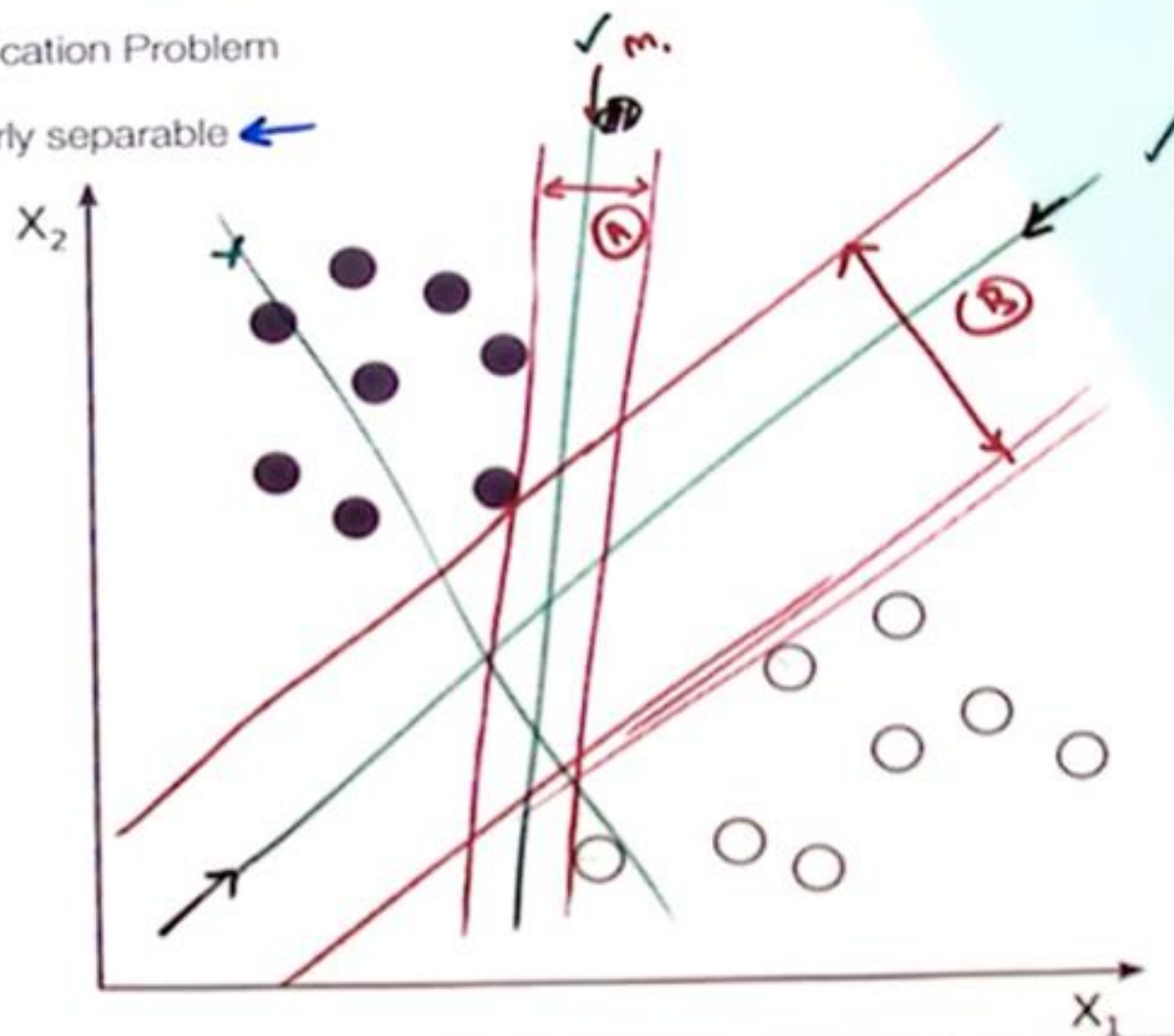


SVM

Support Vector Machine

- A Classification Problem
- Linearly separable ←

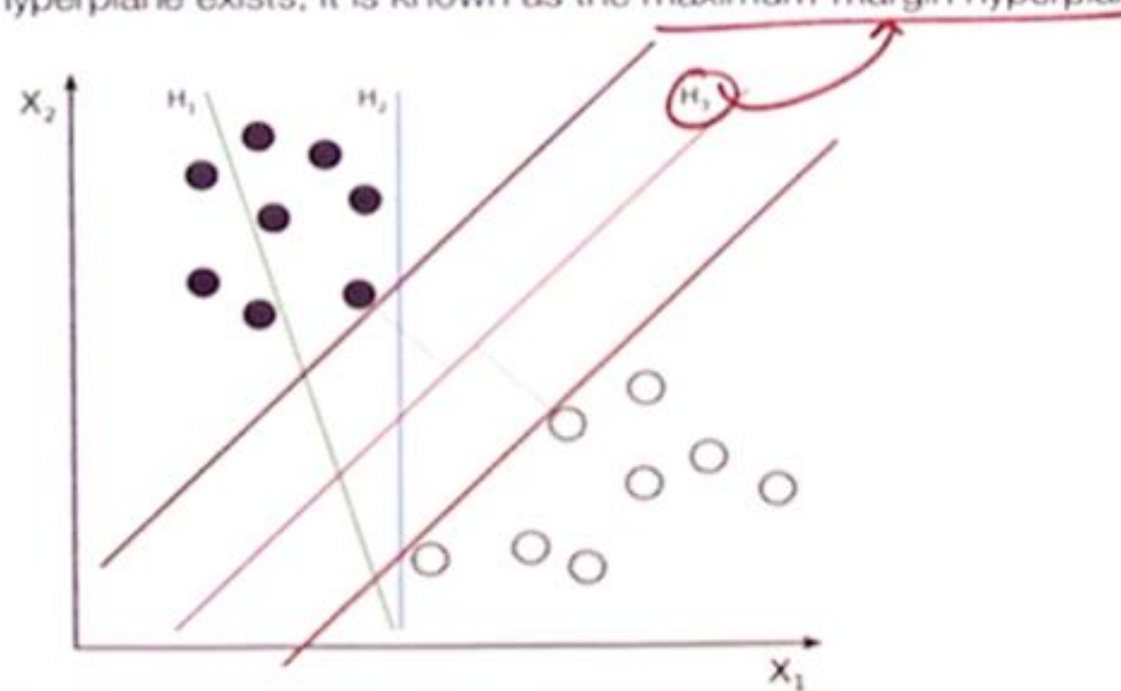


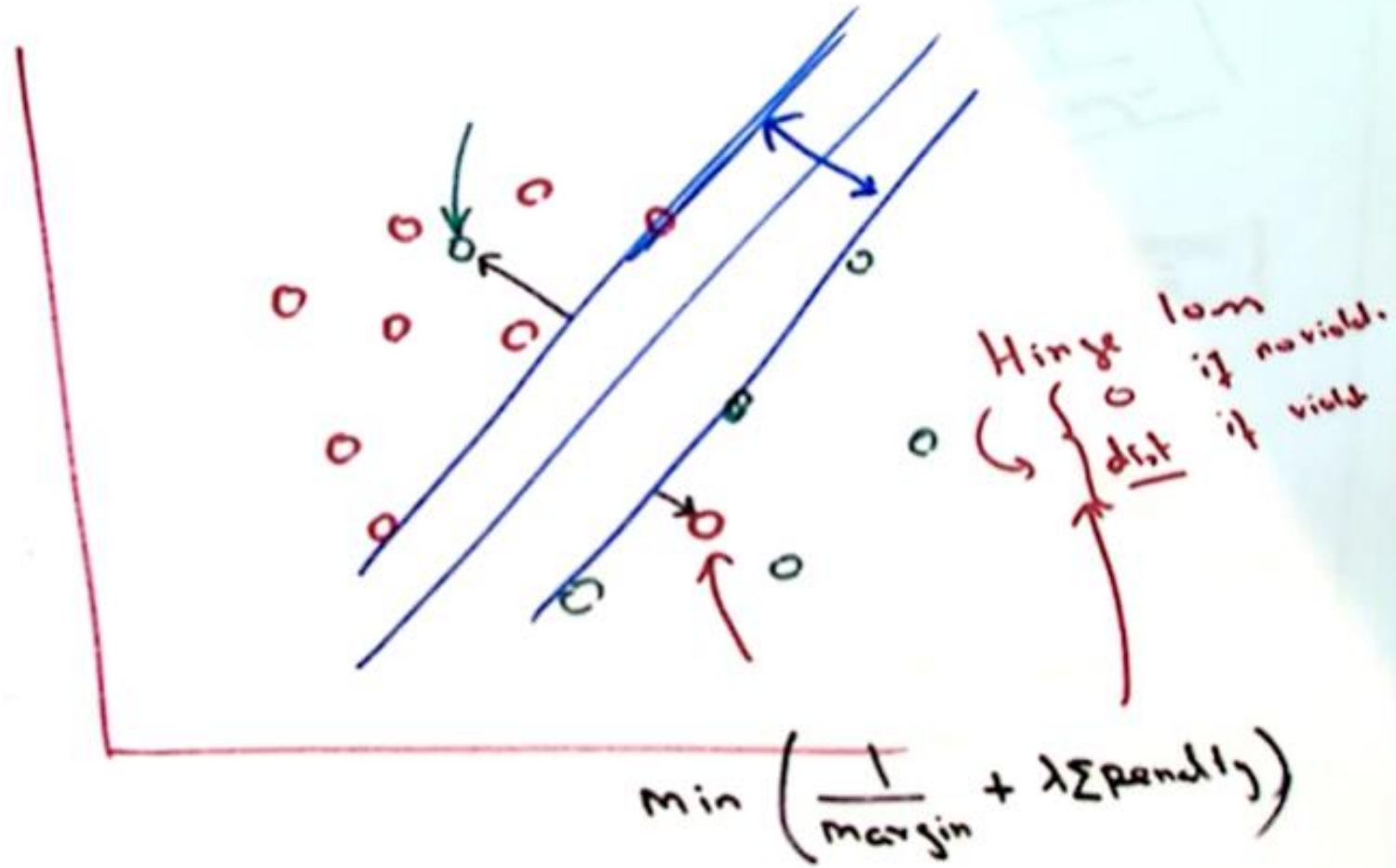
Hard Vs Soft Margin

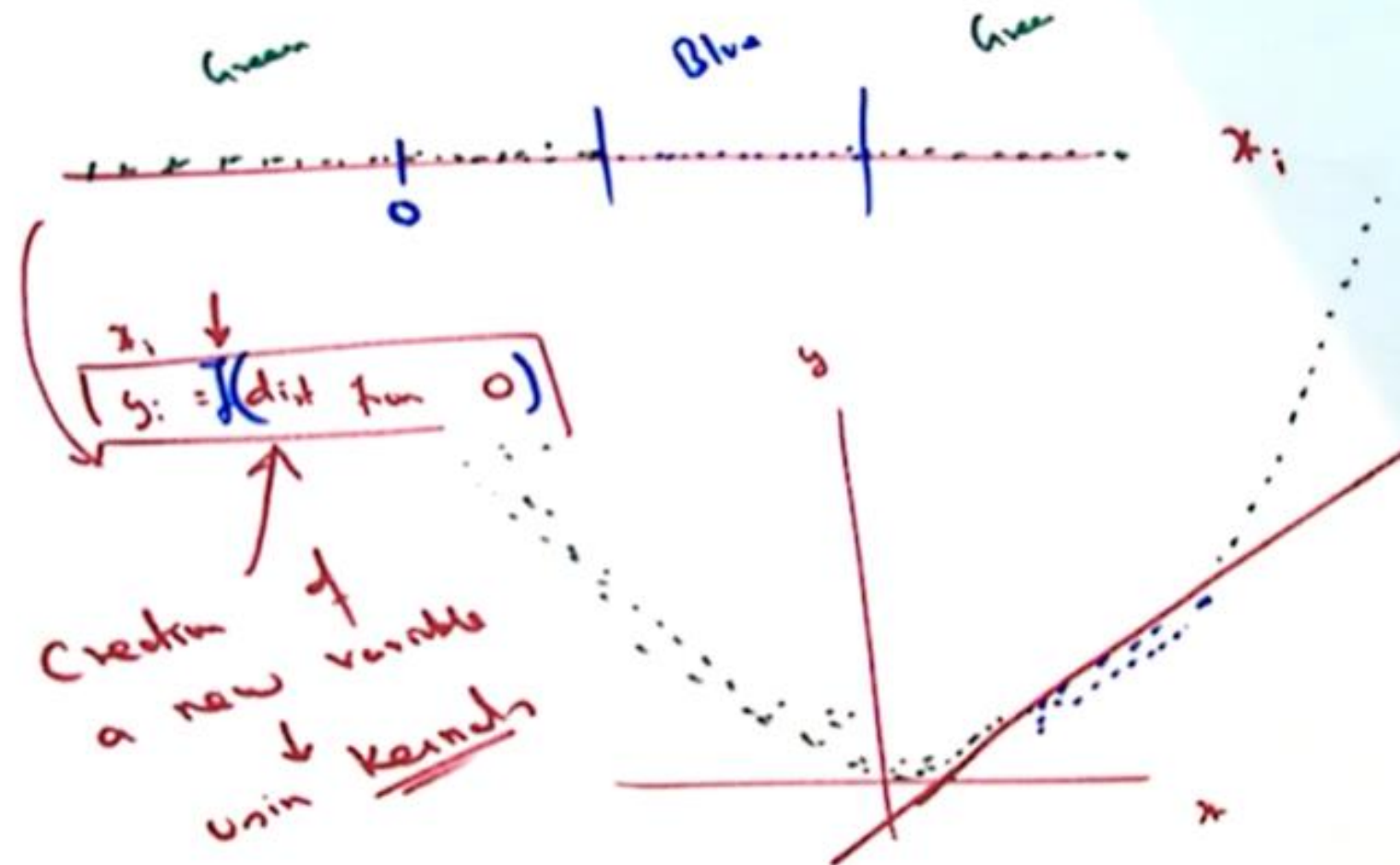
- If the data is linearly separable
 - we can select two parallel hyperplanes that separate the two classes of data, so that the distance between them is as large as possible. }
 - The region bounded by these two hyperplanes is called the "margin", and
 - the maximum-margin hyperplane is the hyperplane that lies halfway between them.
- When data are NOT linearly separable
 - Hinge loss function: adds a penalty for crossing over the margin
 - Penalty is proportional to the distance from the margin

Separating Hyper-planes

- There are many hyperplanes that might classify the data.
- One reasonable choice as the best hyperplane is the one that represents the largest separation, or margin, between the two classes. So we choose the hyperplane so that the distance from it to the nearest data point on each side is maximized.
- If such a hyperplane exists, it is known as the maximum-margin hyperplane

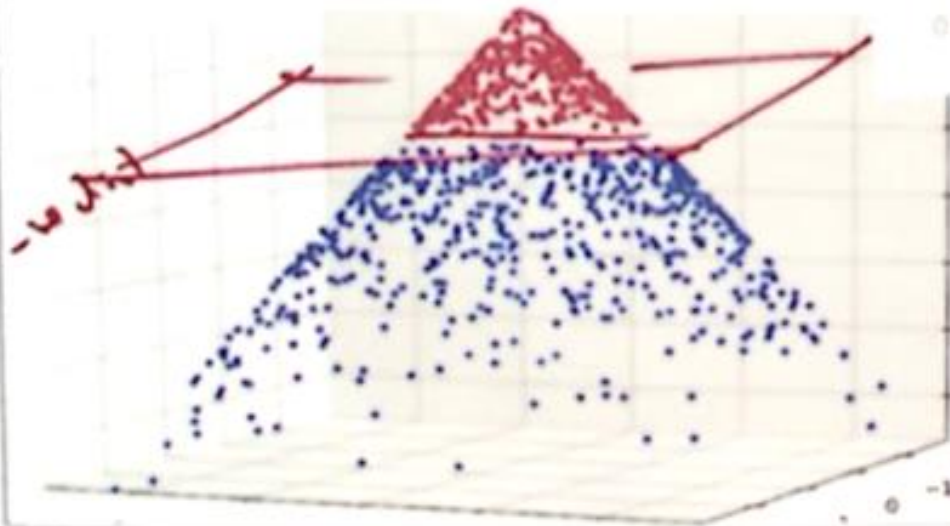






greatlearning
Learning for Life

-
- The figure is a scatter plot titled "Learning for Life". It displays two classes of data points: red dots and blue triangles. The data is plotted on a 2D coordinate system with axes labeled x_1 (horizontal) and x_2 (vertical). Both axes range from 0.0 to 10.0, with major tick marks at 0.0, 2.5, 5.0, 7.5, and 10.0. A large red circle, representing a linear decision boundary, is centered at approximately (5.0, 5.0) with a radius of about 5.0 units. This circle separates the red dots, which are primarily located inside the circle, from the blue triangles, which are primarily located outside the circle. Several red arrows originate from the center of the circle and point outwards towards the boundary, likely representing the normal vector or the direction of the decision boundary.



γ

$\gamma_2 = - \text{dit hon}$
cont

Kernel SVM

- "A complex pattern-classification problem, cast in a high-dimensional space nonlinearly, is more likely to be linearly separable than in a low-dimensional space, provided that the space is not densely populated" - T. Cover