

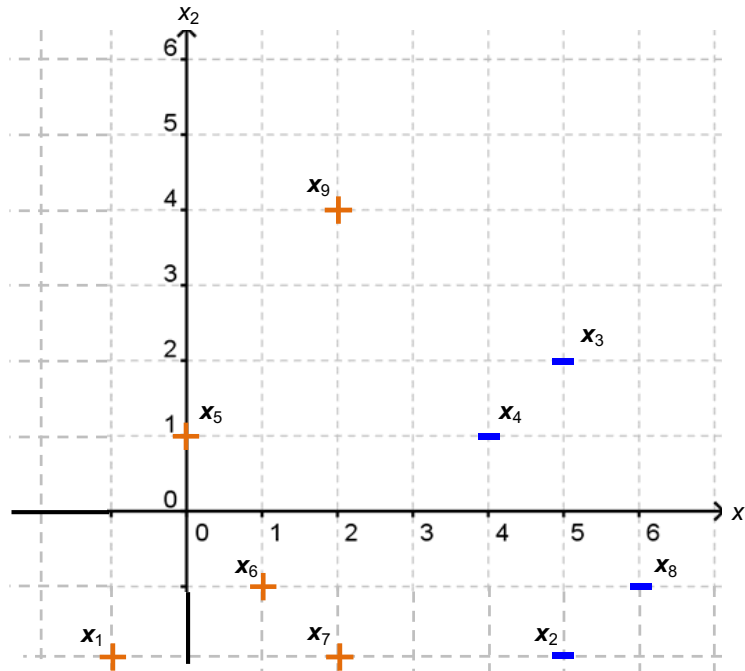
Support Vector Machines*(find and work with a partner)*

1. Prove that the *geometric margin* (physical distance between the point and the hyperplane) for a given example (\vec{x}_i, y_i) and a given hyperplane $(\vec{w} \cdot \vec{x} + b = 0)$ is

$$\gamma_i = y_i \left(\frac{\vec{w}}{\|\vec{w}\|} \cdot \vec{x}_i + \frac{b}{\|\vec{w}\|} \right)$$

SVM Optimization Practice

Incremental SVM optimization algorithm. Let $K = 4$ (initial dataset size). We will iteratively add points in order of their indices (not randomly). Run the incremental SVM optimization algorithm – at each stage, write out S , the support vectors, and which α values end up being 0. At the end, what is the equation of the separating hyperplane?



Round 1:

- $S =$
- Support vectors:
- α 's that are 0:

Round 2:

- $S =$
- Support vectors:
- α 's that are 0:

Round 3:

- $S =$
- Support vectors:
- α 's that are 0:

Round 4:

- $S =$
- Support vectors:
- α 's that are 0: