Support Vector Machines

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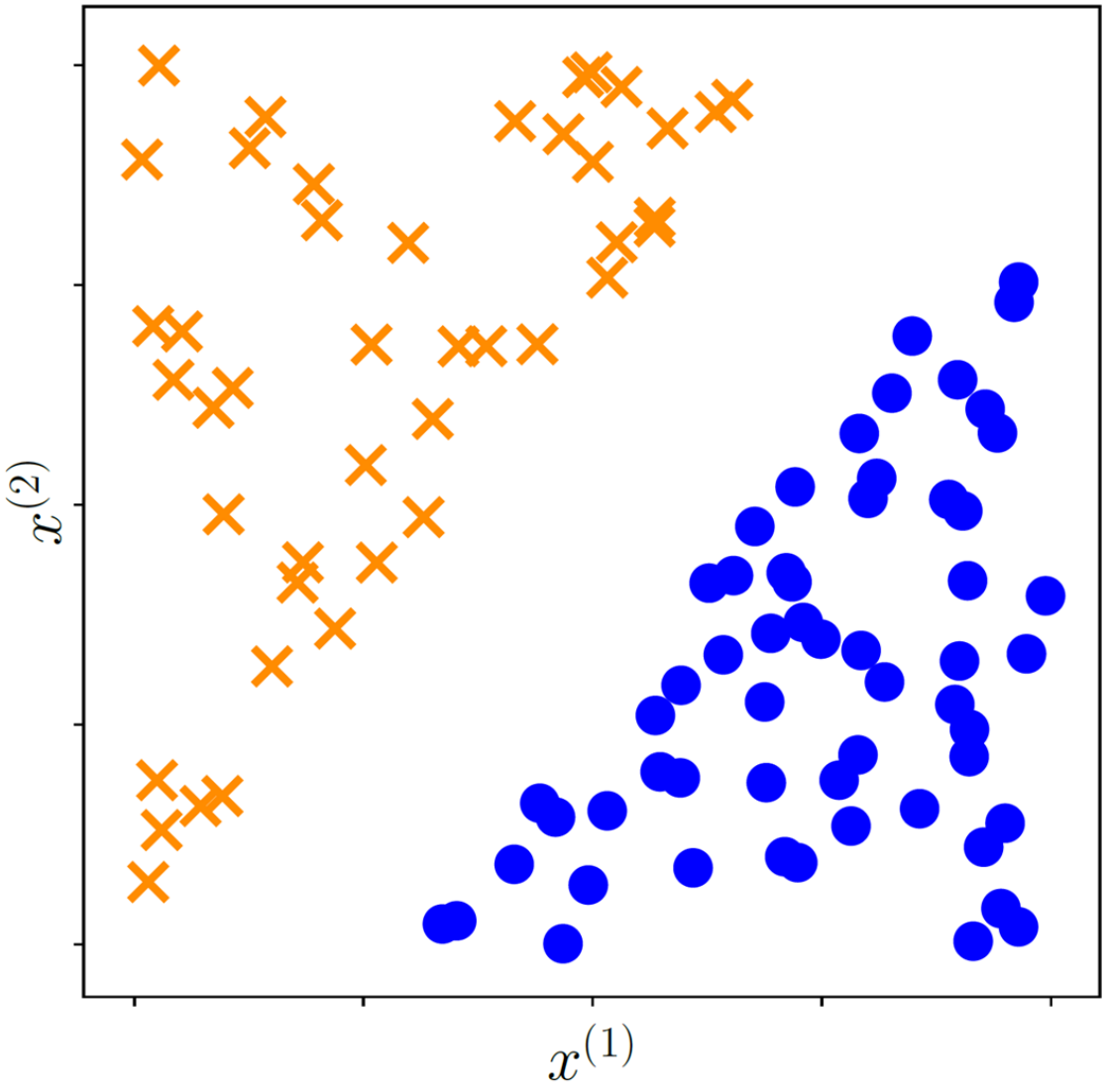

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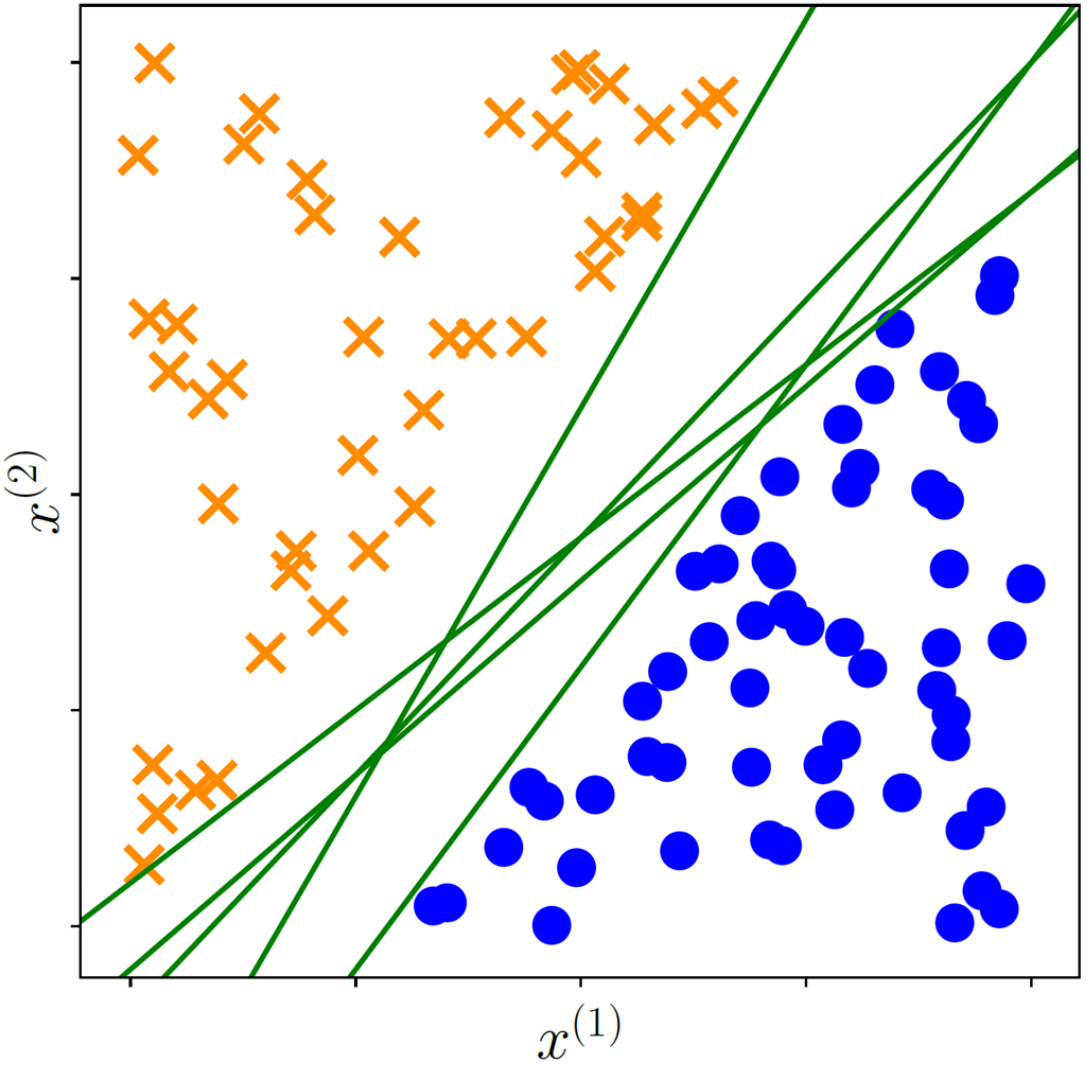

Separating Hyperplane

w - vector normal to hyperplane

$$w^T x + b \geq 0 \text{ when } y_n = +1 \tag{1}$$

$$w^T x + b < 0 \text{ when } y_n = -1 \tag{2}$$

$$y_n(w^T x + b) \geq 0 \tag{3}$$

Representer Theorem

Optimal weight vector is a linear combination of the examples x_n:

$$w = \sum_{i=1}^{N} \alpha_i y_i x_i \tag{4}$$

If $\alpha_i = 0$ then example x_i does not contribute to the solution w.

If $\alpha_i > 0$ then x_i is called a support vector.

SVM Variants

- LinearSVC
- SVC
- NuSVC
- SGDClassifier

References

[1] https://jakevdp.github.io/PythonDataScienceHandbook/05.07-support-vector-machines.html

[2] https://github.com/rasbt/machine-learning-book/blob/main/ch03/ch03.ipynb
Maximum-margin classification with support vector machines

[3] https://www.kaggle.com/code/prashant111/svm-classifier-tutorial