Department of Computer Science
UNIVERSITY OF COLORADO **BOULDER**

Classification: VC Dimension

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LECTURE 7

Questions

Questions

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VC Dimension

To show VC dimension of a set of points

- Show that **a** set of d *can* be shattered
- Show that **no** set of $d + 1$ can be shattered

Axis Aligned Rectangles

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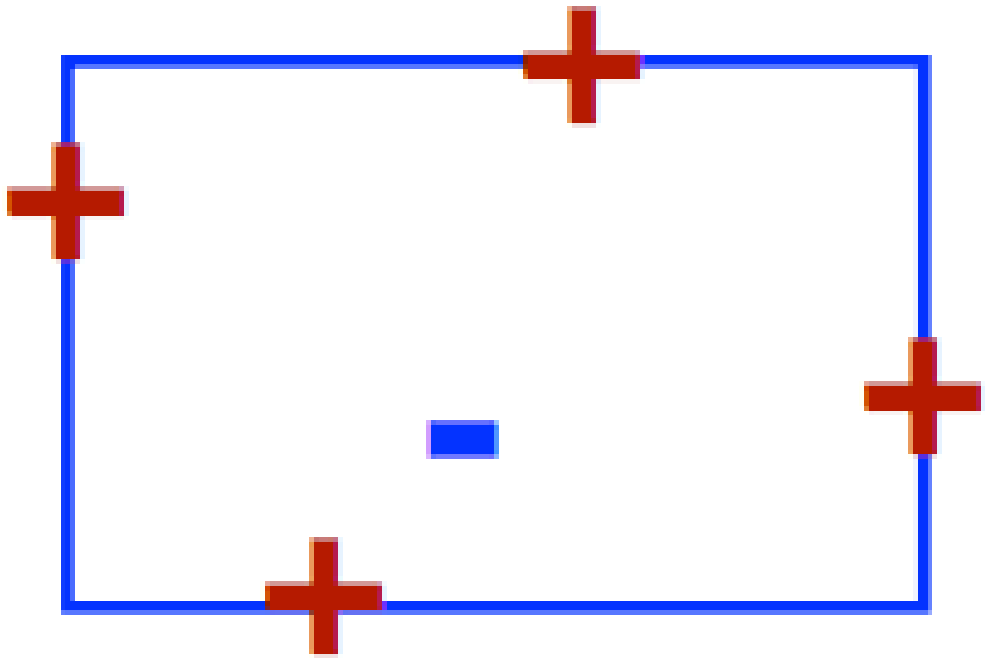
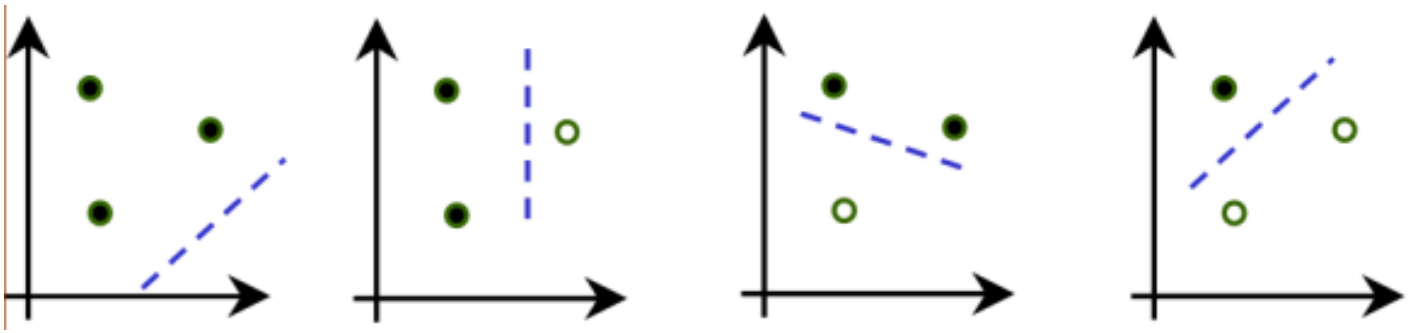


Hyperplanes

Hyperplanes



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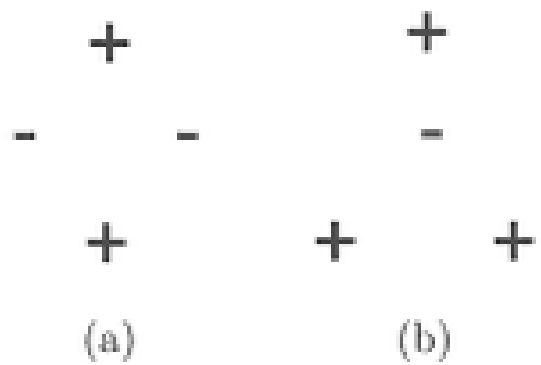

Figure 3.2 Unrealizable dichotomies for four points using hyperplanes in $\mathbb{R}^2$. (a) All four points lie on the convex hull. (b) Three points lie on the convex hull while the remaining point is interior.

Hyperplanes

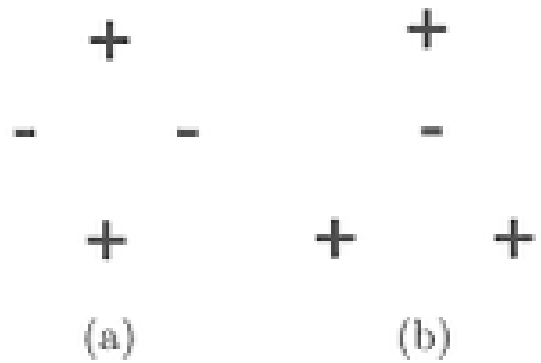

Figure 3.2 Unrealizable dichotomies for four points using hyperplanes in $\mathbb{R}^2$. (a) All four points lie on the convex hull. (b) Three points lie on the convex hull while the remaining point is interior.

In general, the VC dimension of d-dimensional hyperplanes is $d + 1$

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- If a set has d points, there are 2^d ways to do that
- Each configuration requires a different hypothesis
- Solving for the number of hypotheses gives $\lg|H|$

Next time

- Getting more practical
- SVMs
- Excellent theoretical properties