

24 April 1988

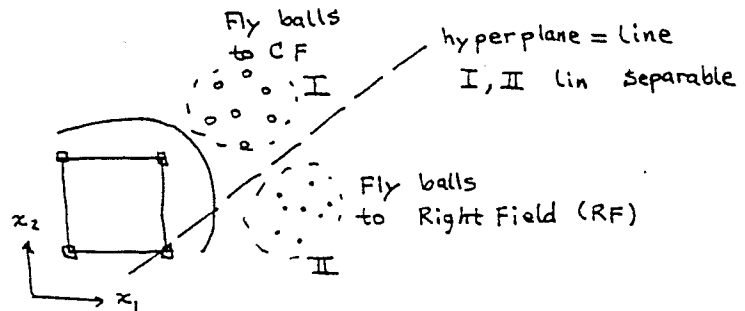
Perceptrons - Linear Separability

Neil E. Cotter

def: Linearly Separable Regions I and II \equiv Can place hyperplane between I and II

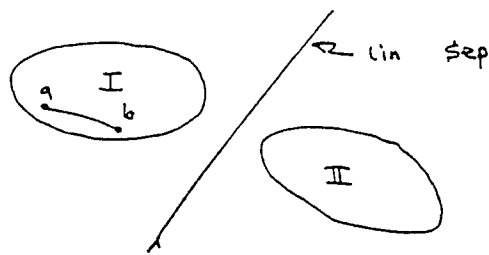
Space dim N	Hyperplane is (dim N-1)
1 line	point
2 plane	line
3 volume	plane
4 space-time	volume (universe at time t_0)
\vdots	\vdots

ex: Baseball



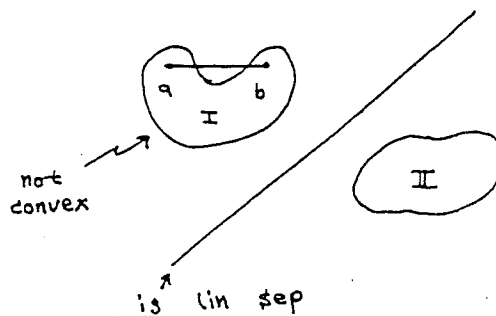
disjant

ex: Any two convex regions are lin. sep.



def: Convex region \equiv Line segment, connecting any two pts a, b in region, is also in region

ex: not convex ~~is~~ not lin sep

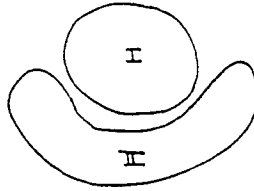


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Perceptrons - Linear Separability (cont.)

Neil E Cotter

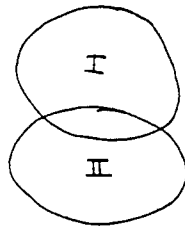
ex: Not lin sep, (not convex)



Can't separate by straight line

• So not linearly separable. II not ~~is~~ convex.

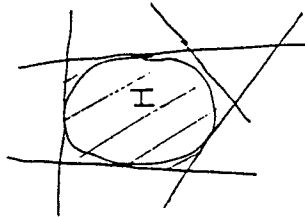
ex: Not lin sep if not disjoint (-obviously)



• Note that I and II can be sets of discrete points and be either lin sep or non lin sep.

- Classification: 1) determine hyperplanes separating regions I, II (assuming I, II lin sep).
- 2) for a given point, determine which side of the hyperplane this point is on, e.g. above or below lin
- 3) point above line is in I, below is in II.

Classification



$I \approx$ polygon formed by hyperplanes (lines)

• Use perceptrons to determine which side of lines a given pt is on.