CS 307 Lecture 20

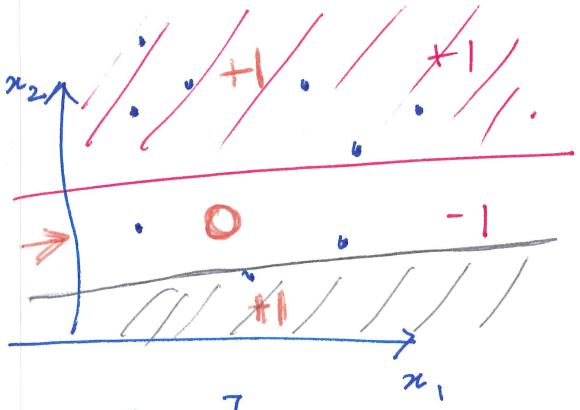
Linear Learning Algorithms.

Feature expansion was a way to use a linear hypothesis on higher dimensional space. to get a non-linear hypothesis in the original feature space.

— Using polynomial features

— Gaussian expansion (RBF)

Linear Classification:



Add features by defining them using step functions / linear classifiers

$[x_1, x_2] = x^T$

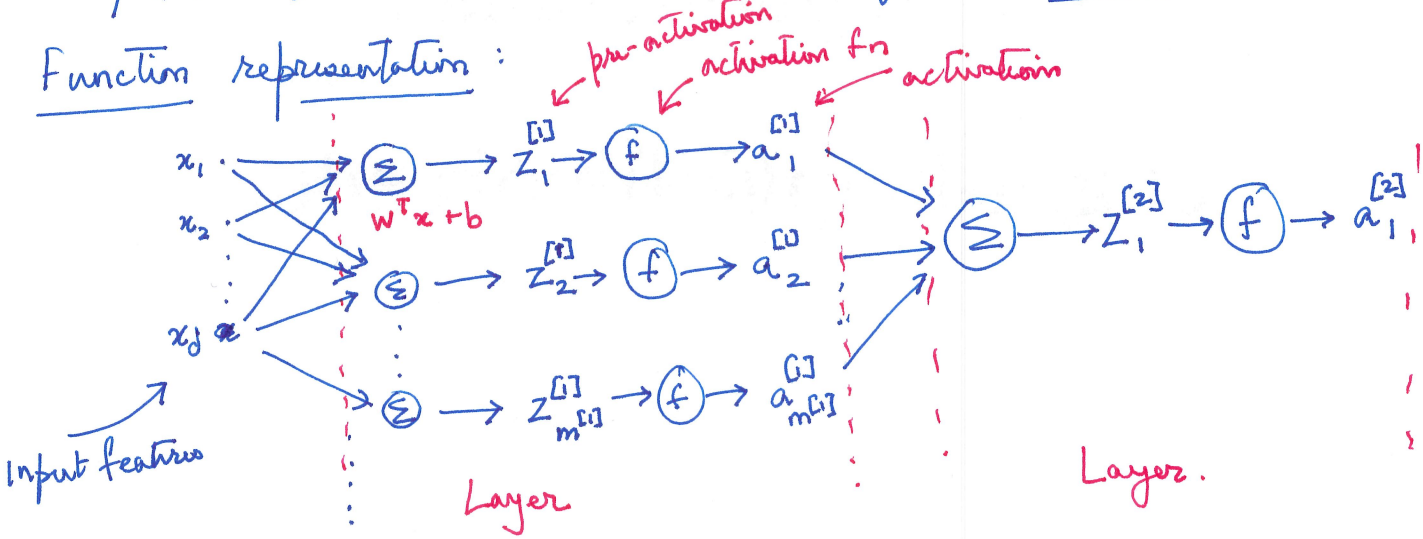
$\phi(x)^T = [x_1 \quad x_2 \quad x_3] \qquad x_3 = 1[\theta_1 x_1 + \theta_2 x_2 + \theta_0 > 0]$

$= \text{sign}(\theta_1 x_1 + \theta_2 x_2 + \theta_0)$

$x_4 = 1[\theta_1' x_1 + \theta_2' x_2 + \theta_0' > 0]$

$\phi(x)^T = [x_1 \quad x_2 \quad x_3 \quad x_4]$ Classification: $1([x_3 + x_4 - \frac{1}{4}] > 0)$

Function representation:



→ forward ← backwards.