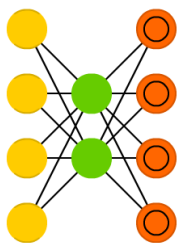


Auto Encoder (AE)



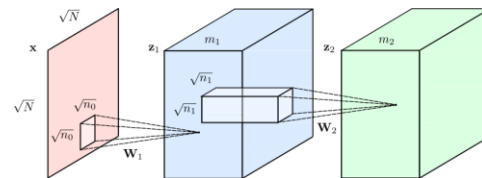
Perceptron (P)



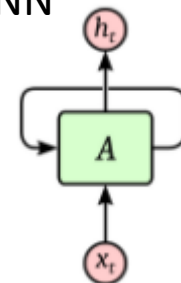
Feed Forward (FF)



CNN



RNN

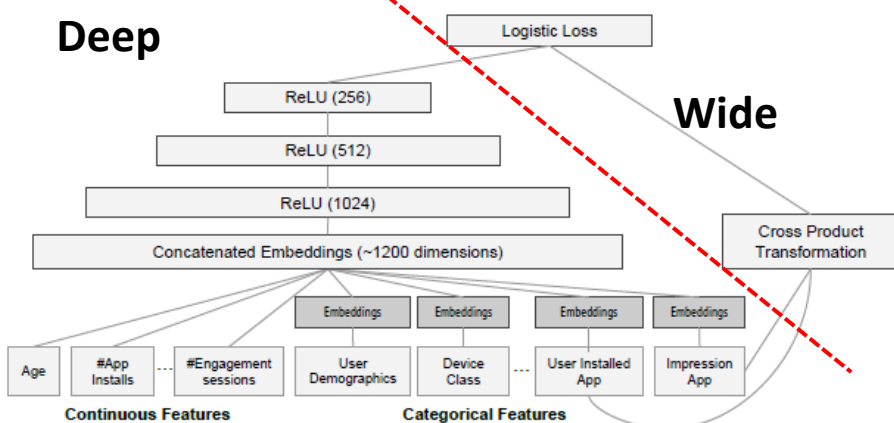


2016
Wide & Deep

2016
PNN

2016
FNN

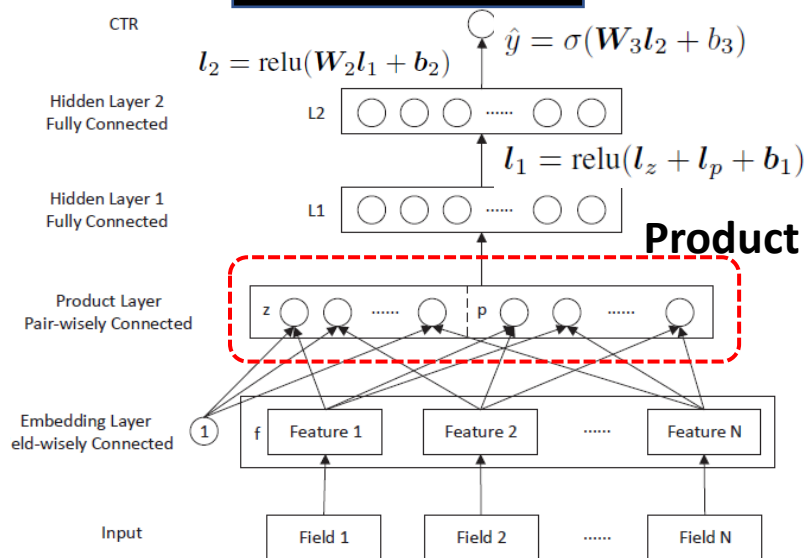
Deep



Wide

$$P(Y = 1|x) = \sigma(\mathbf{w}_{wide}^T [\mathbf{x}, \phi(\mathbf{x})] + \mathbf{w}_{deep}^T a^{(l_f)} + b)$$

CTR



CTR

Fully Connected

Hidden Layer (l2)

Fully Connected

Hidden Layer (l1)

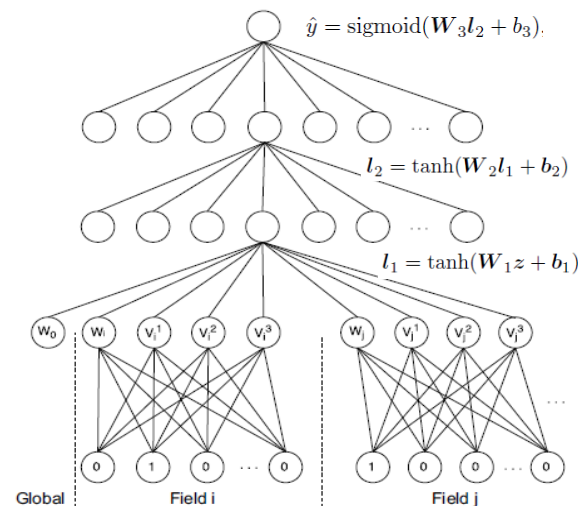
Fully Connected

Dense Real Layer (z)

Initialised by FM's Weights and Vectors.

Fully Connected within each field

Sparse Binary Features (x)



FM 初始化底层

$$y_{FM}(x) := \text{sigmoid}\left(w_0 + \sum_{i=1}^N w_i x_i + \sum_{i=1}^N \sum_{j=i+1}^N \langle v_i, v_j \rangle x_i x_j\right)$$

Product-based Neural Networks, PNN

Factorisation machine supported
Neural Network, FNN