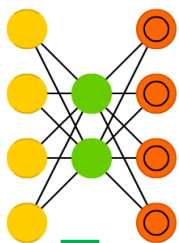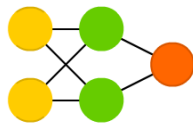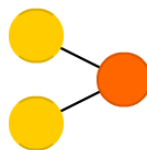Auto Encoder (AE)

Feed Forward (FF)

Perceptron (P)

CNN

RNN

2015
CDL

2015
CCPM

$$\mathbf{W}_{l,*n} \sim \mathcal{N}(0, \lambda_w^{-1} \mathbf{I}_{K_l}).$$

$$\mathbf{R}_{ij} \sim \mathcal{N}(\mathbf{u}_i^T \mathbf{v}_j, \mathbf{C}_{ij}^{-1})$$
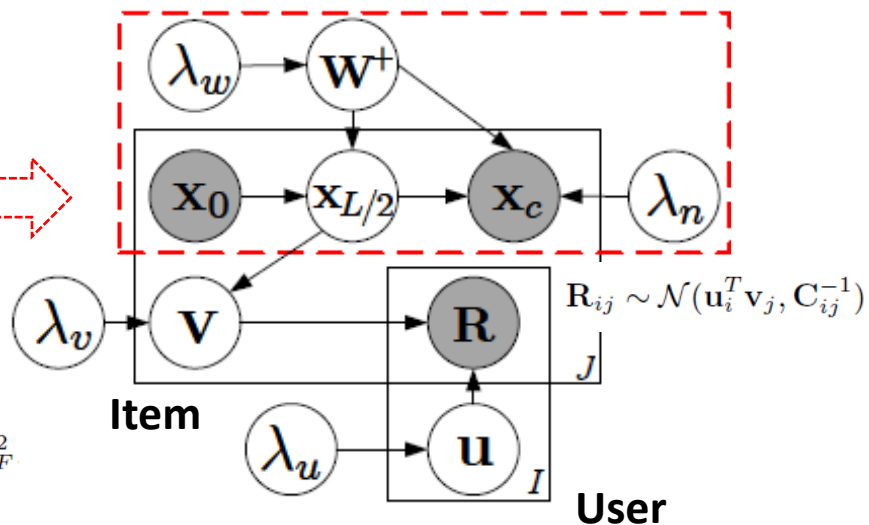
Item

User
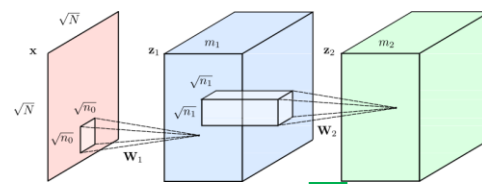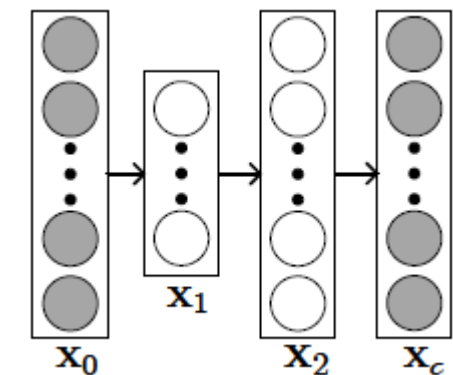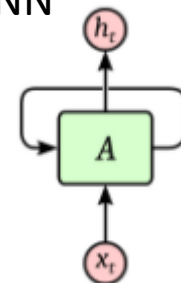
$$\min_{\{\mathbf{W}_l\},\{\mathbf{b}_l\}} \|\mathbf{X}_c - \mathbf{X}_L\|_F^2 + \lambda \sum_l \|\mathbf{W}_l\|_F^2$$

Stacked Denoising
Autoencoder (SDAE)

$$\mathbf{R}_{ij}^* \approx (\mathbf{u}_j^*)^T (f_e(\mathbf{X}_{0,j*}, \mathbf{W}^{+*})^T + \epsilon_j^*) = (\mathbf{u}_i^*)^T \mathbf{v}_j^*$$

Collaborative Deep Learning, CDL
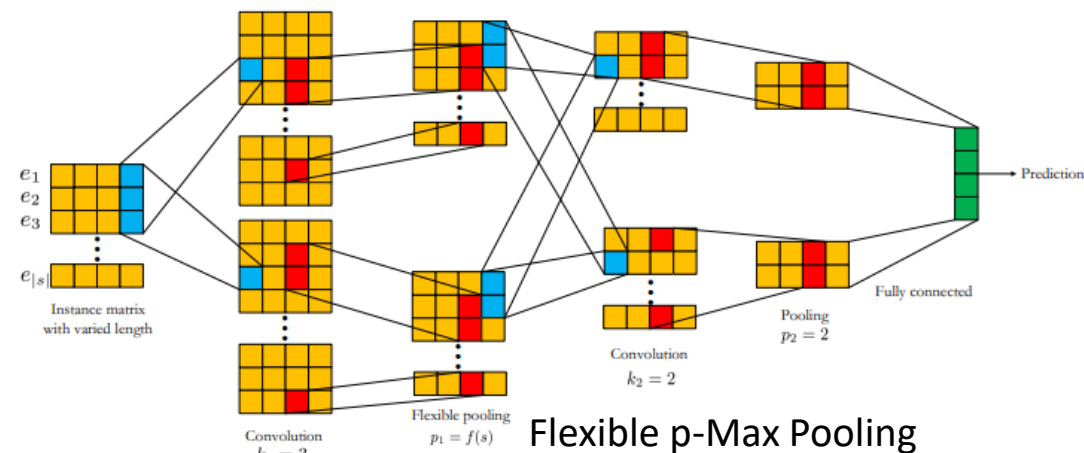
Flexible p-Max Pooling

$$p_i = \begin{cases} (1-(i/l)^{l-i})n, & i = 1, \cdots, l-1 \\ 3, & i = l \end{cases}$$

Convolutional Click Prediction Model (CCPM)