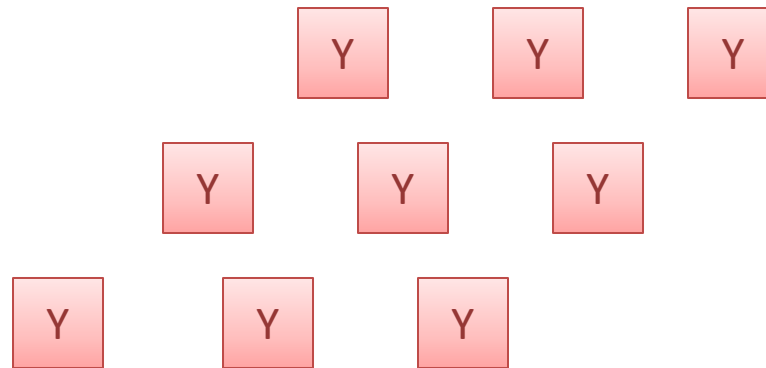


Hierarchical Belief Propagation (HBP)

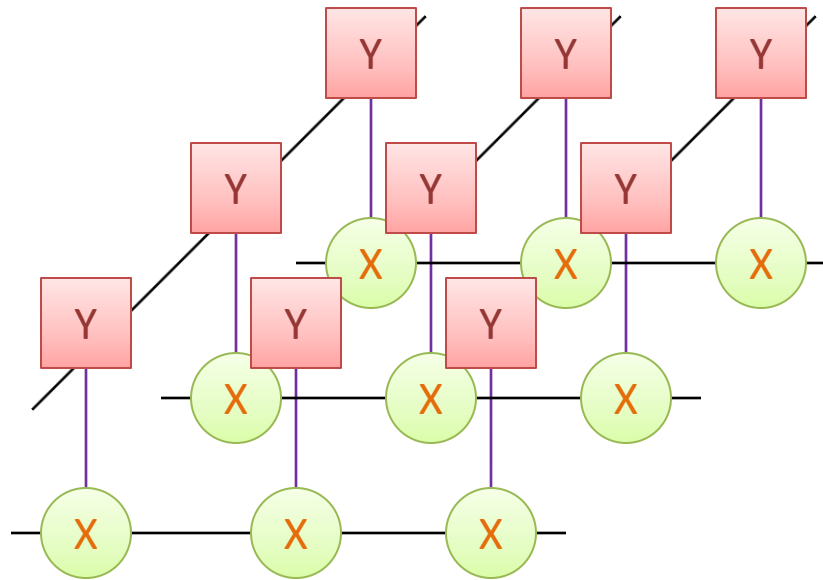


MRF structure

Y : Observation node.

Represent some visible information in low-level problem.

Hierarchical Belief Propagation (HBP)



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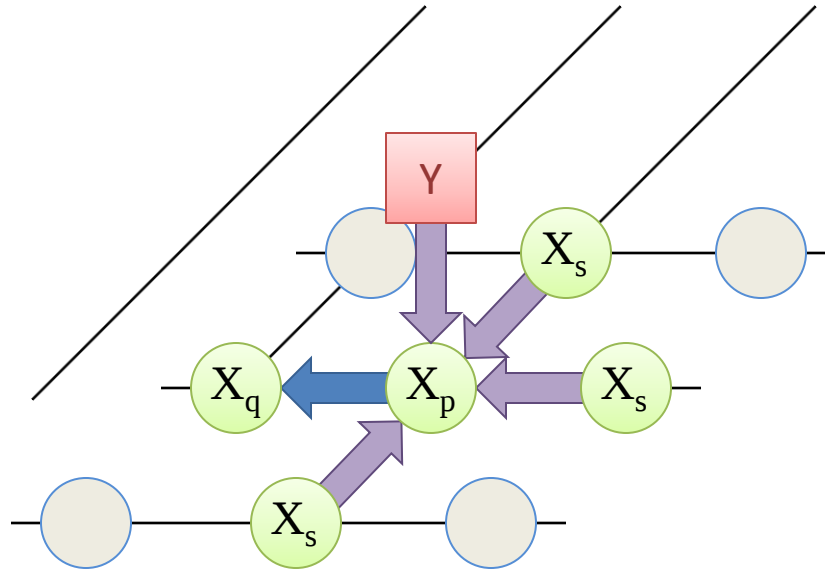
X : Hidden node.

Each node own a corresponding observation node Y.

- Energy function

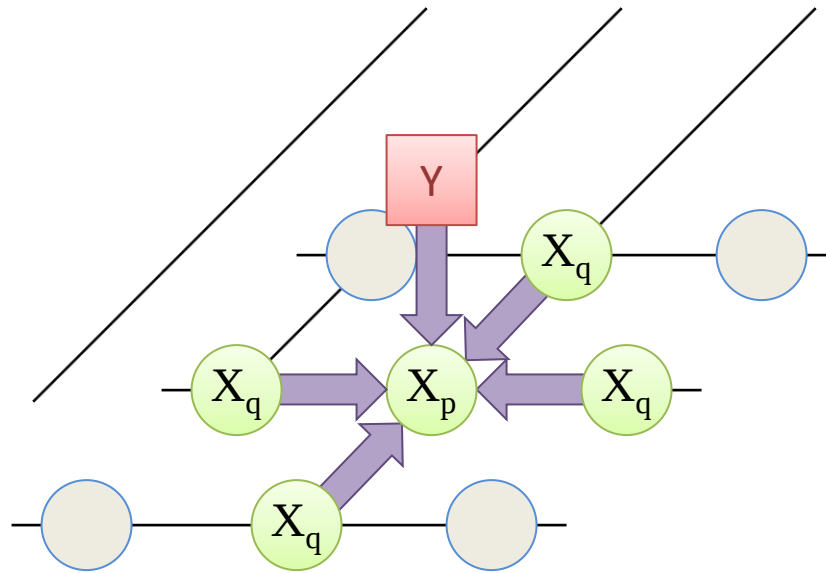
$$E(f) = \underbrace{\sum_{p \in P} D_p(f_p)}_{\text{Data term}} + \lambda \underbrace{\sum_{(p,q) \in N} V(f_p, f_q)}_{\text{Smoothness term}}$$

Hierarchical Belief Propagation (HBP)



- At each iteration, messages are computed.

Hierarchical Belief Propagation (HBP)



- After T iterations, a belief vector is computed for each node

$$b_q(f_q) = D_q(f_q) + \sum_{p \in N(q)} m_{pq}^T(f_q)$$