Probabilistic Graphical Models

Lectures 15

Map Inference - Max Marginals

Inference

- Belief propagation (Sum-product)
- MAP inference

MAP inference

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MAP Inference

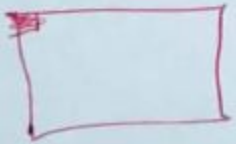
$P(A, B, C, D, E)$

$X^* = \underset{X}{\operatorname{argmax}}\ P(X)$

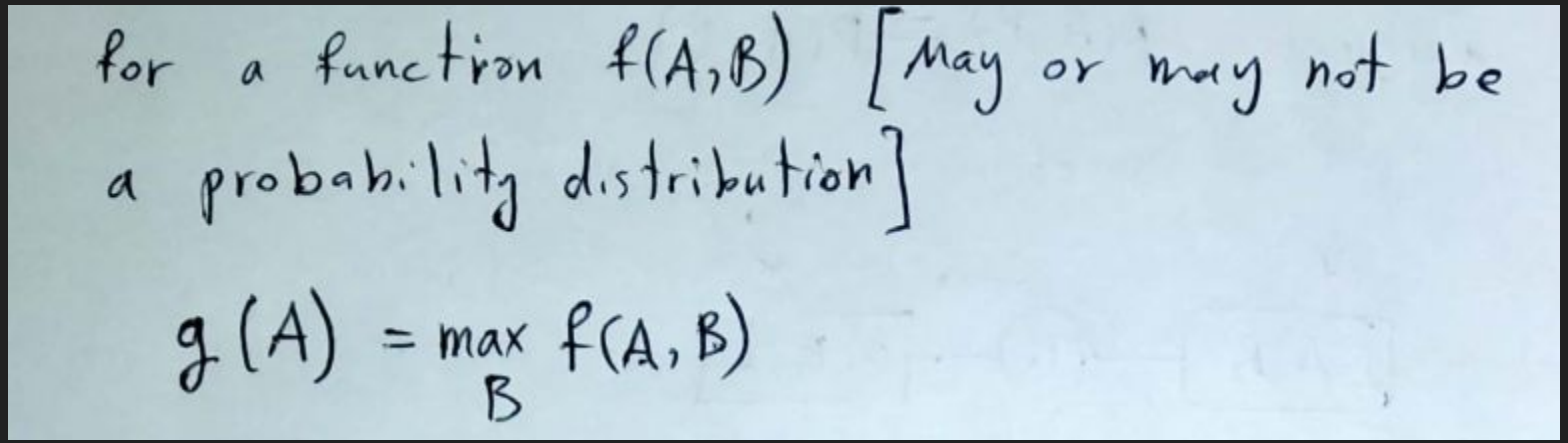
$X^* = \underset{X}{\operatorname{argmax}}\ P(X \mid Y = y)$

$A^*, B^*, C^*, D^*, E^* = \underset{A,B,C,D,E}{\operatorname{argmax}}\ P(A, B, C, D, E)$

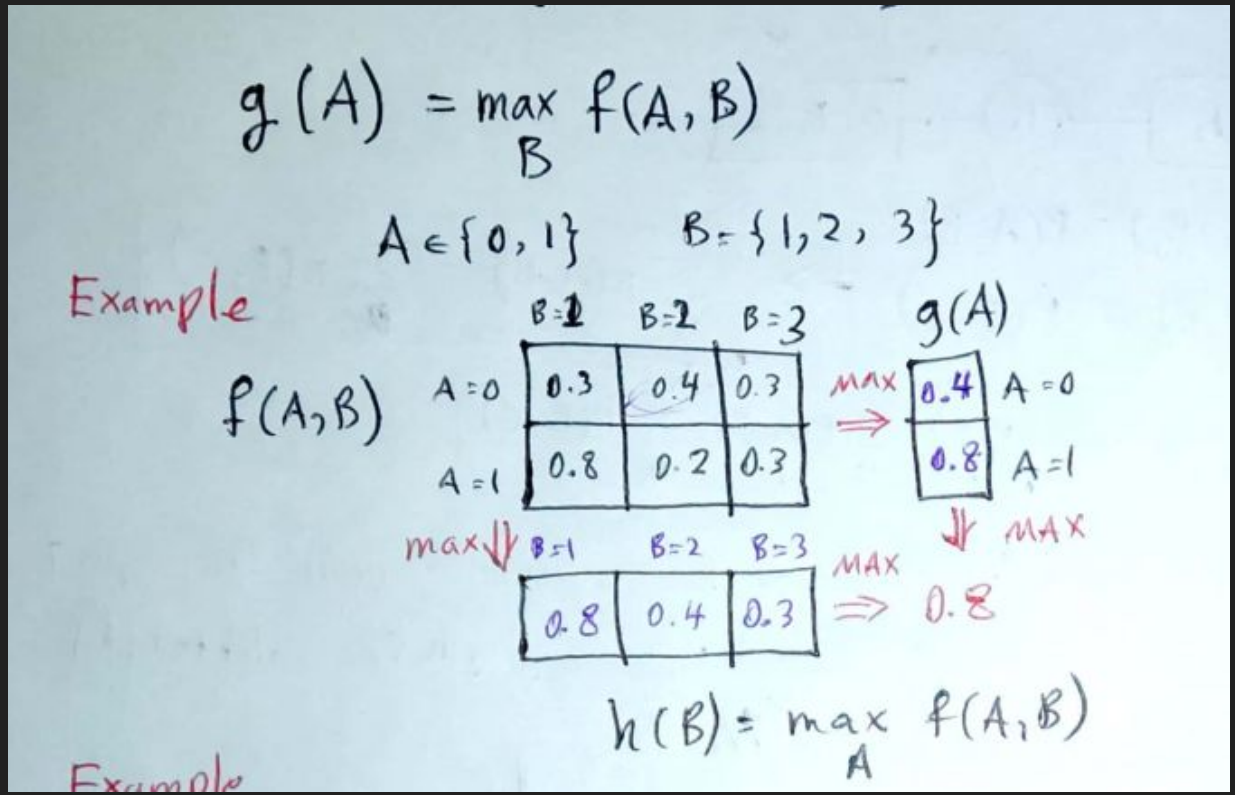
find the joint assignment to $X_1, X_2, \ldots, X_n$ that maximizes $P(X_1, X_2, \ldots, X_n)$.



Max Marginal



Max Marginal



Max Marginal

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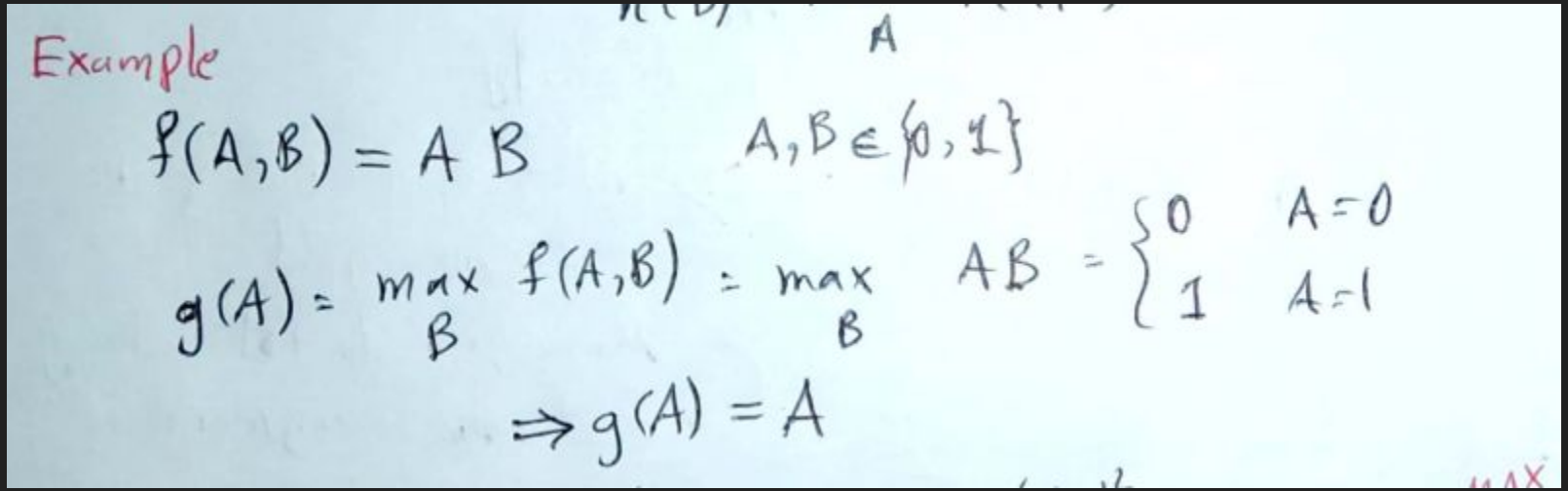

Max Marginal

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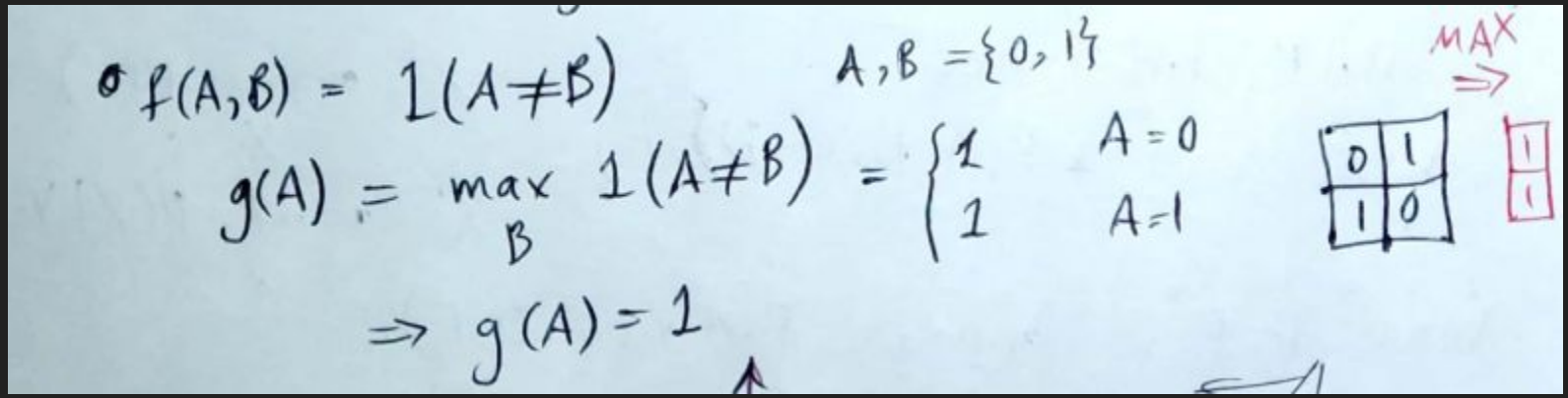

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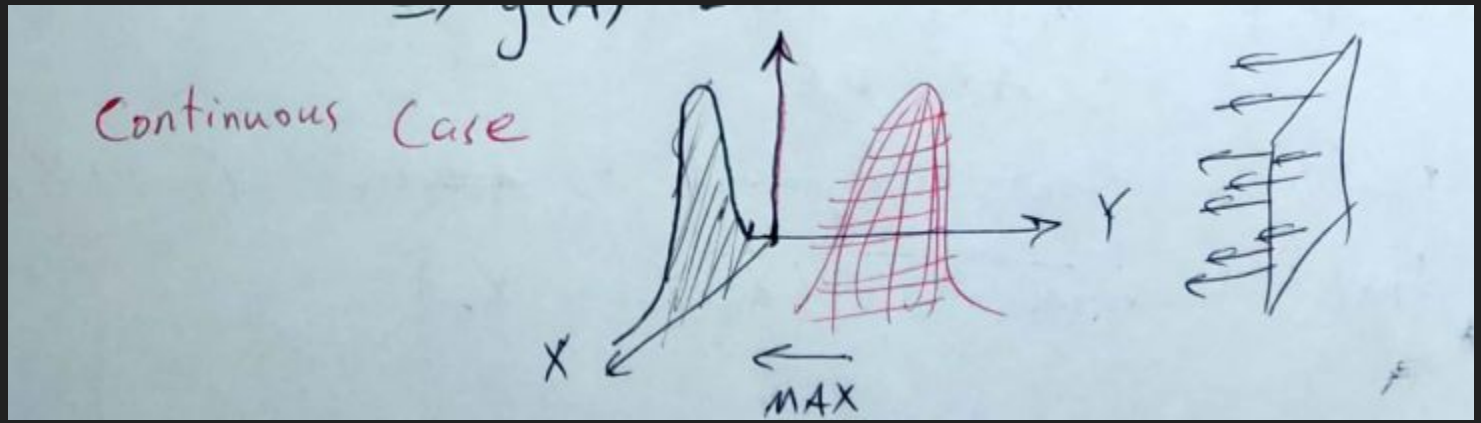

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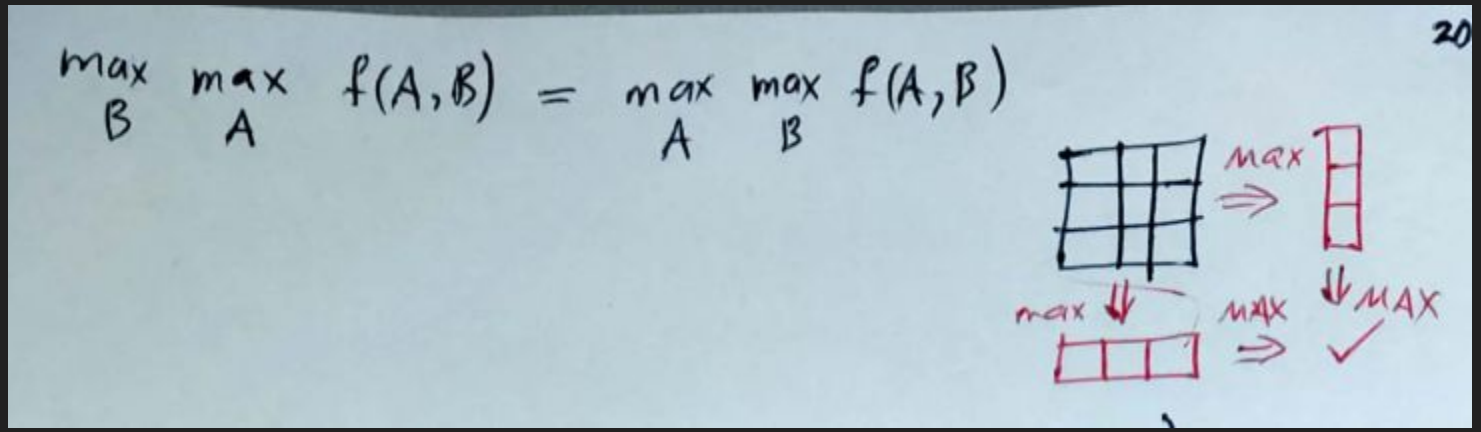
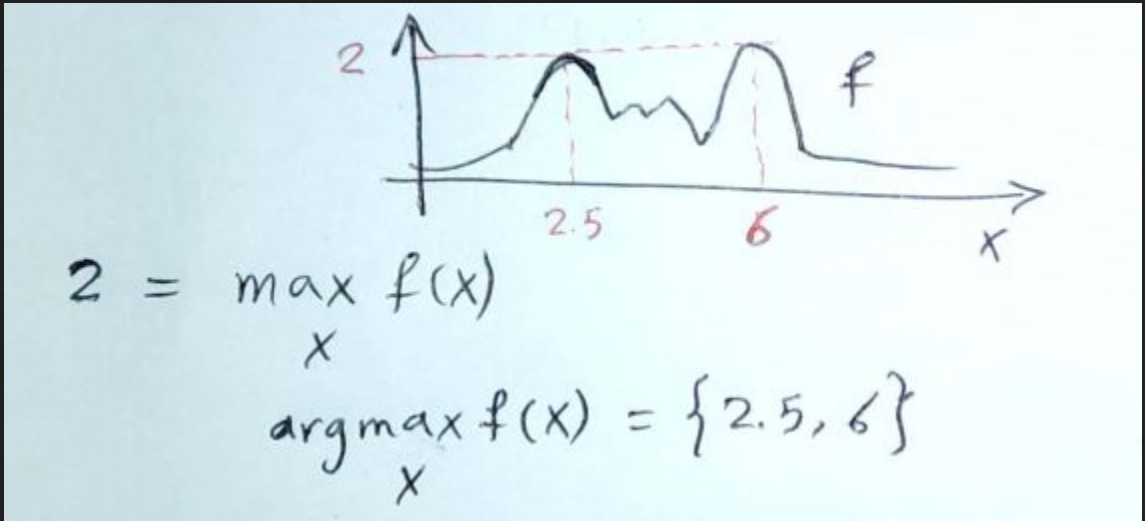
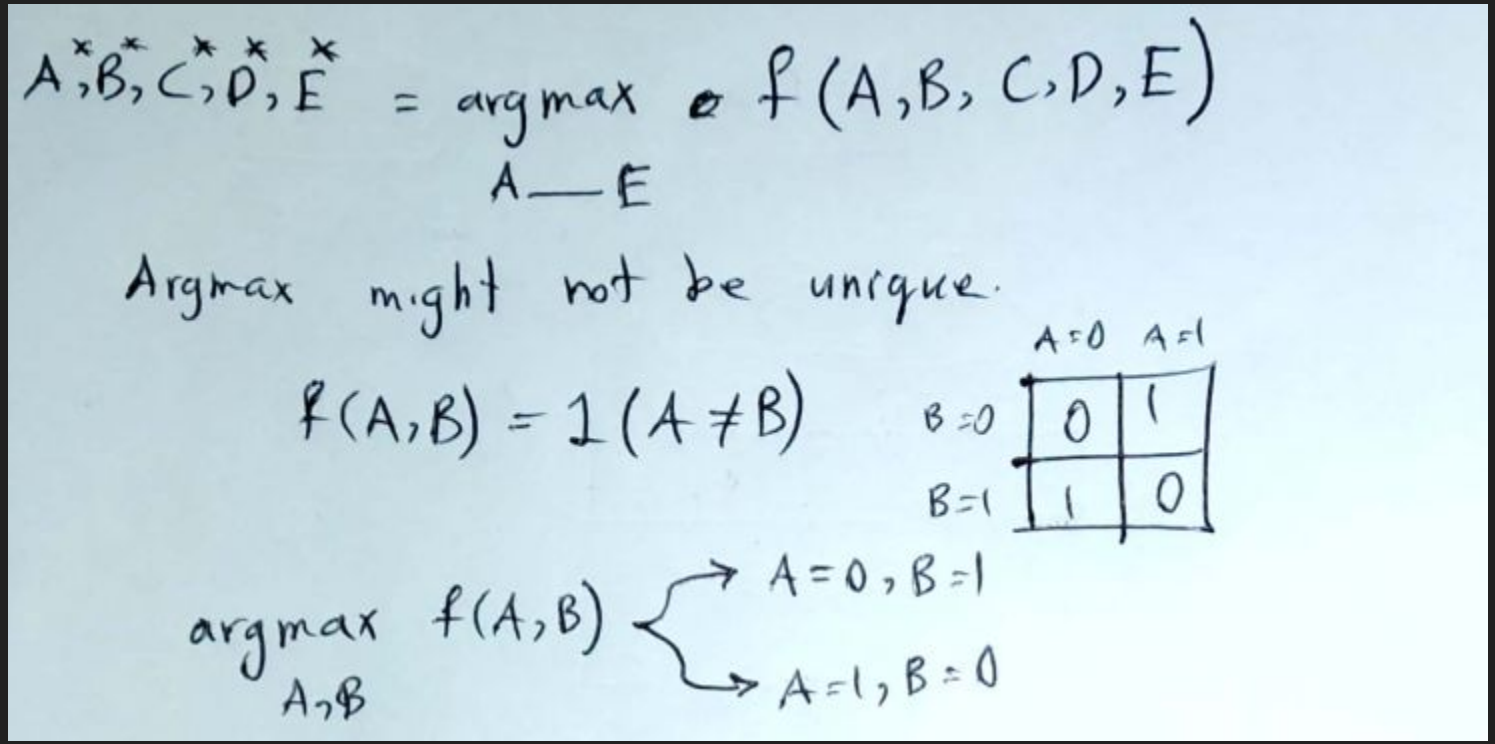


Max Marginal



Max Marginal



Max Marginal

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$$A^*, B^*, C^*, D^*, E^* = \underset{A,B,C,D,E}{\operatorname{argmax}} \; P(A, B, C, D, E)$$

Assume that (A^*, B^*) is unique. (the solution)

1- obtan max-marginal

$$g(A) = \max_{B,C,D,E} P(A, B, C, D, E)$$

2- compute argmax

$$A^{**} = \underset{A}{\operatorname{argmax}} \; g(A)$$

(also unique) نیز

$$A^* \stackrel{?}{=} A^{**} \quad \text{YES}$$