

# VB Nonparametric Random Utility

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## 1. Derivation

- Likelihood:

$$\Pr(y_{ht} | \mathbf{x}, \mathbf{w}, \beta) = \prod_{j=1}^J \left\{ e^{\mathbf{w}'_{htj} \beta_h + f(x_{htj})} / \sum_{j'=1}^J e^{\mathbf{w}'_{htj'} \beta_h + f(x_{htj'})} \right\}^{y_{ht}^j} \quad (1)$$

- $f(x_{htj}) = \sum_{\ell=0}^L \theta_{\ell} \varphi_{\ell}(x_{htj})$

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