0.6 Graphical models

0.6.1 Gibbs' Sampling from an discrete undirected model

Algorithm 35: Gibbs' sampling from undirected model

Input : Potential functions $\{\phi_c[\mathcal{S}_c]\}_{c=1}^C$
Output: Samples $\{\mathbf{x}_t\}_1^T$
begin
    // Initialize first sample in chain
    $\mathbf{x}_0 = \mathbf{x}^{(0)}$
    // For each time sample
    for $t=1$**to** T **do**
        $\mathbf{x}_t = \mathbf{x}_{t-1}$
        // For each dimension
        for $d=1$**to** d **do**
            // For each possible value
            for $k=1$**to** K **do**
                $\lambda_k = 1$
                $x_{td} = k$
                for c *such that* $d \in \mathcal{S}_c$ **do**
                    $\lambda_k = \lambda_k \phi_c[\mathcal{S}_c]$
                end
            end
            $\boldsymbol{\lambda} = \boldsymbol{\lambda}/\sum_{k=1}^K \lambda_k$
            // Draw from categorical distribution
            $x_{td} = \mathsf{DrawFromCategorical}[\boldsymbol{\lambda}]$
        end
    end
end

It is normal to discard the first few thousand entries so that the initial conditions are forgotten. Then entries are chosen that are spaced apart to avoid correlation between the samples.