1 Model

Let $\mathbf{x} \in \{0,1\}^n$. We want to find the distribution $q(\mathbf{x})$ that maximizes the entropy subject to the moment constraints:

$$\mathbb{E}_{\mathbf{x}\sim q}[\mathbf{x}] = p\mathbf{1} \triangleq \mu \tag{1}$$

$$\mathbb{E}_{\mathbf{x}\sim q}[(\mathbf{x}-\mu)(\mathbf{x}-\mu)^\top] = \Sigma \qquad \Sigma_{ij} \triangleq p(1-p)e^{\frac{-|i-j|}{\xi}}, \tag{2}$$

for some $\xi > 0$.

We need to solve for 2^n values that define q. Our constraints can be written as the following linear equations:

$$\sum_{\mathbf{x}\in\{0,1\}^n|\mathbf{x}_i=1} q(\mathbf{x}) = p \qquad \forall i \in [n] \tag{3}$$

$$\tag{4}$$