

Gene state given the data

It's parent state given the data

$$\mathbb{P}(\mathbf{x}^p = \mathbf{x} \mid \tilde{D}) = \underbrace{\left\{ \prod_{m \in \mathbf{O}(p)} \mathbb{P}(\tilde{D}_m \mid x_m) \right\}}_{\text{Everything below } x^p} \underbrace{\sum_{x_p} \mathbb{P}(x_p \mid \tilde{D}) \frac{\mathbb{P}(\mathbf{x}^p = \mathbf{x} \mid x_p)}{\mathbb{P}(\tilde{D}_p \mid x_p)}}_{\text{Everything above } x^p}$$