For a given chunk of four-part music X, parts $\{X_1, X_2, X_3, X_4\}$ and the notes $x_i^t \in X_i$ at various time step t can be visualized as follows,

$$\begin{aligned} X_1 &= \{..., x_1^{t-2}, x_1^{t-1,}, x_1^t, x_1^{t+1}, x_1^{t+2}, ...\} \\ X_2 &= \{..., x_2^{t-2}, x_2^{t-1,}, x_2^t, x_2^{t+1}, x_2^{t+2}, ...\} \\ X_3 &= \{..., x_3^{t-2}, x_3^{t-1,}, x_3^t, x_3^{t+1}, x_3^{t+2}, ...\} \\ X_4 &= \{..., x_4^{t-2}, x_4^{t-1,}, x_4^t, x_4^{t+1}, x_4^{t+2}, ...\} \end{aligned} \tag{1}$$

Relationships exists both across the time steps of the same part, as well as the across parts at the same time step. The first can be intuitively understood as melody, and the latter harmony.

To model these relationships, two LSTMs networks (the Note models, F for the forward model and B for the backward model) and one partially connected network (the Harmony model H) is used to model the conditional probability distribution of each x_i^t,

$$\begin{aligned} F(\{..., x_m^{t-3}, x_m^{t-2}, x_m^{t-1}\}) =& P(x_m^t = n \mid ..., x_1^{t-3}, x_1^{t-2}, x_1^{t-1,}) \\ B(\{x_m^{t+1}, x_m^{t+2}, x_m^{t+3}, ...\}) =& P(x_m^t = n \mid x_m^{t+1}, x_m^{t+2}, x_m^{t+3}, ...) \\ H(\{x_j^t, x_k^t, x_l^t\}) =& P(x_m^t = n \mid x_j^t, x_k^t, x_l^t) \\ \{j, k, l, m\} \in& \{1, 2, 3, 4\} \end{aligned} \tag{2}$$

Lastly, a fully-connected judge network J takes in three suggestions and comes up with a final decision,

$$J(F, B, H) = P(x_m^t = n \mid F, B, H) \tag{3}$$