



$$\begin{aligned}\hat{x}_{MMSE} &= E[x|Z] \\ &= \sum_{A_i} E[x|A_i] p(A_i|Z) \\ &= E[E[x|A_i]|Z]\end{aligned}$$

$$\hat{x}_{MMSE-MAP} = E[x|A_{i_{MAP}}, Z]$$

$$\begin{aligned}i_{MAP} &= \arg \max_i p(A_i|Z) \\ &= \arg \max_i p(Z|A_i)p(A_i)\end{aligned}$$

$$\hat{x}_{MMSE-ML} = E[x|A_{i_{ML}}, Z]$$

$$i_{ML} = \arg \max_i p(Z|A_i)$$