

(7th Assignment is due on June 7th. The paper work must be submitted on the class.)

(1) Assume that $(Y_1, Y_2, Y_3, Y_4) \sim \text{multinomial}$ with $(0.5 - 0.5\theta, 0.25\theta, 0.25\theta, 0.5)$. When the incomplete data $(y_1, y_2, y_3 + y_4) = (38, 34, 125)$ are observed, please use EM algorithm to estimate θ with the initial value $= 0.5$.

(2) Considers historic data on widows and their dependent children from a Swedish pension fund. If y_k denotes the number of widows with k dependent children, then the data values are $y_0 = 3062$, $y_1 = 587$, $y_2 = 284$, $y_3 = 103$, $y_4 = 33$, and $y_5 = 4$, and $y_6 = 2$.

(i) Could we fit this data by the poisson model. Please explain your reason.

(ii) Consider the mixture model where there is a proportion p of widows without children, and another proportion $(1 - p)$ of widows with x children, where x comes from the poisson with mean μ . Please write down complete step of EM method; Based on the observed data, please estimate (p, μ) with the initial value $(0.75, 0.4)$