# Computer Vision Exercise 05

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1.1

1) for quadratic function $P(\omega_m, \omega_n) = C(\omega_m, \omega_n)^2$.

given that $\beta > \alpha$, $\delta > r$,

by expanding the criterion,

$$\cancel{\beta^2} - 2\beta r + \cancel{r^2} + \cancel{\alpha^2} - 2\alpha\delta + \cancel{\delta^2} - \cancel{\beta^2} + 2\beta\delta - \cancel{\delta^2} - \cancel{\alpha^2} + 2\alpha r - \cancel{r^2} \geq 0$$

$$-2\beta r - 2\alpha\delta + 2\alpha r + 2\beta\delta \geq 0$$

$$2\alpha(r - \delta) + 2\beta(\delta - r) \geq 0$$

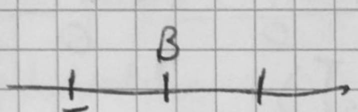
$$2(\delta - r)(\beta - \alpha) \geq 0$$

$\because \delta > r$ and $\beta > \alpha$ $\therefore$ this criterion holds.

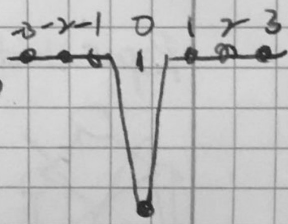
1.2 Potts Model: $(1 - \delta(\omega_m - \omega_n))$, if $(\omega_m - \omega_n) = 0$, $f(\omega_m - \omega_n) = -a$

else $f(\omega_m - \omega_n) = 0$

for the example



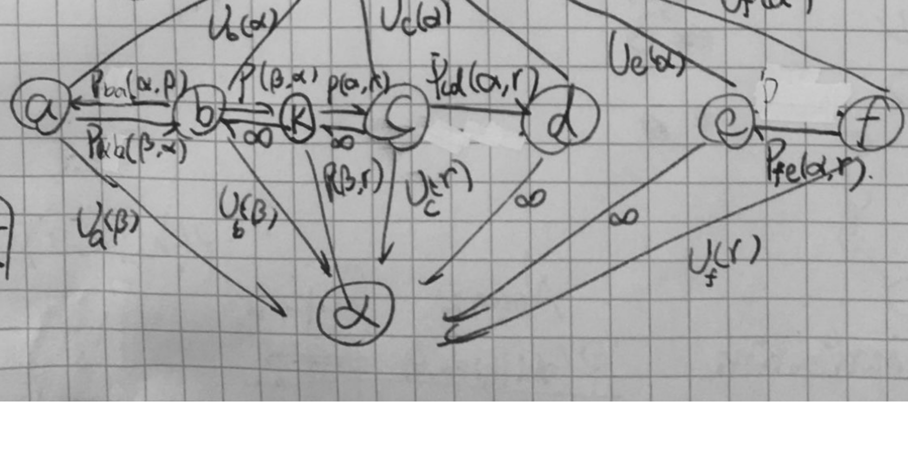

$\delta > r$, $\beta > \alpha$, $\beta = r$




$$(1 - \delta(\beta - r)) + (1 - \delta(\alpha - \delta)) - (1 - \delta(\beta - \delta)) - (1 - \delta(\alpha - r)) \geq 0$$

$$-a + 0 - 0 - 0 = -a \geq 0 \; (\times)$$

2.




$\boxed{\beta}\boxed{\beta}\boxed{r}\boxed{\alpha\alpha}\boxed{r}$