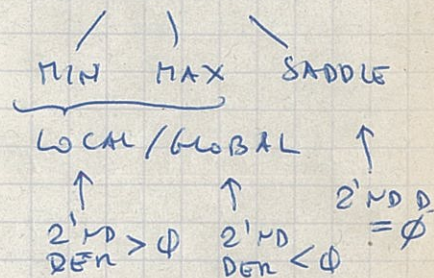
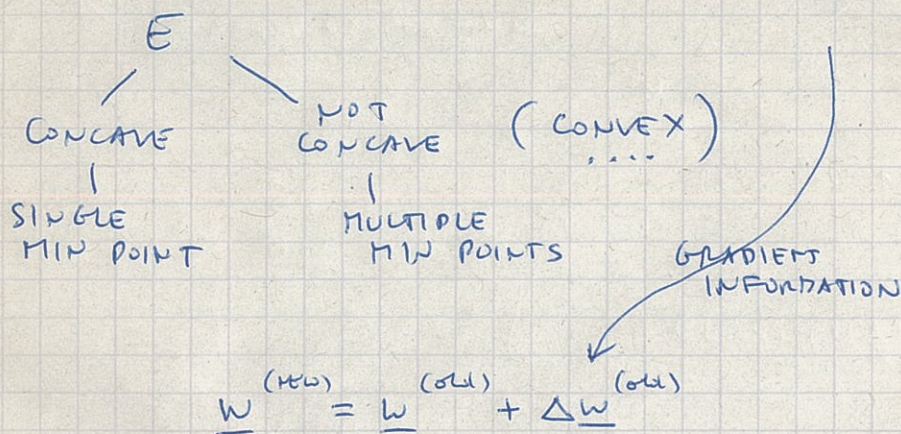


PARAMETER OPTIMIZATION (CH. 5.2.1)

$$\nabla E(\underline{w}) = \frac{\partial E}{\partial \underline{w}} = \phi \quad (\text{STATIONARY POINT})$$



$$\underline{w}^{(new)} = \underline{w}^{(old)} + \Delta \underline{w}^{(old)}$$

GRADIENT INFORMATION (CH. 5.2.2 - 5.2.3)

$$E(\underline{w}) \approx E(\underline{\hat{w}}) + (\underline{w} - \underline{\hat{w}})^T \underline{b} + \frac{1}{2} (\underline{w} - \underline{\hat{w}})^T \underline{H} (\underline{w} - \underline{\hat{w}})$$



$$\nabla E|_{\underline{w}=\underline{\hat{w}}} \quad (\underline{H})_{ij} = \frac{\partial^2 E}{\partial w_i \partial w_j} \bigg|_{\underline{\hat{w}}}$$

$$\nabla E(\underline{w}) \approx \underline{b} + \underline{H} (\underline{w} - \underline{\hat{w}}) \quad (= \phi \text{ IF } \underline{\hat{w}} = \text{MIN})$$

AROUND MINIMUM: $E(\underline{w}) = E(\underline{w}^*) + \frac{1}{2} (\underline{w} - \underline{w}^*)^T \underline{H} (\underline{w} - \underline{w}^*)$

IF: $\underline{H} \underline{u}_i = \lambda_i \underline{u}_i$

$\underline{u}_i^T \underline{u}_j = \delta_{ij}$

$\underline{w} - \underline{w}^* = \sum_i \alpha_i \underline{u}_i$

\underline{H} POSITIVE DEFINITE

$\underline{u}^T \underline{H} \underline{u} > 0 \quad \forall \underline{u}$

$$E(\underline{w}) = E(\underline{w}^*) + \frac{1}{2} \sum_i \lambda_i \alpha_i^2$$

