## convexity

 $W_t$ 

$$\stackrel{\text{nvexit}}{\geq}$$

$$\sum_{i=1}^{n} I_i$$

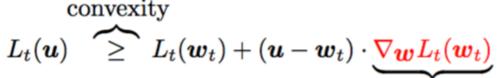
$$\sum_{i=1}^{n} L_i$$

$$\sum_{t=0}^{t} L_t$$









- $= L_t(\boldsymbol{w}_t) \frac{1}{\eta} \underbrace{(\boldsymbol{u} \boldsymbol{w}_t) \cdot (f(\boldsymbol{w}_{t+1}) f(\boldsymbol{w}_t))}_{}$
- $= L_t(\boldsymbol{w}_t) + \frac{1}{n} \left( \Delta_F(\boldsymbol{u}, \boldsymbol{w}_{t+1}) \Delta_F(\boldsymbol{u}, \boldsymbol{w}_t) \Delta_F(\boldsymbol{w}_t, \boldsymbol{w}_{t+1}) \right)$



update

prop. 7 of  $\Delta_F$ 

 $\boldsymbol{u}$