MAP Estimate

$$\hat{h}^{MAP} = \underset{h}{\operatorname{argmax}}\ p(h|D)$$ ← posterior

- $\underset{h}{\operatorname{argmax}}\ p(D|h) \cdot p(h)$

  ↑ likelihood ↑ prior

- $\underset{h}{\operatorname{argmax}}\ \log [p(D|h) \cdot p(h)]$

- $\underset{h}{\operatorname{argmax}}\ [\log (p(D|h)) + \log p(h)]$

As we get more data, MAP estimate converges towards MLE

Ex: $h_1 \triangleq$ powers of two $= \{2, 4, 8, 16, 32, 64\}$

$h_2 \triangleq$ powers of two except 32 $= \{2, 4, 8, 16, 64\}$

$D_1 \rightarrow N_1 = 4$

$p(h_1|D_1) = \left(\frac{1}{6}\right)^4 \cdot p(h_1) \quad p(h_2|D_1) = \left(\frac{1}{5}\right)^4 \cdot p(h_2)$

$D_2 \rightarrow N_2 = 1{,}000{,}000$

$p(h_1|D_2) = \left(\frac{1}{6}\right)^{1{,}000{,}000} \cdot p(h_1) \quad p(h_2|D_2) = \left(\frac{1}{5}\right)^{1{,}000{,}000} p \cdot (h_2)$

(*) Data overwhelms the prior.