Directed Graphical Models

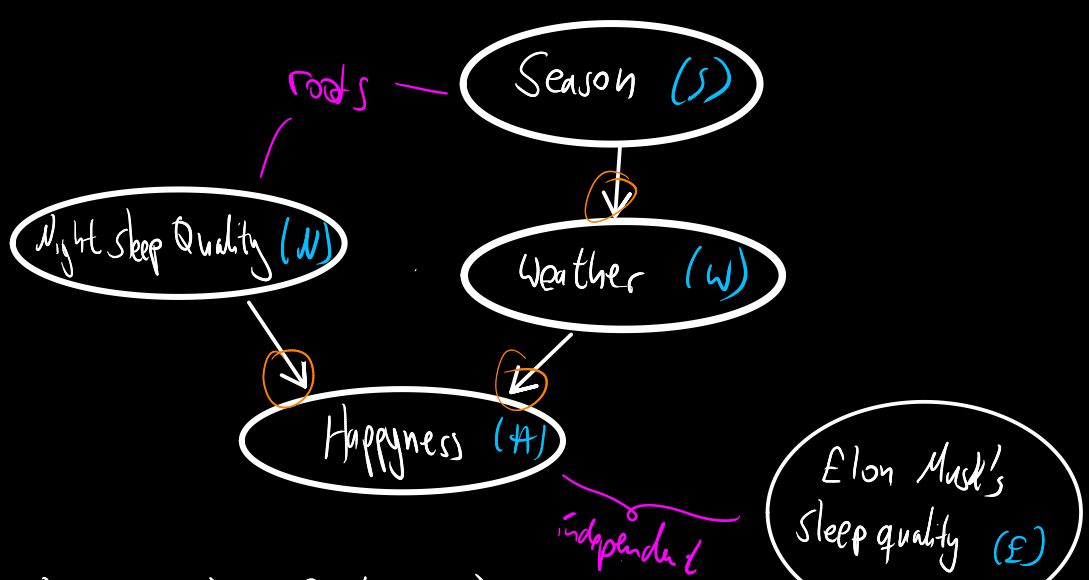
→ joint distributions $p(A, B, C)$

→ factorize according to the interpretation

↙ Sample

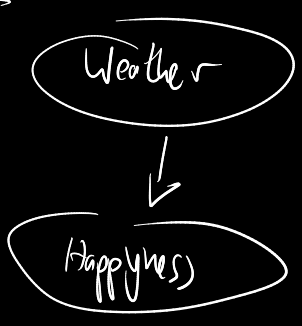
↘ calculate likelihood

DGM = DAG (directed acyclic graphs)



$$p(S, N, W, H, E) = p(E)\,p(S, N, W, H)$$
$$= p(E)\,p(S)\,p(N)\,p(H, W \mid S, N)$$
$$= p(E)\,p(S)\,p(N)\,p(W \mid S)\,p(H \mid N, W)$$

Simpler Example



$$p(W, H) = p(W)\,p(H \mid W)$$

$W \in \{0: \text{Bad}, 1: \text{Good}\}$ — Bernoulli

$H \in \{0: \text{Bad}, 1: \text{Good}\}$ — Bernoulli

$W \sim \text{Bern}(0.3)$

$$H \sim \begin{cases} \text{Bern}(0.6) & \text{if } W = \text{Bad} \\ \text{Bern}(0.1) & \text{if } W = \text{Good} \end{cases}$$

→ tf prob