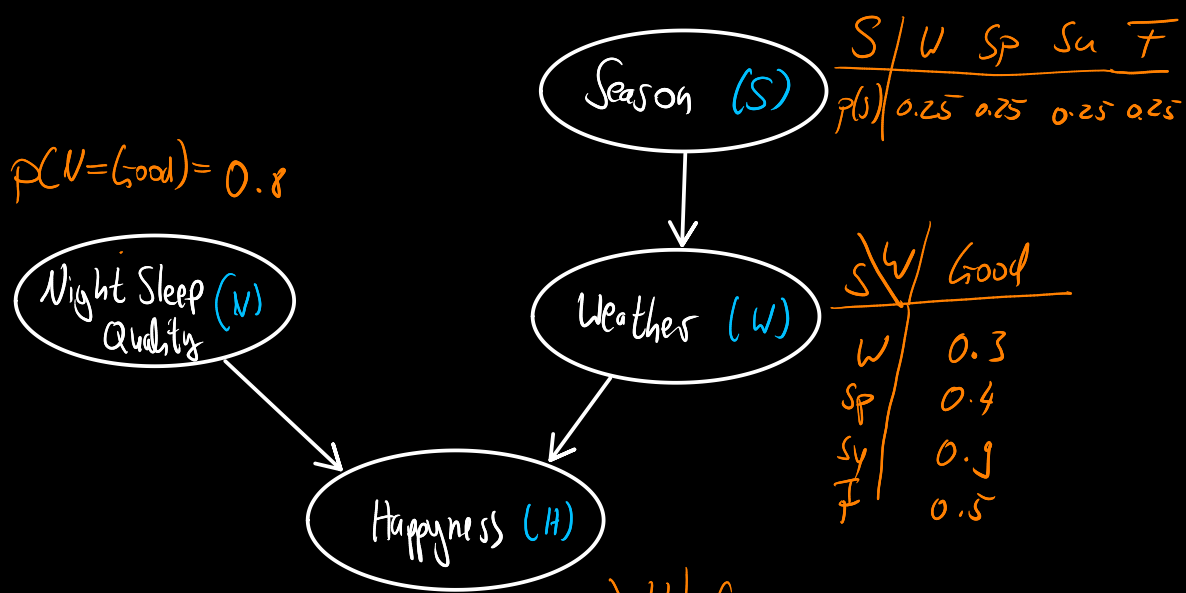


Directed Graphical Models

Ancestral Sampling and Likelihood Calculation



$S \in \{ \overset{0}{W}, \overset{1}{Sp}, \overset{2}{Su}, \overset{3}{F} \}$ } Categorical

$N \in \{ \overset{0}{Bad}, \overset{1}{Good} \}$

$W \in \{ \overset{0}{Bad}, \overset{1}{Good} \}$

$H \in \{ \overset{0}{Bad}, \overset{1}{Good} \}$

} Bernoulli

$(N, W) \backslash H$	Good
$(Good, Good)$	0.89
$(Good, Bad)$	0.50
$(Bad, Good)$	0.50
(Bad, Bad)	0.30

Ancestral sampling

$$(S, N, W, H) = \{ (2, 1, 1, 1), (2, 1, 1, 1) \}$$

Likelihood

recall factorization: $p(S, N, W, H) = p(S)p(N)p(W|S)p(H|W, N)$

$$p(C) = \prod_{i=0}^1 p(S=s^{(i)}) p(N=n^{(i)}) p(W=w^{(i)} | S=s^{(i)}) p(H=h^{(i)} | W=w^{(i)}, N=n^{(i)})$$

$$= (0.25 \cdot 0.8 \cdot 0.9 \cdot 0.9)^2$$

$$\approx \underline{\underline{0.03176}}$$