Markov Model of order 4

x_t=?

x_{t-1}=

x_{t-2}=

x_{t-3}=

x_{t-4}=

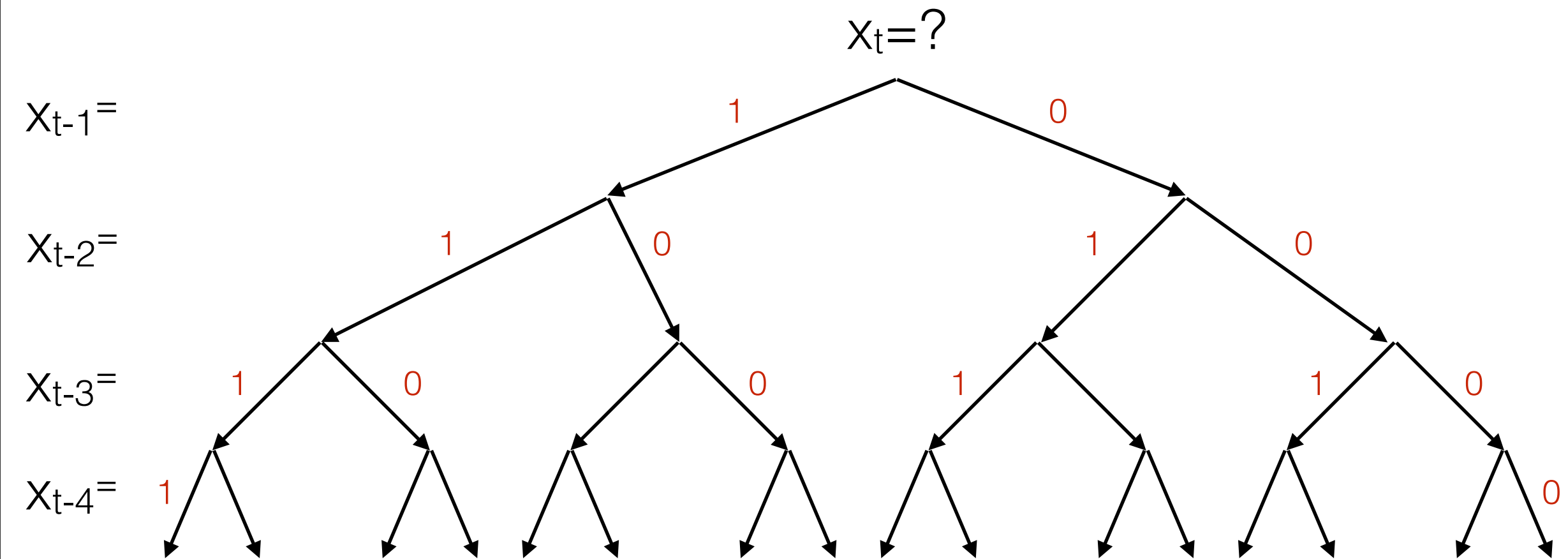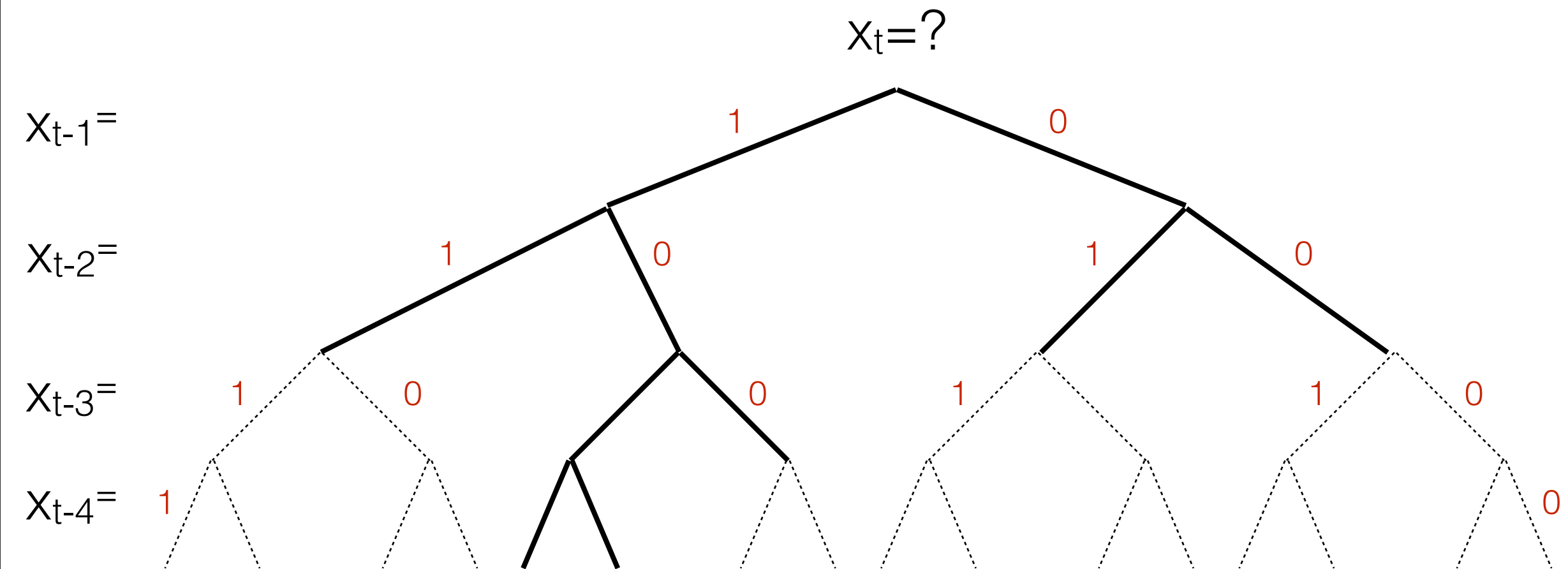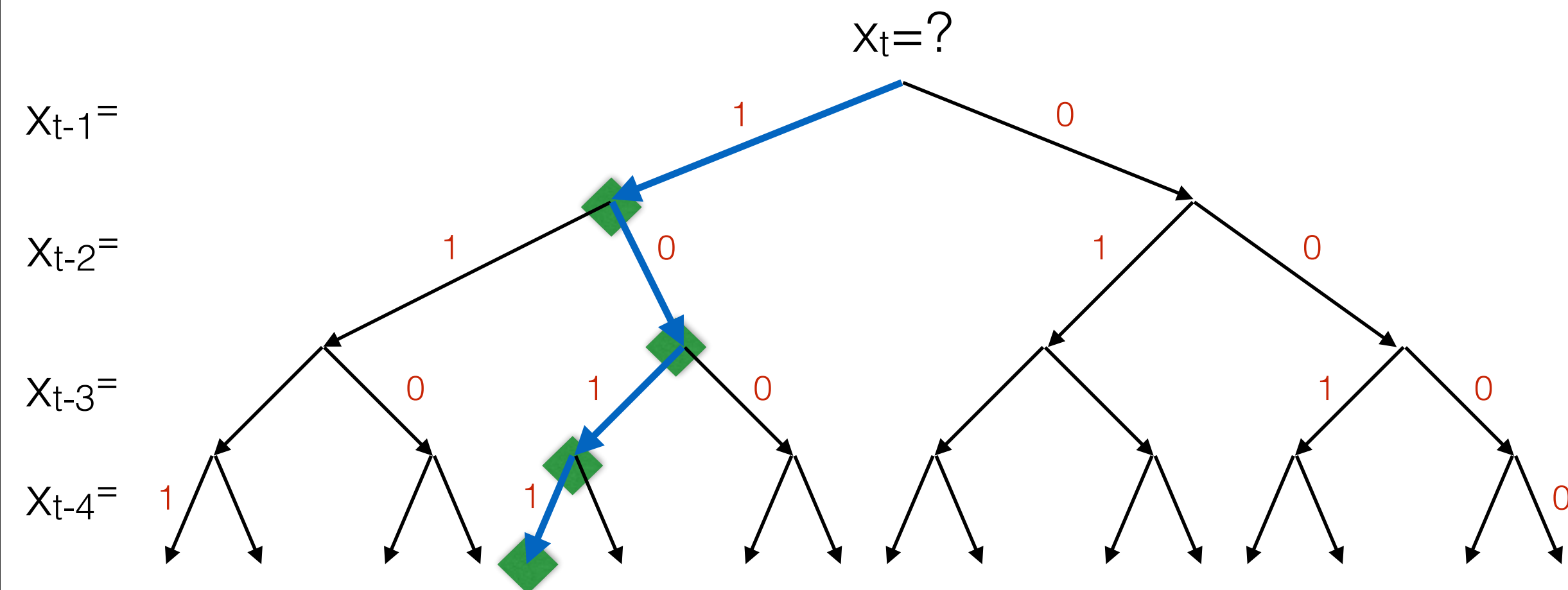**In each leaf node we estimate** $P(x_t \mid x_{t-1}, x_{t-2}, x_{t-3}, x_{t-4})$

Variable Length Markov Model

- **In each leaf node we estimate** $P(x_t \mid x_{t-1}, x_{t-2}, \ldots)$
- **A VMM for each prefix-free subtree**
- **An expert for each subtree**
  = An exponential number of experts

VMM using specialists

- **Each node corresponds to a specialist**
- **Each specialist estimates** $P(x_t \mid x_{t-1}, x_{t-2}, x_{t-3}, x_{t-4})$
- **Number of specialists = number of nodes**
- **At each time t, 4 specialists are awake.**
- **Example: 1,1,0,1,?**
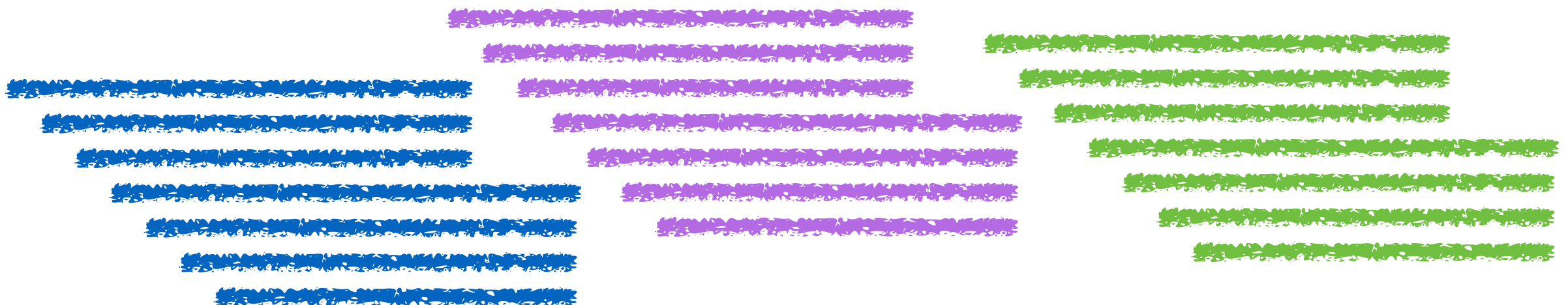
Switching experts

time →

Base Experts

Combined Expert:

Low-Level specialists: $(t_1 < t_2)$ for each base expert

Actual algorithm maintains one weight per base expert (color),
Same as summing over all low-level specialists

Switching within a small set of experts

time →

Base Experts

Combined Expert:

Low-Level specialists: $(t_1 < t_2 < t_3 < ... < t_n)$ for each base expert

Actual algorithm maintains one weight per base expert (color),
Same as summing over all low-level specialists