

Iteration $n = 1$ of conditional SMC: Initialise $(L - 1)$ interpreters.

$$\begin{array}{ccccccc} \mathbf{x}_0^{(1)} & \cdots & \mathbf{x}_0^{(\ell)} & \cdots & \boxed{\text{diagonal}} & \cdots & \mathbf{x}_0^{(L)} \end{array}$$

\vdots

Iteration $n = n$ of conditional SMC.

$$\begin{array}{ccccccc} \mathbf{x}_{n-1}^{(1)} & \cdots & \mathbf{x}_{n-1}^{(\ell)} & \cdots & \boxed{\mathbf{x}_{n-1}^*} & \cdots & \mathbf{x}_{n-1}^{(L)} \\ \hat{w}_{n-1}^{(1)} & \cdots & \hat{w}_{n-1}^{(\ell)} & \cdots & \hat{w}_{n-1}^* & \cdots & \hat{w}_{n-1}^{(L)} \end{array}$$

Resample $(L - 1)$ particles categorically,
with weights being success probabilities; then fork().

$$\begin{array}{ccccccc} \bar{\mathbf{x}}_{n-1}^{(1)} & \cdots & \bar{\mathbf{x}}_{n-1}^{(\ell)} & \cdots & \boxed{\text{diagonal}} & \cdots & \bar{\mathbf{x}}_{n-1}^{(L)} \end{array}$$

Propose by continuing the program, i.e. “propose from prior”.

$$\begin{array}{ccccccc} \bar{\mathbf{x}}_n^{(1)} & \cdots & \bar{\mathbf{x}}_n^{(\ell)} & \cdots & \boxed{\text{diagonal}} & \cdots & \bar{\mathbf{x}}_n^{(L)} \end{array}$$

Insert retained particle; then calculate and normalise weights.

$$\begin{array}{ccccccc} \bar{\mathbf{x}}_n^{(1)} & \cdots & \bar{\mathbf{x}}_n^{(\ell)} & \cdots & \boxed{\mathbf{x}_n^*} & \cdots & \bar{\mathbf{x}}_n^{(L)} \\ \hat{w}_n^{(1)} & \cdots & \hat{w}_n^{(\ell)} & \cdots & \hat{w}_n^* & \cdots & \hat{w}_n^{(L)} \end{array}$$

$$\begin{array}{ccccccc} \mathbf{x}_n^{(1)} & \cdots & \mathbf{x}_n^{(\ell)} & \cdots & \boxed{\mathbf{x}_n^*} & \cdots & \mathbf{x}_n^{(L)} \\ \hat{w}_n^{(1)} & \cdots & \hat{w}_n^{(\ell)} & \cdots & \hat{w}_n^* & \cdots & \hat{w}_n^{(L)} \end{array}$$

\vdots

Iteration $n = N$ of conditional SMC.

\vdots

$$\begin{array}{ccccccc} \mathbf{x}_N^{(1)} & \cdots & \mathbf{x}_N^{(\ell)} & \cdots & \boxed{\mathbf{x}_N^*} & \cdots & \mathbf{x}_N^{(L)} \\ \hat{w}_N^{(1)} & \cdots & \hat{w}_N^{(\ell)} & \cdots & \hat{w}_N^* & \cdots & \hat{w}_N^{(L)} \end{array}$$

Choose a new retained particle by sampling categorically,
with weights being success probabilities.

\mathbf{x}_N^*