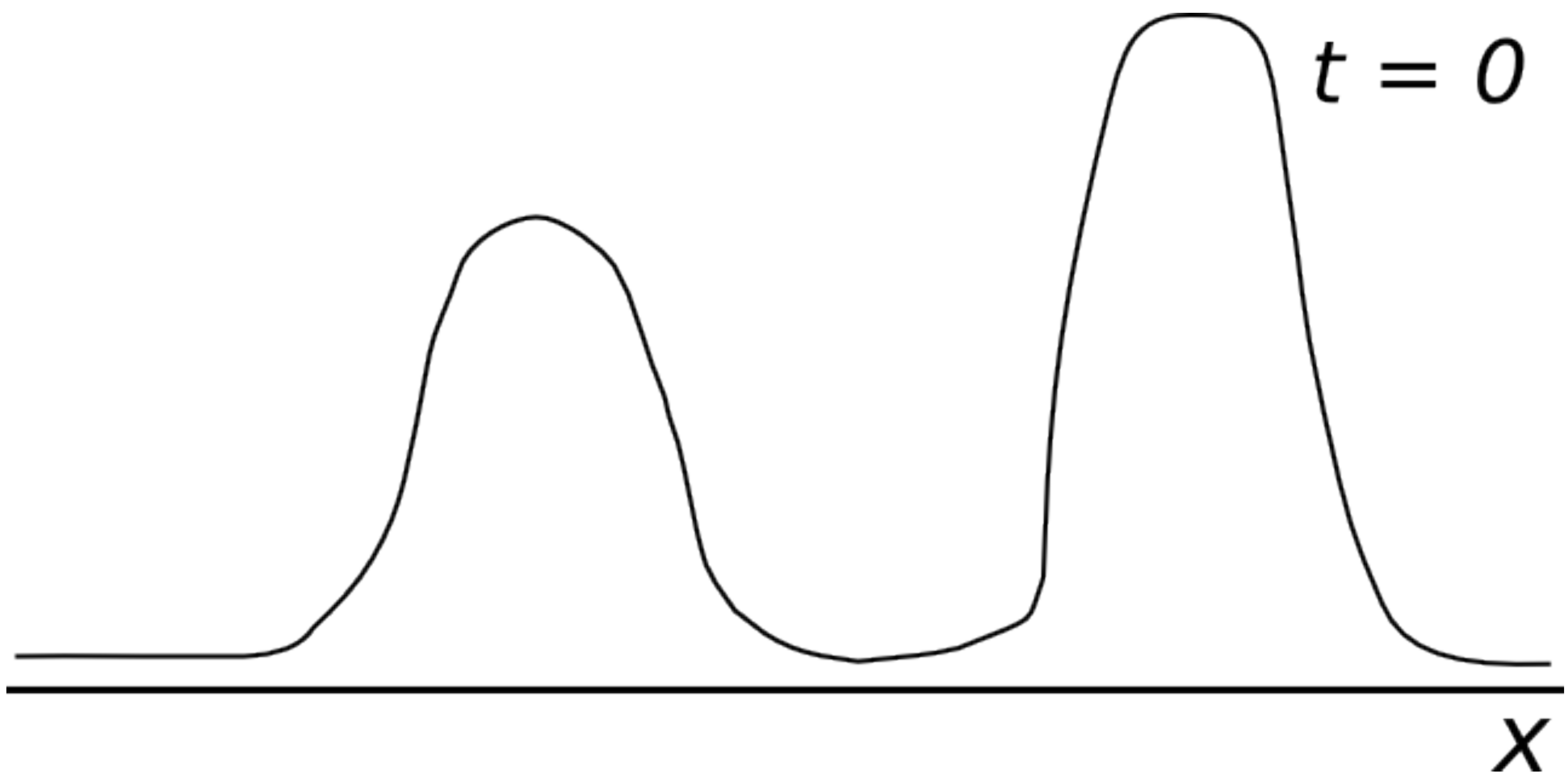
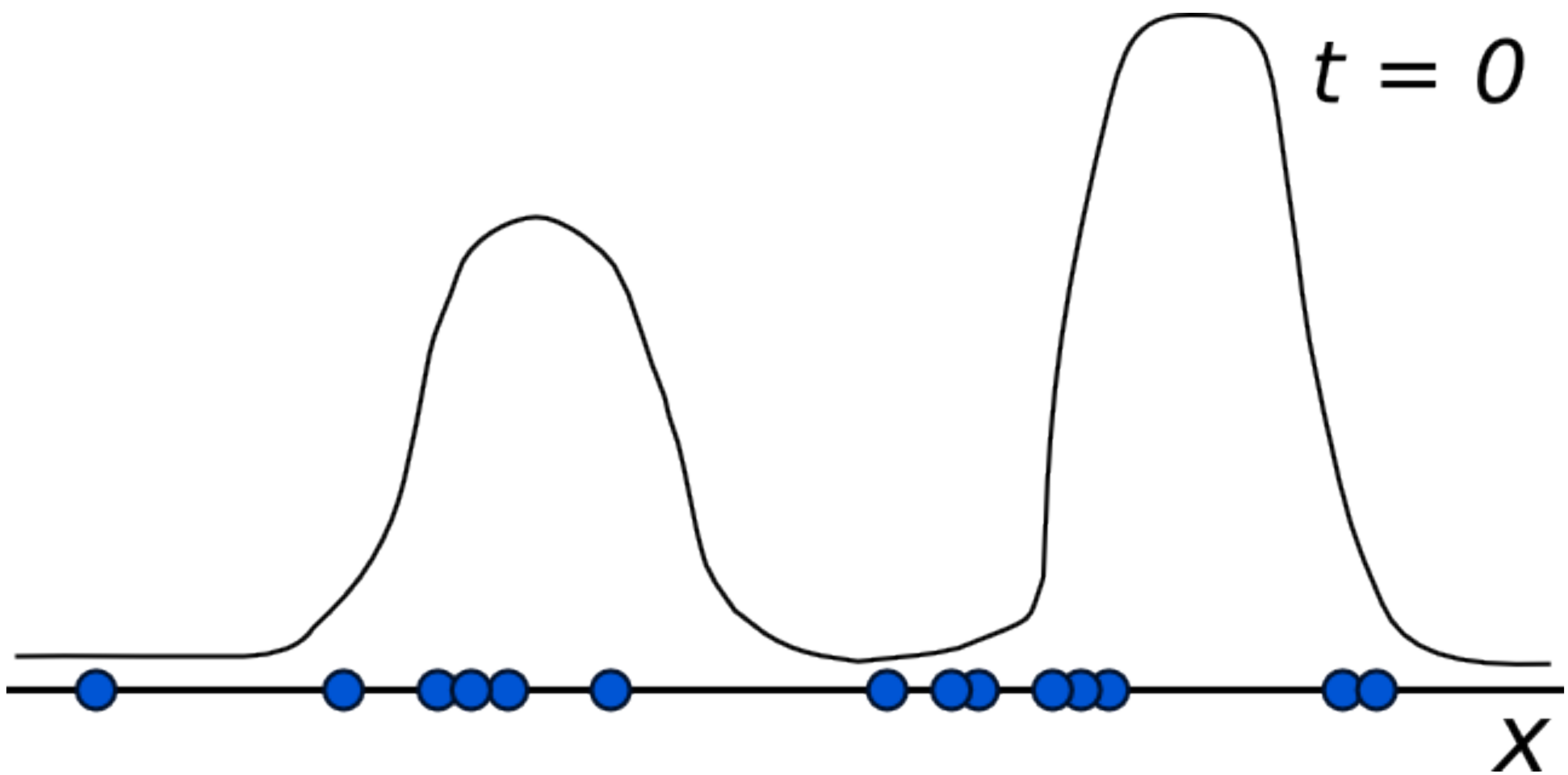
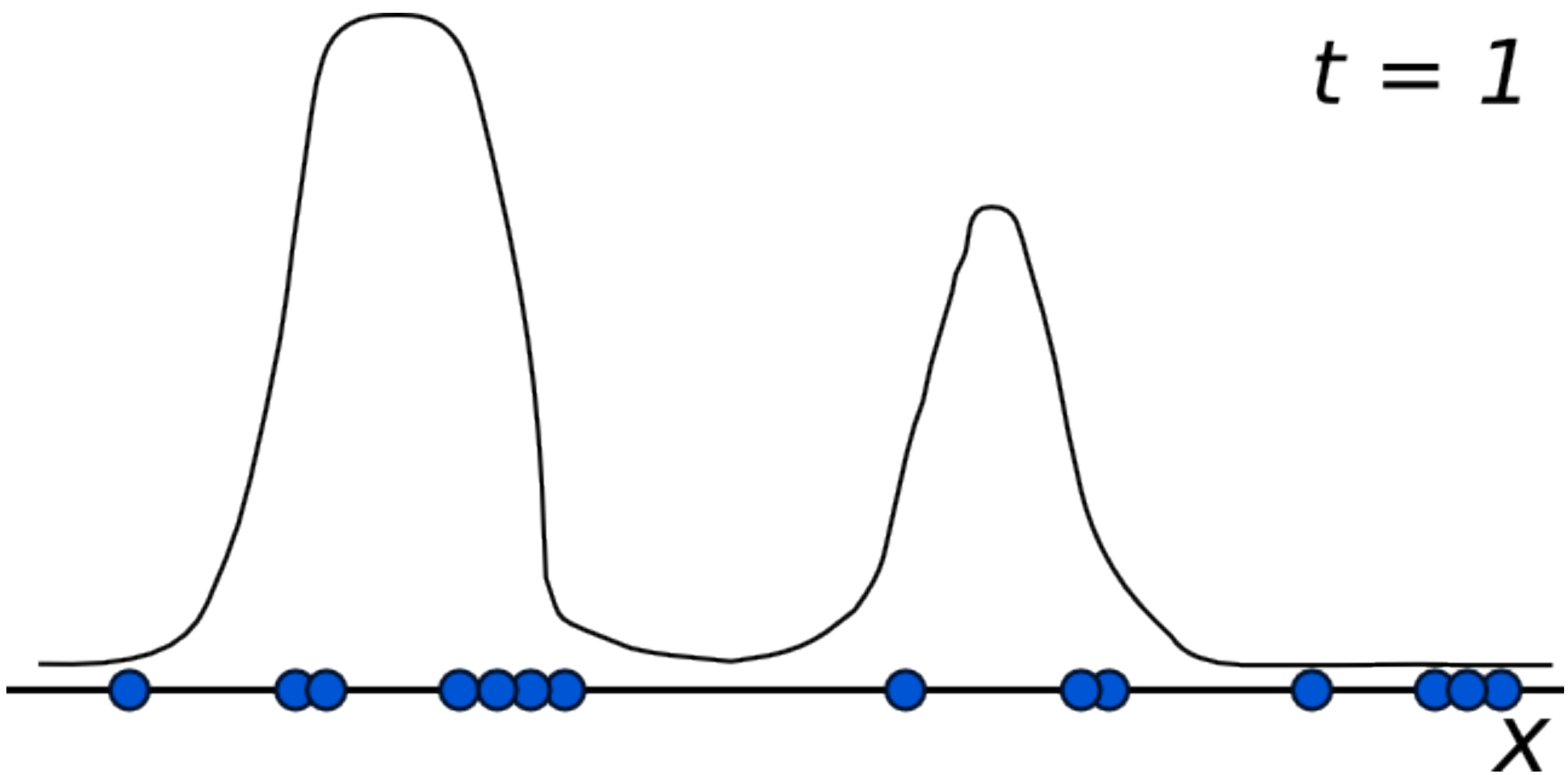
Particle Filter: Initialize



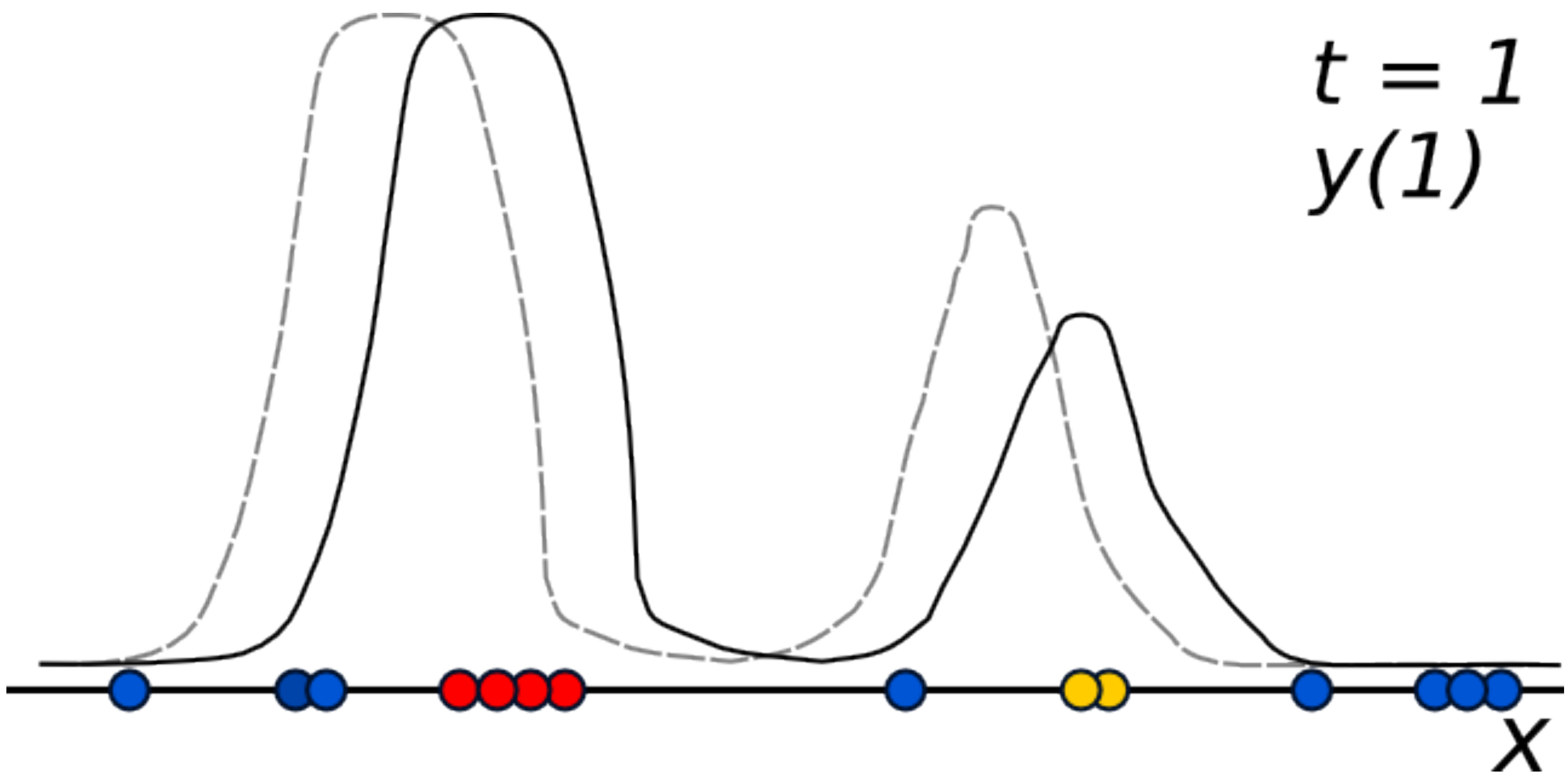
Particle Filter: Initialize



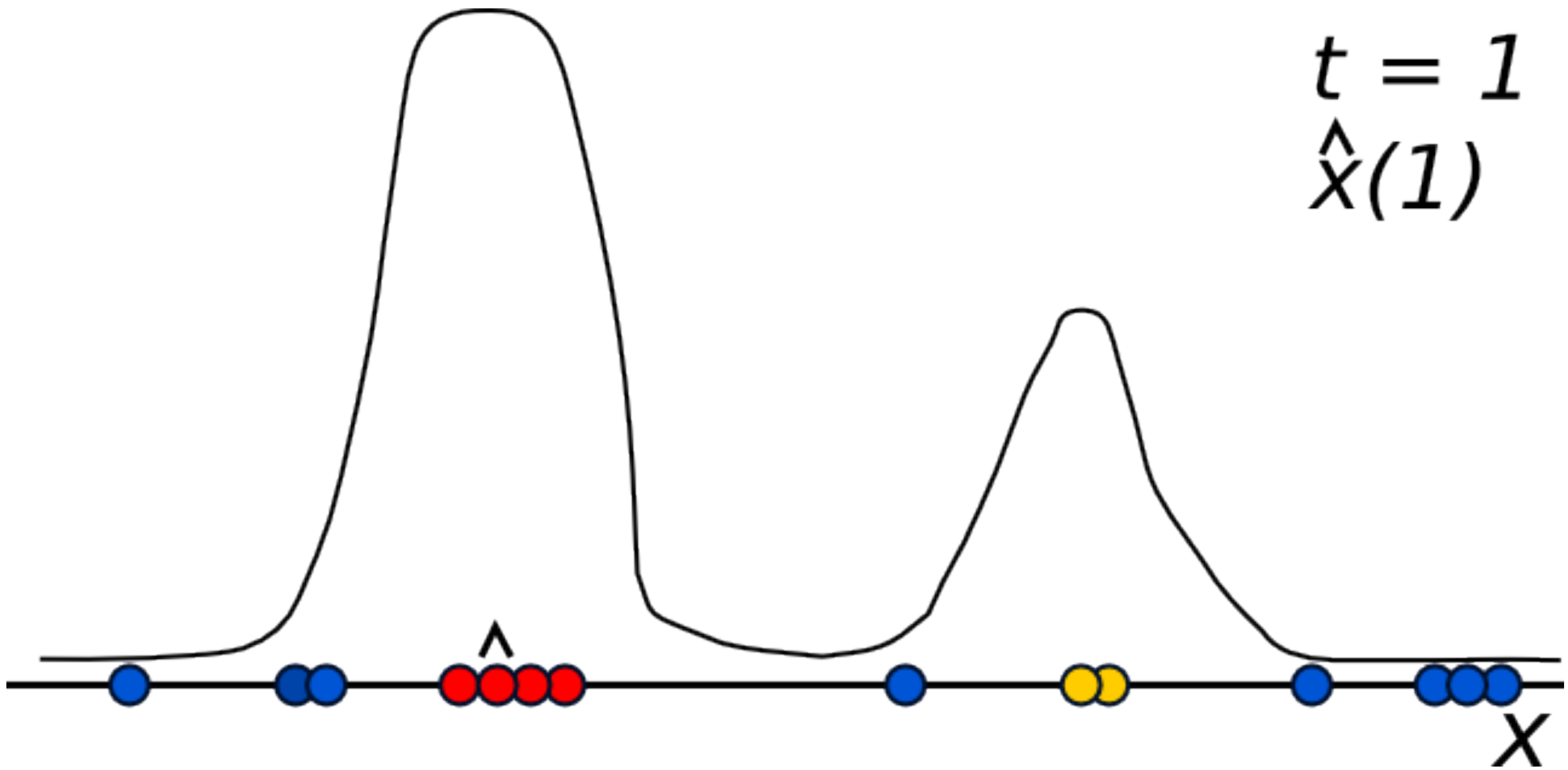
Particle Filter: Propagate



Particle Filter: Update

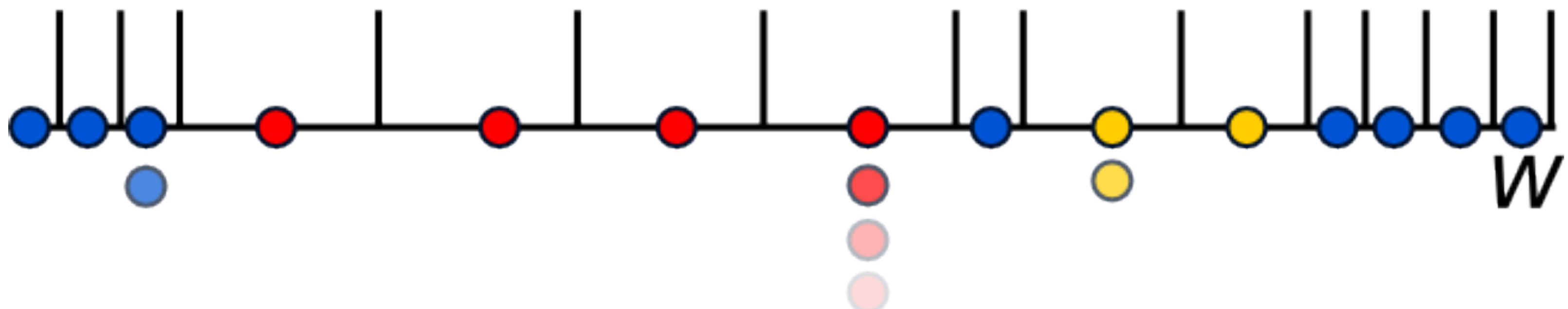


Particle Filter: Average

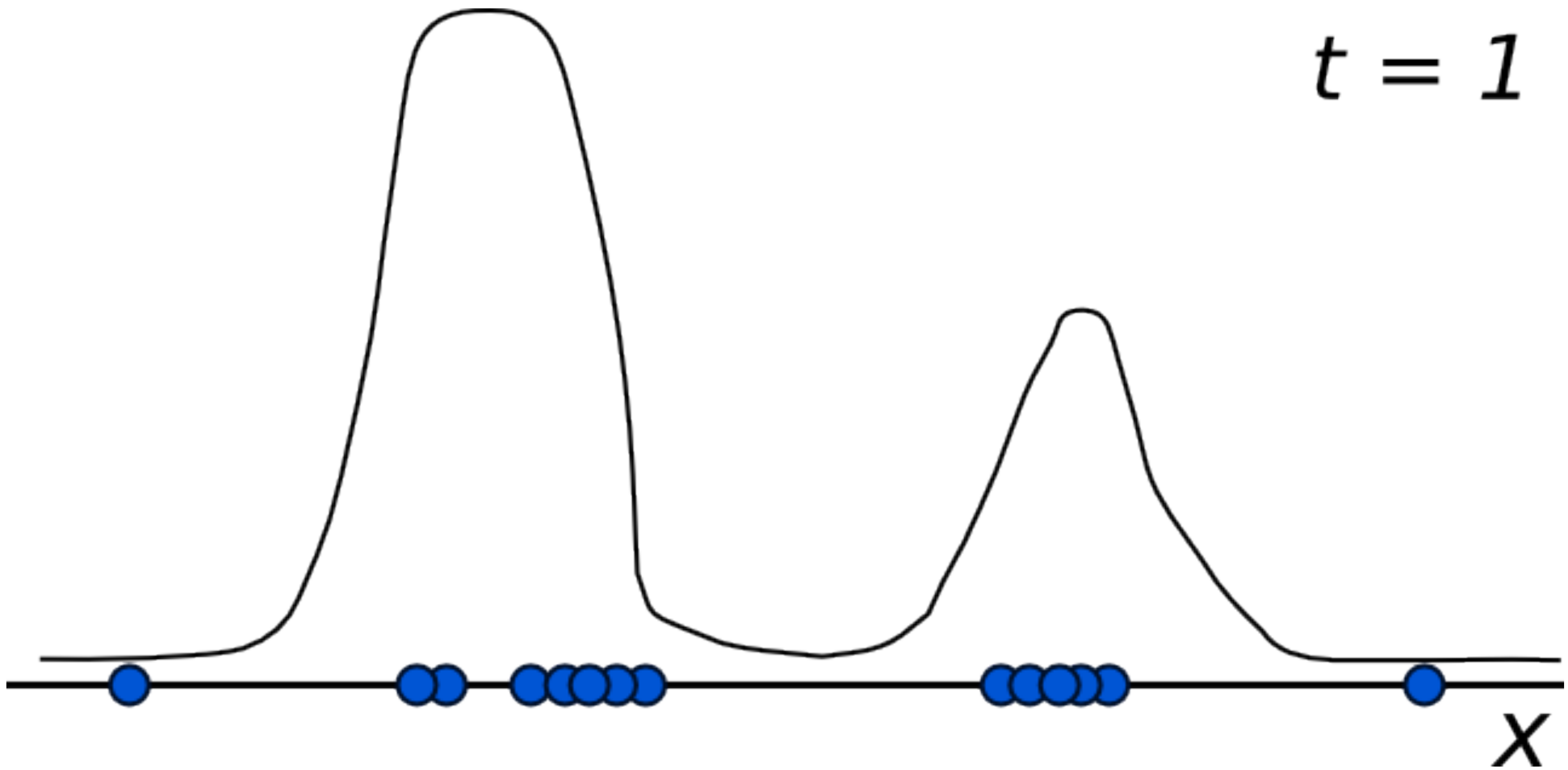


Particle Filter: Resample

$t = 1$



Particle Filter: Resample



Particle Filter: Iterate

Algorithm Particle_filter($\mathcal{X}_{t-1}, u_t, z_t$):
  $\bar{\mathcal{X}}_t = \mathcal{X}_t = \emptyset$
  for $m = 1$ to M do
    sample $x_t^{[m]} \sim p(x_t \mid u_t, x_{t-1}^{[m]})$
    $w_t^{[m]} = p(z_t \mid x_t^{[m]})$
    $\bar{\mathcal{X}}_t = \bar{\mathcal{X}}_t + \langle x_t^{[m]}, w_t^{[m]} \rangle$
  endfor
  for $m = 1$ to M do
    draw i with probability $\propto w_t^{[i]}$
    add $x_t^{[i]}$ to $\mathcal{X}_t$
  endfor
  return $\mathcal{X}_t$