Algorithm 1 Metropolis-Hastings Sampler with Constraints

Set $\mathbb{S} = \emptyset$ and take raw data $\mathbb{Z}$
Load the n-state detection model
Initialize all the resource descriptors to their maximal capacity.
Initialize $\vec{C}$ by randomly choosing a qualified sample within the support of $Post(\hat{H}|\mathbb{Z})$ as the starting point.
for $Cycle = 2$ to $E+B$ **do**
  for $j = 1$ to D_{object} **do**
    repeat
      $P_j = C_j +$ Rand(-S,S)
      {Generate a new integer based on the current value and a proposal value within the step length}
      if $P_j < 1$ **then**
        $P_j = 1 + (1 - P_j)$
        {Overflow and Reflection}
      end if
      if $P_j > D_{zone}$ **then**
        $P_j = D_{zone} - (P_j - D_{zone})$
        {Overflow and Reflection}
      end if
    until The value of any resource descriptor related to the referred zone is no less than zero after the proposed allocation on the current object is committed
    $j \leftarrow j + 1$
  end for
  Generate a random number between 0 and 1: $Jitter$
  if $Jitter \leq \min(1, \frac{Post(\vec{P}|\mathbb{Z})}{Post(\vec{C}|\mathbb{Z})})$ **then**
    $\vec{C} = \vec{P}$
    {Metropolis-Hastings}
  end if
  Add $\vec{C}$ into $\mathbb{S}$ as the next sample
  Resetting all the resource descriptors
  $Cycle \leftarrow Cycle + 1$
end for