Algorithm 1 AI Data Security Awareness Emergence Simulation Algorithm

Input: Cellular space size L, initial states S^0 and S_v^0, parameters α, β, and δ, intervention strategy I
Output: State distribution S^t, overall awareness level S_o^t, and population statistics
Initialize L_d, set S^0 and S_v^0 (uniform/skewed/clustered distribution)
for $t = 1$ to $T = 100$ **do**
    for each cell (i, j) **do**
        Compute $P_{(i,j)}^t = \sum_{k \in N_{(i,j)}} \omega_k S_k^t$
        Update $T_1(P) = 50 - \alpha P$, $T_2(P) = 80 - \beta P$
        if intervention strategy I is mild publicity **then**
            Randomly select 10% cells, $S_v \leftarrow \min(99, S_v + \text{randint}[5, 10])$
        else if intervention strategy I is mandatory training **then**
            Randomly select 20% cells, $S_v \leftarrow \min(99, S_v + \text{randint}[10, 20])$
        end if
        Apply decay factor: $S_v \leftarrow \max(0, S_v - \delta \cdot \text{randint}[0, 2])$
        Update $S_{(i,j)}^{t+1}$ based on S_v and T_1, T_2
    end for
    Compute $S_o^t = \sum_{i,j} S_{v(i,j)}^t$
    Record state distribution and population statistics
end for
Visualize: State distribution heatmaps, population curves, S_o trend plots