Building the Base Model: Infection Dynamics in a Population
i. Define the Environment and Initial Conditions
• Create a 75×75 voxel grid representing a bounded area where individuals (agents) can move and interact.
• Populate the grid with 100 agents, initialized randomly in the following states:
– 95 agents as susceptible (S) – individuals at risk of infection.
– 5 agents as infected (I) – individuals who can transmit the infection.
– 0 agents as recovered (R) – individuals who have recovered and are immune.
ii. Define Agent Behaviors
• Movement: Each agent moves to a neighboring cell each time step (up, down, left, right, or stays in place). Movement can be random or follow simple rules, e.g., random walk (Brownian motion) or Levy walk.
• Transmission: If a susceptible agent shares a cell with an infected agent, there is a probability p that the susceptible agent becomes infected.
• Recovery: Infected agents have a probability q of recovering at each time step, after which they transition to the recovered state.
iii. Run the Simulation
• Simulate the model over 200 time steps, recording the population co in each compartment (susceptible, infected, recovered ) at each step.