Title: Site percolation on the square lattice

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Short description:

i. Language: Python
ii. Environment: Visual Studio Code
iii. Basic info about the computer used for simulations:

Processor: 2,7 GHz Dual-Core Intel Core i5, RAM: 8 GB 1867 MHz DDR3

(a) Visualize sample configurations for L = 10 and 3 values of p = 0.4,0.6,0.8 within the burning algorithm and describe each site by the number, as shown during the lecture.

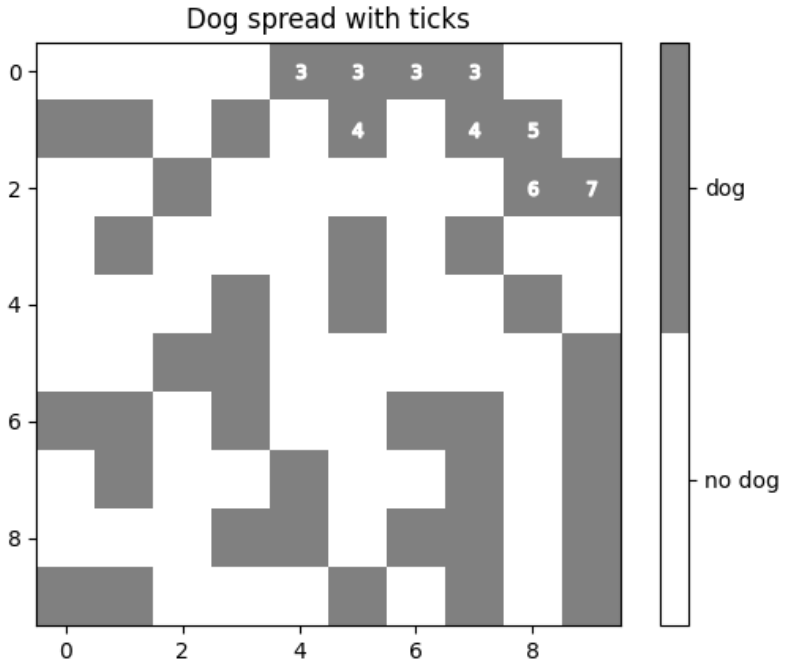


Figure 1 Configuration of L=10 and p=0.4

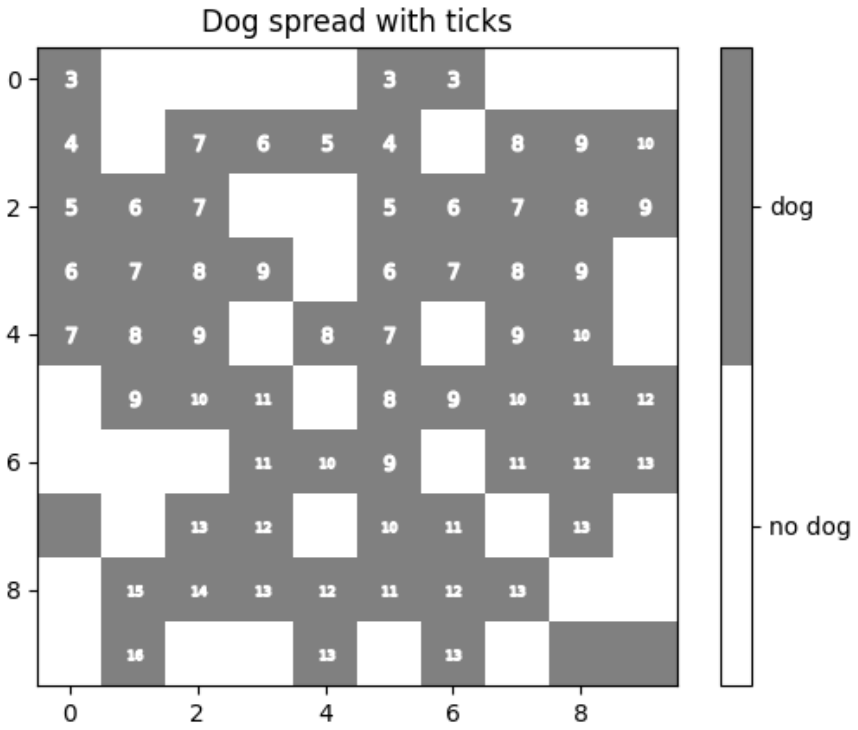


Figure 2 Configuration of L=10 and p=0.6

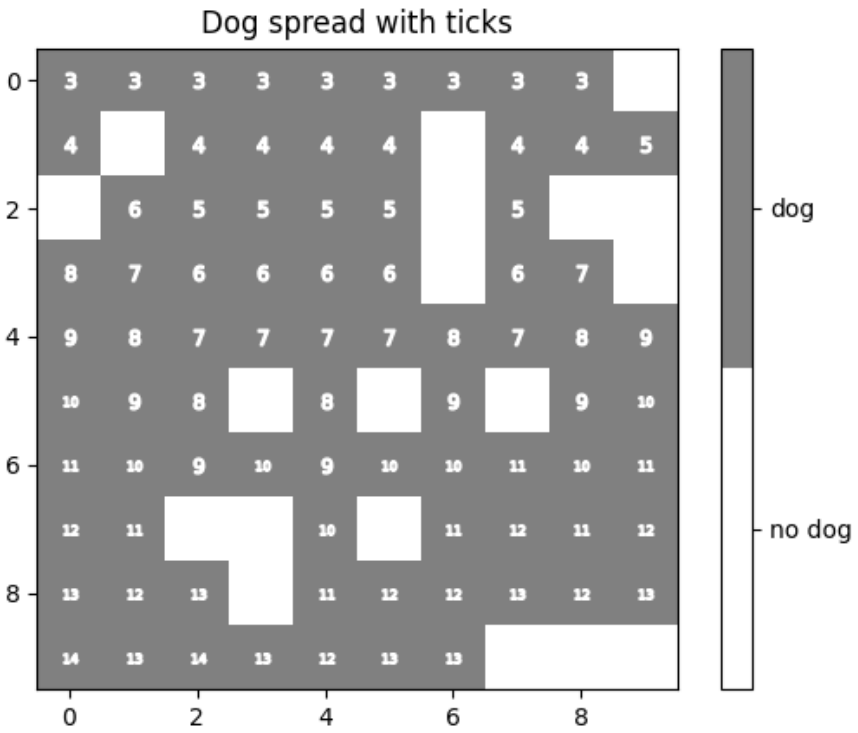


Figure 3 Configuration of L=10 and p=0.8

(b) Probability Pflow that the path connecting the first and the last row exists as a function of p for L = 10, 50, 100 (use legend).

For all runs I used:
plow = 0, pmax = 1, step = 0.01 and T = 100

a) L = 10

Execution time: 5.693042993545532

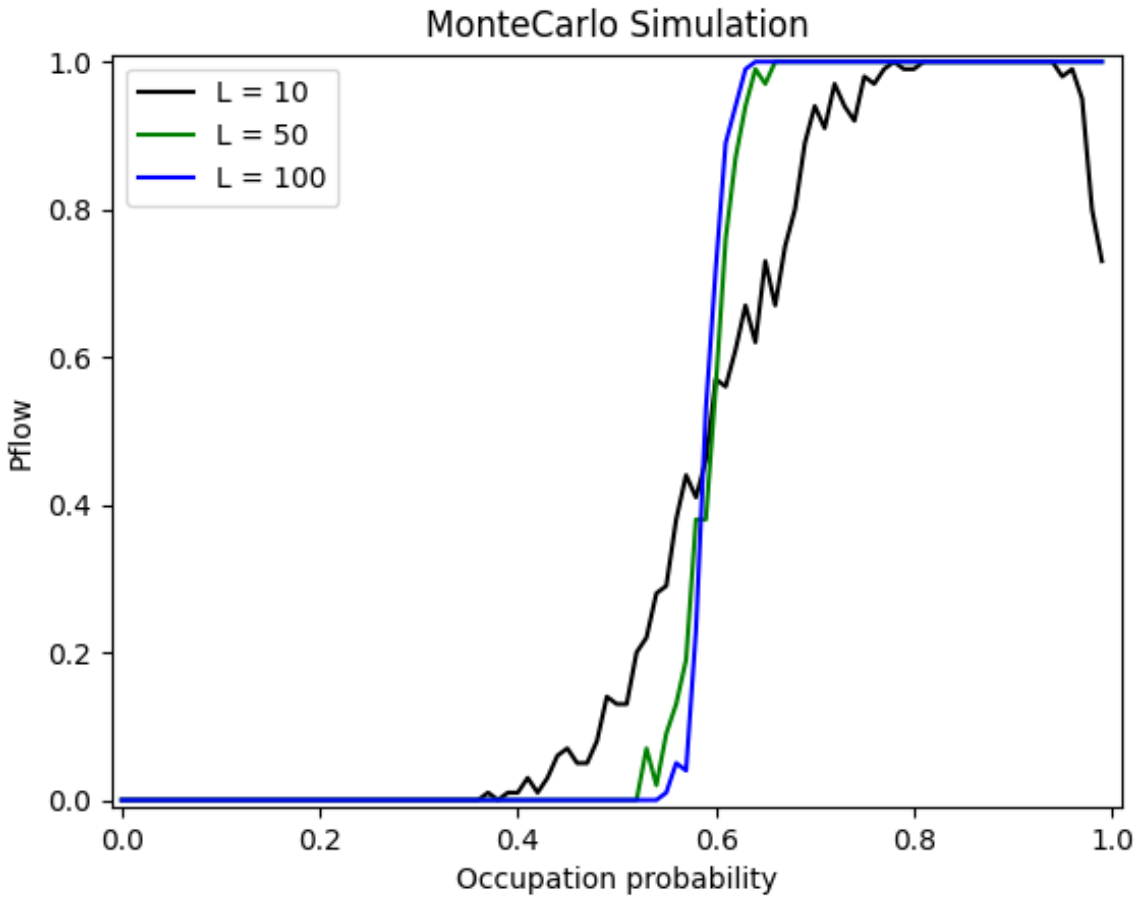
b) L = 50

Execution time: 302.8307538032532

c) L = 100

Execution time: 2072.30863404274

Probability Pflow related to occupation probability:



d) Additional plots showing spreading flea on dogs with percolation example:

Legend:

Black square – Flea on dog
Gray square – Dog without flea
White square – No dog on this square
L – size of lattice
Pd – probability of being a dog on one square.
Pf – probability of flea jumping on another dog.

Simulation was performed with initial values:

L = 100
Pd = 0.7
Pf = 0.8
Pos_x = 50
Pos_y = 50