Modelling and Simulation
Practical Assignment 2: Percolation

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1. Introduction

Iets over de toepassingen van dit model, bosbranden enzo

In

2. Method

Inleiding in experiment

Pseudo code

Iets over de exacte stopconditie

3. Experiments

Inleiding in experiment

3.1. Probability

Discuss cluster size statistics, mean cluster size M and sd as a function p for finite clusters

Determine some vague fraction

To investigate the effect of different p on a lattice with a constant size we perform the following experiment. We opt for a lattice size, with $N = 20$, which results in 41×41 sized grid. We calculate the mean and standard deviation of the finite clusters over $r_{max} = 200$ runs. The probability of growth p is incremented with 0.01 ranging from 0.3 to 0.7. The resulting statistics for all p are shown in figure 1.

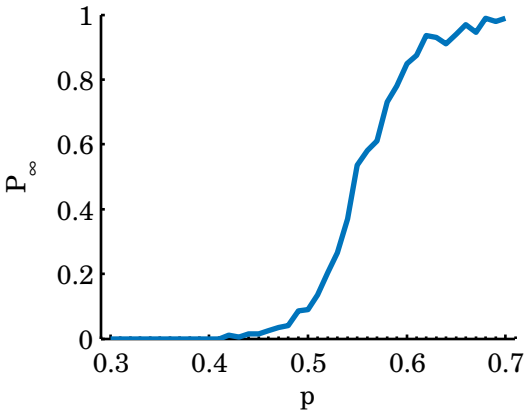

Figure 2: *Ratio of percolating clusters, P_∞, as a function of p. Ratios calculated over $r_{max} = 200$ runs on a grid size of 41×41.*

We observe that the mean cluster sizes up to approximately $p = 0.55$ generally increase, which is consistent with the definition of p. With $p > 0.55$ we see that the mean cluster sizes start do decrease again. This drop in mean cluster size can be explained with the plot shown in figure 2. Figure 2 shows the P_∞ ratio as a function of p, where the P_∞ is the ratio of 'infinite' clusters. Looking at approximately $p = 0.55$ we see that the number of finite clusters decrease...

Which is not as obvious, as I first thought so need to look at theory...

*These authors contributed equally to this work.

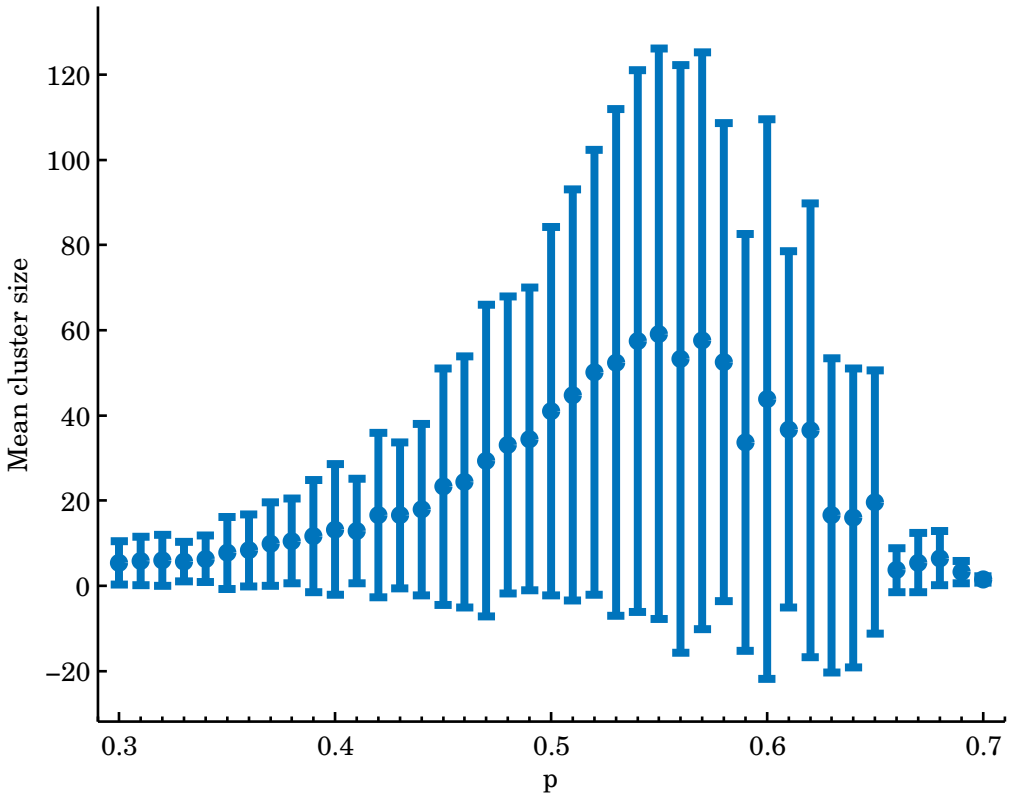

Figure 1: *Mean cluster sizes μ (indicated by the points) and standard deviations σ (vertical error bars) computed as a function of p, with a step size of* 0.01*. Values μ and σ were calculated over* 200 *runs with a grid of size* 41×41*.*

3.2. System Size

How do the results change when the system size changes. Experiment with different latice sizes

Wat could the behavior be in the limit of infinite lattice sizes

3.3. Fractal Dimension

Bonus: Determine the fractal dimension of finite clusters as a function of p.

3.4. Connectivity

Present mask used previously, and 8-connected mask

How does the connectivity influence the final cluster

4. Conclusion

Vat bevindingen van experiment samen