University of BRISTOL

Percolation

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Abstract

Some sorts of documents need abstracts. Others do not.

1 Introduction

Start your document with words, written in full sentences and paragraphs. It is a good idea to break your document into sections and subsections

2 Formatting

We can *emphasis* some words, i.e., make them *italic*, and we can make some words **bold**. Note how using a new line in the code does not correspond to a new line in the output file. Same if we have a large white space.

Instead, if we want a new line/new paragraph, you need to press enter twice, or use
which starts a new line but not a new paragraph.

2.1 lists

Lists can be numbered or unnumbered, and you can have sub-list inside a list.

1. This is the first item in a numbered list.

2. And the second

3. (a) Here the third item is in fact a numbered sub-list.
   (b) item 2 of the numbered sub-list

4. • Here the fourth item is an unnumbered sub-list.
   • item 2 of the unnumbered sub-list

2.2 Definitions and theorems

We start with some basic definitions for Percolation, specifically bond percolation where we consider the edges on the graph to be either open or closed.

Definition 2.1. $\mathbb{Z} = \{..., -2, -1, 0, 1, 2, ...\}$ and $\mathbb{Z}^d = \{(x_1, x_2, ..., x_d) : x_i \in \mathbb{Z}\}$

Definition 2.2. For $x, y \in \mathbb{Z}^d$, define the distance from x to y, denoted $\delta(x, y)$, by

$$\delta(x, y) := \sum_{i=1}^{d} |x - y|$$

Definition 2.3. *d-dimensional cubic lattice*

Definition 2.4. A *label* allows the user to tell Latex 'remember the numbering of that definition/theorem/equation'

Lemma 2.5. *If something has a label, then we can refer to it, without knowing what number it is*

Proof. For example, by calling up Definition 2.4. This works even if the ordering of things move. Note that the end of proof square box is already there ☐

Theorem 2.6. *And a final theorem*

Proof. Combining Definition 2.4 with Lemma 2.5 we get Equation 2 below. ☐

3 Existence of a critical value on $\mathbb{Z}^d$

4 Including maths

Some maths, like $\varepsilon > 0$ or $a_{23} = \alpha^3$, is written in-line. More important or complex maths is displayed on its own line. For example,

$$\lim_{x \to \infty} f(x) = \frac{\pi}{4}.$$

Sometimes you need multiple lines of maths to line up nicely:

$$\begin{aligned} f(x + y) &= (x + y, -2(x + y)) \\ &= (x, -2x) + (y, -2y) \\ &= f(x) + f(y), \end{aligned}$$

Figure 1: The logo for the University of Bristol

and sometimes you want to number lines in an equation

$$A^T = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}^T \tag{1}$$

$$= \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix} \tag{2}$$

5 References and Figures

LaTeX [1] also allows you to cite your sources. For more details on how this can be done, we refer the reader to [2, sec: Embedded System]. But once you have a bibliography, you can use the cite command easily. Finally we add Figure 1 to show how to add graphics. Note that we first need to make sure to have the graphic uploaded to Overleaf or saved in the same folder as your Tex file (whichever is relevant to your case). Notice how the picture was resized using the scale command and that LaTeX determine that the picture looks better above.

References

[1] Leslie Lamport, *LaTeX: a document preparation system*, Addison Wesley, Massachusetts, 2nd edition, 1994.

[2] Wikibooks, *LaTeX/Bibliography Management*, [Online], Accessed at https://en.wikibooks.org/wiki/LaTeX/Bibliography_Management, (DATE ACCESSED).