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Implementierung der Cut & Count-Technik für das Steiner Tree-Problem

10. November 2016

Springer

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Kapitel 1
Einleitung

1.1 Notation

Für den Rest der Arbeit wird folgende Notation eingeführt. Die Bezeichnung $G = (V,E)$ beschreibt einen ungerichteten Graphen. Entsprechend beschreiben $V(G)$ und $E(G)$ die Menge der Knoten bzw. Kanten des Graphen G. Die Bezeichung $G[X]$ einer Knotenmenge $X \subseteq V(G)$ steht für den Subgraphen, der von X erzeugt wird. Für eine Menge an Kanten $X \subseteq E$ beschreibt $V(X)$ die Menge der Endknoten der Kanten aus X und $G[X]$ den Subgraphen (V,X). Die Knotenmenge für eine Menge von Kanten X im Graphen $G[X]$ ist diesselbe wie im Graphen G.

Mit einem „Schnitt“einer Menge $X \subseteq V$ ist das Paar (X_1,X_2) mit den Eigenschaften $X_1 \cap X_2 = \emptyset, X_1 \cup X_2 = X$. X_1 und X_2 werden als linke und rechte „Seiten“des Schnittes bezeichnet.

Die Zahl $cc(G)$ eines Graphen G beschreibt die Anzahl der zusammenhängenden Komponenten („**c**onnected **c**omponent“).

Für zwei Bags x,y eines Wurzelbaums gilt, dass y ein Nachkomme von x ist, falls es möglich ist ausgehend von y einen Weg zu x zu finden, der im Baum nur nach oben geht verläuft. Insbesondere ist x sein eigener Nachkomme.

Für zwei Integer a,b sagt die Gleichung $a \equiv b$ aus, dass a genau dann gerade ist, wenn auch b gerade ist. Zudem wird Iverson's Klammernotation verwendet. Falls p ein Prädikat ist, dann sei $[p]$ 1 (0) falls p wahr (unwahr) ist. Falls $\omega : U \to 1,\ldots,N$, so bezeichnet $\omega(S) = \sum_{e \in S} \omega(e)$ für $S \subseteq U$.

Für eine Funktion s mit $s[v \to \alpha]$ schreiben wir die Funktion s $(v, s(v)) \cup (v, \alpha)$. Diese Definition funktioniert unabhängig davon, ob $s(v)$ bereits definiert wurde oder nicht.

Kapitel 2
(Nice) Tree Decomposition

2.1 Tree Decomposition

Use the template *chapter.tex* together with the Springer document class SVMono (monograph-type books) or SVMult (edited books) to style the various elements of your chapter content in the Springer layout.

2.2 Nice Tree Decomposition

2.3 Further Requirements

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Kapitel 7
Chapter Heading

7.1 Section Heading

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7.2 Section Heading

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Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

Use the standard `equation` environment to typeset your equations, e.g.

$$a \times b = c \,, \tag{7.1}$$

however, for multiline equations we recommend to use the `eqnarray` environment[1].

$$\begin{aligned} a \times b &= c \\ \mathbf{a} \cdot \mathbf{b} &= \mathbf{c} \end{aligned} \tag{7.2}$$

[1] In physics texts please activate the class option `vecphys` to depict your vectors in ***boldface-italic*** type - as is customary for a wide range of physical subjects.

7.2.1 Subsection Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the LaTeX automatism for all your cross-references and citations as has already been described in Sect. 7.2.

> Please do not use quotation marks when quoting texts! Simply use the `quotation` environment – it will automatically render Springer's preferred layout.

7.2.1.1 Subsubsection Heading

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Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

Paragraph Heading

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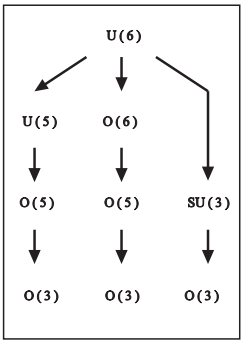

Abb. 7.1 If the width of the figure is less than 7.8 cm use the `sidecapion` command to flush the caption on the left side of the page. If the figure is positioned at the top of the page, align the sidecaption with the top of the figure – to achieve this you simply need to use the optional argument `[t]` with the `sidecaption` command

[2] If you copy text passages, figures, or tables from other works, you must obtain *permission* from the copyright holder (usually the original publisher). Please enclose the signed permission with the manucript. The sources must be acknowledged either in the captions, as footnotes or in a separate section of the book.

For typesetting numbered lists we recommend to use the `enumerate` environment – it will automatically render Springer's preferred layout.

1. Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
   a. Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
   b. Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
2. Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.

Subparagraph Heading

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Please note that the first line of text that follows a heading is not indented, whereas the first lines of all subsequent paragraphs are.

For unnumbered list we recommend to use the `itemize` environment – it will automatically render Springer's preferred layout.

- Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development, cf. Table 7.1.
  – Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
  – Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.
- Livelihood and survival mobility are oftentimes coutcomes of uneven socioeconomic development.

Run-in Heading Boldface Version Use the LaTeX automatism for all your cross-references and citations as has already been described in Sect. 7.2.

Run-in Heading Italic Version Use the LaTeX automatism for all your cross-references and citations as has already been described in Sect. 7.2.

7.3 Section Heading

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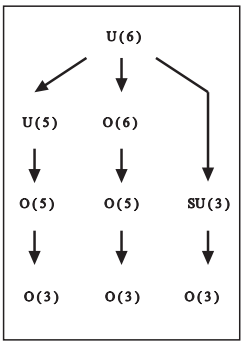

Abb. 7.2 Please write your figure caption here

Tabelle 7.1 Please write your table caption here

Classes	Subclass	Length	Action Mechanism
Translation	mRNA[a]	22 (19–25)	Translation repression, mRNA cleavage
Translation	mRNA cleavage	21	mRNA cleavage
Translation	mRNA	21–22	mRNA cleavage
Translation	mRNA	24–26	Histone and DNA Modification

[a] Table foot note (with superscript)

LaTeX automatism for all your cross-references and citations as has already been described in Sect. 7.2.

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If you want to list definitions or the like we recommend to use the Springer-enhanced `description` environment – it will automatically render Springer's preferred layout.

Type 1 That addresses central themes pertainng to migration, health, and disease. In Sect. 7.1, Wilson discusses the role of human migration in infectious disease distributions and patterns.

Type 2 That addresses central themes pertainng to migration, health, and disease. In Sect. 7.2.1, Wilson discusses the role of human migration in infectious disease distributions and patterns.

7.3.1 Subsection Heading

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Theorem 7.1. *Theorem text goes here.*

Definition 7.1. Definition text goes here.

Beweis. Proof text goes here. □

Paragraph Heading

Instead of simply listing headings of different levels we recommend to let every heading be followed by at least a short passage of text. Furtheron please use the LaTeX automatism for all your cross-references and citations as has already been described in Sect. 7.2.

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Theorem 7.2. *Theorem text goes here.*

Definition 7.2. Definition text goes here.

Beweis. Proof text goes here. □

Danksagung If you want to include acknowledgments of assistance and the like at the end of an individual chapter please use the `acknowledgement` environment – it will automatically render Springer's preferred layout.

Appendix

When placed at the end of a chapter or contribution (as opposed to at the end of the book), the numbering of tables, figures, and equations in the appendix section continues on from that in the main text. Hence please *do not* use the `appendix` command when writing an appendix at the end of your chapter or contribution. If there is only one the appendix is designated "Appendix", or "Appendix 1", or "Appendix 2", etc. if there is more than one.

$$a \times b = c \tag{7.3}$$

Problems

7.1. A given problem or Excercise is described here. The problem is described here. The problem is described here.

7.2. Problem Heading
(a) The first part of the problem is described here.
(b) The second part of the problem is described here.

Literaturverzeichnis

In view of the parallel print and (chapter-wise) online publication of your book at www.springerlink.com it has been decided that – as a genreral rule – references should be sorted chapter-wise and placed at the end of the individual chapters. However, upon agreement with your contact at Springer you may list your references in a single seperate chapter at the end of your book. Deactivate the class option `sectrefs` and the `thebibliography` environment will be put out as a chapter of its own.

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1. all works by the author alone, ordered chronologically by year of publication
2. all works by the author with a coauthor, ordered alphabetically by coauthor
3. all works by the author with several coauthors, ordered chronologically by year of publication.

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- The *two* recommended styles for references in books on *mathematical, physical, statistical and computer sciences* are depicted in [1, 2, 3, 4, 5] and [6, 7, 8, 9, 10].
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[4] Always use the standard abbreviation of a journal's name according to the ISSN *List of Title Word Abbreviations*, see http://www.issn.org/en/node/344

1. Brown B, Aaron M (2001) The politics of nature. In: Smith J (ed) The rise of modern genomics, 3rd edn. Wiley, New York
2. Dod J (1999) Effective Substances. In: The dictionary of substances and their effects. Royal Society of Chemistry. Available via DIALOG.
http://www.rsc.org/dose/title of subordinate document. Cited 15 Jan 1999
3. Slifka MK, Whitton JL (2000) Clinical implications of dysregulated cytokine production. J Mol Med, doi: 10.1007/s001090000086
4. Smith J, Jones M Jr, Houghton L et al (1999) Future of health insurance. N Engl J Med 965:325–329
5. South J, Blass B (2001) The future of modern genomics. Blackwell, London