

Studierendenseminar SS 2020: Concentration of measure and applications

The references below refer to [vH14]. You will find most of the topics covered in the sources [Ver18, BLM13] as well, which might be helpful for further reading and obtaining an alternative point of view.

Please read the Introduction of [vH14] independently.

- 9.4. pp. 13 – 17 (including Corollary 2.4): Tensorization of variance, bounded difference inequalities;
- 16.4. / 23.4. pp. 17 – 20 (Example 2.5 to end of section; from problems include Problem 2.3): Random matrices, bin packing;
- 30.4. pp. 45 – 50 (from problems only include Problem 3.5): Chernov bound, subgaussian random variables, Hoeffding's lemma;
- 7.5. pp. 50 – 53 (Section 3.2 martingale method; from problems only include Problem 3.6): Inequalities of Azuma, Azuma-Hoeffding, McDiarmid, bin packing;
- 14.5. pp. 55 – 58 (till end of proof of Lemma 3.15): Definition and properties of entropy, Herbst's argument;
- 18.6. pp. 58 – 60 (top of p. 58 to bottom of p. 60): Discrete MLS, bounded differences, random matrices;
- 25.6. pp. 113 – 117 (Section 5.1, no problems included): Maximal (tail) inequalities;
- 2.7. pp. 119 – 124 (Section 5.2, omit proof of Lemma 5.13 if time is short): Covering, packing, approximation;
- 9.7. pp. 131 – 134 (Section 5.3): Chaining method;
- 16.7. pp. 135 – 138 (Section 5.3 continued, starting with Example 5.28): Chaining method;

Literatur

- [BLM13] Stéphane Boucheron, Gábor Lugosi, and Pascal Massart. *Concentration inequalities*. Oxford University Press, Oxford, 2013. A nonasymptotic theory of independence, With a foreword by Michel Ledoux.
- [Ver18] Roman Vershynin. *High-dimensional probability*, volume 47 of *Cambridge Series in Statistical and Probabilistic Mathematics*. Cambridge University Press, Cambridge, 2018. Draft available at <https://www.math.uci.edu/~rvershyn/papers/HDP-book/HDP-book.html>.
- [vH14] Ramon van Handel. *Probability in high dimension*, 2014. Available at <https://web.math.princeton.edu/~rvan/APC550.pdf>.