David B. Blumenthal

Curriculum Vitae

Academic Career

10/2019 – Present **Postdoctoral Fellow**, *Technical University of Munich, Chair of Experimental Bioinformatics*, Freising (Germany).
Research on algorithmic techniques for network biology and drug repurposing.

3/2019 – 9/2019 **Postdoctoral Fellow**, *Free University of Bozen-Bolzano*, Bolzano (Italy).
Research on graph similarity search and graph edit distance.

11/2015 – 2/2019 **Ph. D. Computer Science**, *Free University of Bozen-Bolzano*, Bolzano (Italy).
Research on graph similarity search and graph edit distance under supervision of Prof. Dr. Johann Gamper. Areas of application mainly come from pattern matching and bioinformatics. Interrupted for parental leave from 6/2017 to 9/2017.

2/2018 & 11/2018 **Visiting Researcher**, *GREYC Research Lab in Digital Sciences*, Caen (France).
Collaboration with Prof. Dr. Sébastien Bougleux and Prof. Dr. Luc Brun.

10/2013 – 6/2015 **M. Sc. Mathematics**, *Technische Universität Berlin*, Berlin (Germany), mark: 1,0 (very good).
Specialised in combinatorial optimisation and discrete structures. Thesis *"LP-Based Approximation of the Capacitated Facility Location Problem"* under supervision of Prof. Dr. Rolf H. Möhring.

10/2011 – 11/2013 **M. A. Philosophy**, *Freie Universität Berlin*, Berlin (Germany), mark: 1,0 (very good).
Specialised in theories of truth. Thesis *"Pragmatismus oder Essentialismus. Von der Unausweichlichkeit einer philosophischen Entscheidung"* under supervision of Prof. Dr. Gerog W. Bertram.

9/2010 – 6/2011 **Erasmus Exchange**, *University of Edinburgh*, Edinburgh (UK).
Attended lectures in mathematics, philosophy, and history.

10/2009 – 8/2013 **B. Sc. Mathematics**, *Freie Universität Berlin*, Berlin (Germany), mark: 1,4 (very good).
Specialised in set theory and discrete structures. Thesis *"Maximale Unterhalbgruppen von Ω^Ω"* under supervision of PD Dr. Lutz Heindorf.

10/2007 – 8/2011 **B. A. Philosophy and History**, *Freie Universität Berlin*, Berlin (Germany), mark: 1,0 (very good).
Specialised in philosophy of language and global history. Thesis *"Die Semantik von Äußerungen über fiktive Kontexte"* under supervision of Prof. Dr. Georg W. Bertram.

2007 **Abitur**, *Ott-Heinrich Gymnasium*, Wiesloch (Germany), overall mark: 1,0 (very good).

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Work Experience outside Academia

3/2013 – 5/2013   **Intern**, *SAP AG*, Berlin (Germany).
Worked for the *SAP HANA Core* team in Berlin. Developed a prototype of a statistical tool for internal quality assurance.

8/2008 – 10/2008   **Intern**, *Stiftung Denkmal für die ermordeten Juden Europas*, Berlin (Germany).
Edited and categorised hand-written letters.

Awards and Funding

2017   Best paper award for "Exact Computation of Graph Edit Distance for Uniform and Non-Uniform Metric Edit Costs" at the 11th IAPR-TC-15 International Workshop on Graph-based Representations in Pattern Recognition (GbRPR 2017).

11/2015 – 2/2019   Ph. D. grant from the Faculty of Computer Science of the Free University of Bozen-Bolzano.

2015   M. Sc. award from the Institute of Mathematics of the Technische Universität Berlin.

12/2007 – 6/2015   Scholarship from the *Studienstiftung des deutschen Volkes* (German Scholarship Foundation).

Academic Services

PC Member   HCC 2019

Reviewer   Nature Computational Science (2020), BioData Mining (2020), Information Sciences (2020), European Journal of Operational Research (2020), Pattern Recognition Letters (2019, 2018), Information Systems Frontiers (2019), ICPR 2018

External Reviewer   VLDB 2017, EDBT 2017, ICDE 2016

Teaching

2020   Einführung in die Bioinformatik II, labs, B. Sc. Bioinformatics (Technical University of Munich).

2017/2018   Mathematical Methods for Experimental Science, labs, B. Sc. Computer Science (Free University of Bozen-Bolzano).

2016/2017   Data structures and Algorithms, labs, B. Sc. Computer Science (Free University of Bozen-Bolzano).

2015/2016   Calculus, tutorials, B. Sc. Computer Science (Free University of Bozen-Bolzano).

Computer Skills

Programming   C++, Python, Java, R, MATLAB

Mathematics   Gurobi, LIBSVM

Tools   CMake, gprof, Git, Doxygen

Text-Editing   LaTeX, HTML, CSS

Projects

CoVex   An online systems medicine platform for COVID-19 drug repurposing: `https://www.exbio.wzw.tum.de/covex/`.

EpiGEN   A generic Python pipeline for simulation of epistasis data freely available on GitHub: `https://github.com/baumbachlab/epigen`.

GEDLIB An easily extensible C++ library graph edit distance computation freely available on GitHub: `https://github.com/dbblumenthal/gedlib`.

Languages

Mothertongue German

Fluent English, Italian

Basic French

Non-Academic Interests

- Music
- Running
- Literature
- Guitar
- Cycling
- Cinema

Publications

2020 **Journal Papers**

- S. Sadegh, J. Matschinske, D. B. Blumenthal, *et al.*, "Exploring the SARS-CoV-2 virus-host-drug interactome for drug repurposing," *Nat. Commun.*, vol. 11, no. 1, p. 3518, 2020. DOI: `10.1038/s41467-020-17189-2`

- S. Helmer, D. B. Blumenthal, and K. Paschen, "What is meaningful research and how should we measure it?" *Scientometrics*, vol. 125, no. 1, pp. 153–169, 2020. DOI: `10.1007/s11192-020-03649-5`

- D. B. Blumenthal, L. Viola, M. List, *et al.*, "EpiGEN: An epistasis simulation pipeline," *Bioinformatics*, 2020, in press. DOI: `10.1093/bioinformatics/btaa245`

- D. B. Blumenthal, N. Boria, J. Gamper, *et al.*, "Comparing heuristics for graph edit distance computation," *VLDB J.*, vol. 29, no. 1, pp. 419–458, 2020. DOI: `10.1007/s00778-019-00544-1`

- D. B. Blumenthal and J. Gamper, "On the exact computation of the graph edit distance," *Pattern Recognit. Lett.*, vol. 134, pp. 46–57, 2020. DOI: `10.1016/j.patrec.2018.05.002`

- N. Boria, D. B. Blumenthal, S. Bougleux, *et al.*, "Improved local search for graph edit distance," *Pattern Recognit. Lett.*, vol. 129, pp. 19–25, 2020. DOI: `10.1016/j.patrec.2019.10.028`

- S. Bougleux, B. Gaüzère, D. B. Blumenthal, *et al.*, "Fast linear sum assignment with error-correction and no cost constraints," *Pattern Recognit. Lett.*, vol. 134, pp. 37–45, 2020. DOI: `10.1016/j.patrec.2018.03.032`

- T. Chondrogiannis, P. Bouros, J. Gamper, *et al.*, "Finding k-shortest paths with limited overlap," *VLDB J.*, 2020, in press. DOI: `10.1007/s00778-020-00604-x`

2019 **Ph. D. Thesis**

○ D. B. Blumenthal, "New techniques for graph edit distance computation," PhD thesis, Free University of Bozen-Bolzano, 2019. arXiv: 1908.00265 [cs.DS]

International Conference and Workshop Papers

○ D. B. Blumenthal, S. Bougleux, J. Gamper, *et al.*, "GEDLIB: A C++ library for graph edit distance computation," in *GbRPR 2019*, D. Conte, J.-Y. Ramel, and P. Foggia, Eds., ser. LNCS, vol. 11510, Cham: Springer, 2019, pp. 14–24. DOI: 10.1007/978-3-030-20081-7_2

2018 **Journal Papers**

○ D. B. Blumenthal and J. Gamper, "Improved lower bounds for graph edit distance," *IEEE Trans. Knowl. Data Eng.*, vol. 30, no. 3, pp. 503–516, 2018. DOI: 10.1109/TKDE.2017.2772243

International Conference and Workshop Papers

○ D. B. Blumenthal, É. Daller, S. Bougleux, *et al.*, "Quasimetric graph edit distance as a compact quadratic assignment problem," in *ICPR 2018*, IEEE Computer Society, 2018, pp. 934–939. DOI: 10.1109/ICPR.2018.8546055

○ D. B. Blumenthal, S. Bougleux, J. Gamper, *et al.*, "Ring based approximation of graph edit distance," in *S+SSPR 2018*, X. Bai, E. Hancock, T. Ho, *et al.*, Eds., ser. LNCS, vol. 11004, Cham: Springer, 2018, pp. 293–303. DOI: 10.1007/978-3-319-97785-0_28

○ T. Chondrogiannis, P. Bouros, J. Gamper, *et al.*, "Finding k-dissimilar paths with minimum collective length," in *SIGSPATIAL 2018*, New York: ACM, 2018, pp. 404–407. DOI: 10.1145/3274895.3274903. arXiv: 1809.06831 [cs.DS]

2017 **International Conference and Workshop Papers**

○ D. B. Blumenthal and J. Gamper, "Correcting and speeding-up bounds for non-uniform graph edit distance," in *ICDE 2017*, IEEE Computer Society, 2017, pp. 131–134. DOI: 10.1109/ICDE.2017.57

○ D. B. Blumenthal and J. Gamper, "Exact computation of graph edit distance for uniform and non-uniform metric edit costs," in *GbRPR 2017*, P. Foggia, C. Liu, and M. Vento, Eds., ser. LNCS, vol. 10310, Cham: Springer, 2017, pp. 211–221. DOI: 10.1007/978-3-319-58961-9_19

2013 **International Conference and Workshop Papers**

○ D. B. Blumenthal, "Rede über fiktive Kontexte," in *GAP.8 2012*, M. Hoeltje, T. Spitzley, and W. Spohn, Eds., Duisburg, Essen: DuEPublico, 2013, pp. 16–31