

# Robert Hoehndorf

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## Education

- 2005-2009 University of Leipzig, Leipzig, Germany; Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany.
- PhD in Computer Science
  - Dissertation title: *Basic considerations for improving interoperability between ontology-based biological information systems*
  - Advisors: Prof. Dr. Heinrich Herre and Dr. Janet Kelso
- 2001-2005 University of Leipzig, Leipzig, Germany.
- Diplom (M.Sc.) in Computer Science.
  - Thesis title: *Situoid theory - an ontological approach to situation theory*
  - Advisor: Prof. Dr. Heinrich Herre

## Professional experience

- 2020–now *Associate Professor* in Computer Science, Computer, Electrical, and Mathematical Sciences & Engineering Division, King Abdullah University of Science and Technology.
- 2014–2020 *Assistant Professor* in Computer Science, Computer, Electrical, and Mathematical Sciences & Engineering Division, King Abdullah University of Science and Technology.
- 2013-2014 *Research Fellow* in Bioinformatics, Department of Computer Science, Aberystwyth University.
- 2012-2013 *Research Associate*, Department of Physiology, Development and Neuroscience, University of Cambridge.
- 2010-2012 *Research Associate*, Department of Genetics, University of Cambridge.

- 2009-2010 *Postdoctoral Fellow*, European Bioinformatics Institute.
- 2009 *Postdoctoral researcher*, Max Planck Institute for Evolutionary Anthropology.

## Researcher identifiers

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## Honors and awards

- 2016 *First prize (shared)*. Ontology Alignment Evaluation Initiative 2016: Phenotype Track.
- 2009-2010 *Postdoctoral fellowship*, European Bioinformatics Institute, European Molecular Biology Laboratory, Hinxton, UK.
- 2005-2008 *PhD fellowship*, Graduate school “Knowledge Representation”, Department of Computer Science, University of Leipzig.

## Professional affiliations

- 2006–now International Society of Computational Biology (ISCB)

## Publications

Names highlighted in bold are students or postdocs directly supervised by me; the corresponding author is indicated with an asterisk.

## PEER-REVIEWED JOURNAL ARTICLES

### Publications at KAUST

- [1] **Abdelhakim, M.**, McMurray, E., Syed, A. R., **Kafkas, S.**, Kamau, A. A., Schofield, P. N., and Hoehndorf\*, R. “DDIEM: drug database for inborn errors of metabolism”. In: *Orphanet Journal of Rare Diseases* 15.1 (June 2020).
- [2] Alfares, A., Alsubaie, L., Aloraini, T., Alaskar, A., **Althagafi, A.**, Alahmad, A., Rashid, M., Alswaid, A., Alothaim, A., Eyaid, W., Ababneh, F., Albalwi, M., Alotaibi, R., Almutairi, M., Altharawi, N., Alsamer, A., **Abdelhakim, M.**, **Kafkas, S.**, Mineta, K., Cheung, N., Abdallah, A. M., Büchmann-Møller, S., Fukasawa, Y., Zhao, X., Rajan, I., Hoehndorf, R., Mutairi, F. A., Gojobori, T., and Alfadhel\*, M. “What is the right sequencing approach? Solo VS extended family analysis in consanguineous populations”. In: *BMC Medical Genomics* 13.1 (July 2020).

- [3] **Althubaiti, S., Kafkas, S., Abdelhakim, M.,** and Hoehndorf\*, R. “Combining lexical and context features for automatic ontology extension”. In: *Journal of Biomedical Semantics* 11 (2020), p. 1.
- [4] **Chen, J., Althagafi, A.,** and Hoehndorf\*, R. “Predicting candidate genes from phenotypes, functions and anatomical site of expression”. In: *Bioinformatics* (Oct. 2020).
- [5] **Kulmanov, M.** and Hoehndorf, R. “DeepGOPlus: improved protein function prediction from sequence”. In: *Bioinformatics* 36.2 (2020), pp. 422–429.
- [6] **Kulmanov, M.** and Hoehndorf\*, R. “DeepPheno: Predicting single gene loss-of-function phenotypes using an ontology-aware hierarchical classifier”. In: *PLOS Computational Biology* 16.11 (Nov. 2020), pp. 1–22.
- [7] **Kulmanov, M.,** Smaili, F. Z., Gao, X., and Hoehndorf\*, R. “Semantic similarity and machine learning with ontologies”. In: *Briefings in Bioinformatics* (Oct. 2020).
- [8] Slater\*, L. T., Gkoutos, G. V., and Hoehndorf, R. “Towards semantic interoperability: finding and repairing hidden contradictions in biomedical ontologies”. In: *BMC Medical Informatics and Decision Making* 20.S10 (Dec. 2020).
- [9] Smaili, F. Z., Gao\*, X., and Hoehndorf\*, R. “Formal axioms in biomedical ontologies improve analysis and interpretation of associated data”. In: *Bioinformatics* 36.7 (2020), pp. 2229–2236.
- [10] Umair, M., Ballow, M., Asiri, A., Alyafee, Y., Tuwajri, A., Alhamoudi, K. M., Aloraini, T., **Abdelhakim, M.,** Althagafi, A. T., **Kafkas, S.,** Alsubaie, L., Alrifai, M. T., Hoehndorf, R., Alfares, A., and Alfadhel\*, M. “EMC10 homozygous variant identified in a family with global developmental delay, mild intellectual disability, and speech delay”. In: *Clinical Genetics* 98.6 (Sept. 2020), pp. 555–561.
- [11] Vos, R. A., Katayama, T., Mishima, H., Kawano, S., Kawashima, S., Kim, J.-D., Moriya, Y., Tokimatsu, T., Yamaguchi, A., Yamamoto, Y., Wu, H., Amstutz, P., Antezana, E., Aoki, N. P., Arakawa, K., Bolleman, J. T., Bolton, E., Bonnal, R. J. P., Bono, H., Burger, K., Chiba, H., Cohen, K. B., Deutsch, E. W., Fernández-Breis, J. T., Fu, G., Fujisawa, T., Fukushima, A., García, A., Goto, N., Groza, T., Hercus, C., Hoehndorf, R., Itaya, K., Juty, N., Kawashima, T., Kim, J.-H., Kinjo, A. R., Kotera, M., Kozaki, K., Kumagai, S., Kushida, T., Lütteke, T., Matsubara, M., Miyamoto, J., Mohsen, A., Mori, H., Naito, Y., Nakazato, T., Nguyen-Xuan, J., Nishida, K., Nishida, N., Nishide, H., Ogishima, S., Ohta, T., Okuda, S., Paten, B., Perret, J.-L., Prathipati, P., Prins, P., Queralt-Rosinach, N., Shinmachi, D., Suzuki, S., Tabata, T., Takatsuki, T., Taylor, K., Thompson, M., Uchiyama, I., Vieira, B., Wei, C.-H., Wilkinson, M., Yamada, I., Yamanaka, R., Yoshitake, K., Yoshizawa, A. C., Dumontier, M., Kosaki, K., and Takagi\*, T. “BioHackathon 2015: Semantics of data for life sciences and reproducible research”. In: *F1000Research* 9 (Feb. 2020), p. 136.
- [12] **Alghamdi, S.,** Sundberg, B. A., Sundberg, J. P., Schofield, P. N., and Hoehndorf\*, R. “Quantitative evaluation of ontology design patterns for combining pathology and anatomy ontologies”. In: *Scientific Reports* 9 (Mar. 2019), p. 4025.

- [13] **Althubaiti, S.**, Karwath, A., Dallol, A., Noor, A., Alkhayyat, S. S., Alwassia, R., Mineta, K., Gojobori, T., Beggs, A. D., Schofield, P. N., Gkoutos, G. V., and Hoehndorf\*, R. "Ontology-based prediction of cancer driver genes". In: *Scientific Reports* 9 (2019), p. 17405.
- [14] **Boudellioua, I., Kulmanov, M.**, Schofield, P. N., Gkoutos, G. V., and Hoehndorf\*, R. "DeepPVP: phenotype-based prioritization of causative variants using deep learning". In: *BMC Bioinformatics* 20 (2019), p. 65.
- [15] Cooper, T. K., Silva, K. A., Kennedy, V. E., **Alghamdi, S.**, Hoehndorf, R., Sundberg, B. A., Schofield, P. N., and Sundberg\*, J. P. "Hyaline Arteriosclerosis in 30 Strains of Aged Inbred Mice". In: *Veterinary Pathology* (May 2019), p. 0300985819844822.
- [16] **Kafkas, S., Abdelhakim, M.**, Hashish, Y., **Kulmanov, M.**, Abdellatif, M., Schofield, P. N., and Hoehndorf\*, R. "PathoPhenoDB: linking human pathogens to their disease phenotypes in support of infectious disease research". In: *Scientific Data* 6.1 (June 2019), p. 79.
- [17] **Kafkas, S.** and Hoehndorf\*, R. "Ontology based mining of pathogen–disease associations from literature". In: *Journal of Biomedical Semantics* 10 (2019), p. 15.
- [18] **Kafkas, Ş.** and Hoehndorf\*, R. "Ontology based text mining of gene-phenotype associations: application to candidate gene prediction". In: *Database* 2019 (Feb. 2019), baz019.
- [19] Katayama\*, T., Kawashima, S., Micklem, G., Kawano, S., Kim, J., Kocbek, S., Okamoto, S., Wang, Y., Wu, H., Yamaguchi, A., Yamamoto, Y., Antezana, E., Aoki-Kinoshita, K., Arakawa, K., Banno, M., Baran, J., Bolleman, J., Bonnal, R., Bono, H., Fernández-Breis, J., Buels, R., Campbell, M., Chiba, H., Cock, P., Cohen, K., Dumontier, M., Fujisawa, T., Fujiwara, T., Garcia, L., Gaudet, P., Hattori, E., Hoehndorf, R., Itaya, K., Ito, M., Jamieson, D., Jupp, S., Juty, N., Kalderimis, A., Kato, F., Kawaji, H., Kawashima, T., Kinjo, A., Komiyama, Y., Kotera, M., Kushida, T., Malone, J., Matsubara, M., Mizuno, S., Mizutani, S., Mori, H., Moriya, Y., Murakami, K., Nakazato, T., Nishide, H., Nishimura, Y., Ogishima, S., Ohta, T., Okuda, S., Ono, H., Perez-Riverol, Y., Shinmachi, D., Splendiani, A., Strozzi, F., Suzuki, S., Takehara, J., Thompson, M., Tokimatsu, T., Uchiyama, I., Verspoor, K., Wilkinson, M., Wimalaratne, S., Yamada, I., Yamamoto, N., Yarimizu, M., Kawamoto, S., and Takagi\*, T. "BioHackathon series in 2013 and 2014: improvements of semantic interoperability in life science data and services". In: *F1000Research* 8.1677 (2019).
- [20] Linn, S. C., Mustonen, A. M., Silva, K. A., Kennedy, V. E., Sundberg, B. A., Bechtold, L. S., **Alghamdi, S.**, Hoehndorf, R., Schofield, P. N., and Sundberg\*, J. P. "Nail abnormalities identified in an ageing study of 30 inbred mouse strains". In: *Experimental Dermatology* 28.4 (Aug. 2019), pp. 383–390.
- [21] Weiland\*, C., **Kulmanov, M.**, Schmidt, M., and Hoehndorf\*, R. "A Machine Learning Based Approach for Similarity Search on Biodiversity Knowledge Graphs". In: *Biodiversity Information Science and Standards* 3 (2019), e37048.
- [22] Zhou, N. et al. "The CAFA challenge reports improved protein function prediction and new functional annotations for hundreds of genes through experimental screens". In: *Genome Biology* 20 (2019), p. 244.

- [23] **Alshahrani, M.** and Hoehndorf\*, R. “Semantic Disease Gene Embeddings (SmuDGE): phenotype-based disease gene prioritization without phenotypes”. In: *Bioinformatics* 34.17 (Sept. 2018), pp. i901–i907.
- [24] **Boudellioua, I., Kulmanov, M.,** Schofield, P. N., Gkoutos, G. V., and Hoehndorf\*, R. “OligoPVP: Phenotype-driven analysis of individual genomic information to prioritize oligogenic disease variants”. In: *Scientific Reports* 8 (2018), p. 14681.
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- [26] Gkoutos, G. V., Schofield, P. N., and Hoehndorf\*, R. “The anatomy of phenotype ontologies: principles, properties and applications”. In: *Briefings in Bioinformatics* 19.5 (Sept. 2018), pp. 1008–1021.
- [27] Henkel, R., Hoehndorf, R., Kacprowski, T., Knüpfer, C., Liebermeister, W., and Waltemath\*, D. “Notions of similarity for systems biology models”. In: *Briefings in Bioinformatics* 19.1 (Jan. 2018), pp. 77–88.
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- [29] **Kulmanov, M.,** Schofield, P. N., Gkoutos, G. V., and Hoehndorf\*, R. “Ontology-based validation and identification of regulatory phenotypes”. In: *Bioinformatics* 34.17 (Sept. 2018), pp. i857–i865.
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- [31] **Rodriguez-Garcia, M.** and Hoehndorf\*, R. “Inferring ontology graph structures using OWL reasoning”. In: *BMC Bioinformatics* 19.1 (2018), p. 7.
- [32] Smaili, F. Z., Gao\*, X., and Hoehndorf\*, R. “Onto2Vec: joint vector-based representation of biological entities and their ontology-based annotations”. In: *Bioinformatics* 34.13 (July 2018), pp. i52–i60.
- [33] Smaili, F. Z., Gao\*, X., and Hoehndorf\*, R. “OPA2Vec: combining formal and informal content of biomedical ontologies to improve similarity-based prediction”. In: *Bioinformatics* (2018), bty933.
- [34] Younis\*, S., Weiland, C., Hoehndorf, R., Dressler, S., Hickler, T., Seeger, B., and Schmidt, M. “Taxon and trait recognition from digitized herbarium specimens using deep convolutional neural networks”. In: *Botany Letters* 165.3–4 (2018), pp. 377–383.
- [35] **Alshahrani, M.,** Khan, M. A., **Maddouri, O.,** Kinjo, A. R., Queralt-Rosinach, N., and Hoehndorf\*, R. “Neuro-symbolic representation learning on biological knowledge graphs”. In: *Bioinformatics* 33.17 (2017), pp. 2723–2730.

- [36] **Boudellioua, I.**, Mahamad Razali, R. B., **Kulmanov, M.**, Hashish, Y., Bajic, V. B., Goncalves-Serra, E., Schoenmakers, N., Gkoutos, G. V., Schofield, P. N., and Hoehndorf\*, R. "Semantic prioritization of novel causative genomic variants". In: *PLOS Computational Biology* 13.4 (Apr. 2017), e1005500.
- [37] Hoehndorf\*, R. and Queralt-Rosinach, N. "Data science and symbolic AI: Synergies, challenges and opportunities". In: *Data Science* 1.1–2 (2017), pp. 27–38.
- [38] Kafkas\*, Ş., Sarntivijai, S., and Hoehndorf, R. "Usage of cell nomenclature in biomedical literature". In: *BMC Bioinformatics* 18.17 (Dec. 2017), p. 561.
- [39] **Kulmanov, M.** and Hoehndorf\*, R. "Evaluating the effect of annotation size on measures of semantic similarity". In: *Journal of Biomedical Semantics* 8.1 (Jan. 2017), p. 7.
- [40] **Kulmanov, M.**, Khan, M. A., and Hoehndorf\*, R. "DeepGO: predicting protein functions from sequence and interactions using a deep ontology-aware classifier". In: *Bioinformatics* 34.4 (2017), pp. 660–668.
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- [42] **Rodriguez-Garcia, M.**, Gkoutos, G. V., Schofield, P. N., and Hoehndorf\*, R. "Integrating phenotype ontologies with PhenomeNET". In: *Journal of Biomedical Semantics* 8.1 (Dec. 2017), p. 58.
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- [44] Bolleman\*, J. T., Mungall, C. J., Strozzi, F., Baran, J., Dumontier, M., Bonnal, R. P. J., Buels, R., Hoehndorf, R., Fujisawa, T., Katayama, T., and Cock, P. A. J. "FALDO: a semantic standard for describing the location of nucleotide and protein feature annotation". In: *Journal of Biomedical Semantics* 7.1 (Apr. 2016), p. 39.
- [45] **Boudellioua, I.**, Saidi, R., Hoehndorf, R., Martin, M. J., and Solovyev\*, V. "Prediction of Metabolic Pathway Involvement in Prokaryotic UniProtKB Data by Association Rule Mining". In: *PLoS ONE* 11.7 (July 2016), e0158896.
- [46] Fisher, H. M., Hoehndorf, R., Bazelato, B. S., Dadras, S. S., King, L. E., Gkoutos, G. V., Sundberg, J. P., and Schofield\*, P. N. "DermO; an ontology for the description of dermatologic disease". In: *Journal of Biomedical Semantics* 7.1 (June 2016), p. 38.
- [47] Hoehndorf\*, R., **Alshahrani, M.**, Gkoutos, G. V., Gosline, G., Groom, Q., Hamann, T., Kattge, J., Oliveira, S. M. de, Schmidt, M., Sierra, S., Smets, E., Vos, R. A., and Weiland, C. "The flora phenotype ontology (FLOPO): tool for integrating morphological traits and phenotypes of vascular plants". In: *Journal of Biomedical Semantics* 7.1 (Nov. 2016), p. 65.

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#### Publications before joining KAUST

- [1] Dumontier\*, M., Baker, C., Baran, J., Callahan, A., Chepelev, L., Cruz-Toledo, J., Del Rio, N., Duck, G., Furlong, L., Keath, N., Klassen, D., McCusker, J., Queralt-Rosinach, N., Samwald, M., Villanueva-Rosales, N., Wilkinson, M., and Hoehndorf, R. “The

- Semanticscience Integrated Ontology (SIO) for biomedical research and knowledge discovery”. In: *Journal of Biomedical Semantics* 5.1 (2014), p. 14.
- [2] Hoehndorf\*, R., Hancock, J. M., Hardy, N. W., Mallon, A. M., Schofield, P. N., and Gkoutos\*, G. V. “Analyzing gene expression data in mice with the Neuro Behavior Ontology”. In: *Mamm Genome* 25.1-2 (2014), pp. 32–40.
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## PEER-REVIEWED BOOK CHAPTERS

### Publications at KAUST

- [1] Hammar, K., Kutz, O., Dimou, A., Hahmann, T., Hoehndorf, R., Masolo, C., and Vita, R., eds. *JOWO 2020: The Joint Ontology Workshops : Proceedings of the Joint Ontology Workshops co-located with the Bolzano Summer of Knowledge (BOSK 2020)*. CEUR Workshop Proceedings 2708. CEUR-WS, 2020.
- [2] Hoehndorf, R., Gkoutos, G. V., and Schofield, P. N. “Datamining with Ontologies”. In: *Data Mining Techniques for the Life Sciences*. Ed. by Carugo, O. and Eisenhaber, F. New York, NY: Springer New York, May 2016, pp. 385–397.
- [3] Schofield, P. N., Hoehndorf, R., Smith, C. L., Eppig, J. T., and Gkoutos, G. V. “Kaufmann’s Atlas of Mouse Development Supplement”. In: Amsterdam: Elsevier Academic Press, 2015. Chap. The Informatics of Developmental Phenotypes, pp. 307–318.

## Publications before joining KAUST

- [1] Kelso, J., Hoehndorf, R., and Prüfer, K. “Ontologies in Biology”. In: *Theory and Applications of Ontology: Computer Applications*. Ed. by Poli, R., Healy, M., and Kameas, A. Springer Netherlands, July 2010, pp. 347–371.

## CONFERENCE PRESENTATIONS

### Publications at KAUST

- [1] **Kulmanov, M., Liu-Wei, W.**, Yan, Y., and Hoehndorf\*, R. “EL Embeddings: Geometric construction of models for the Description Logic EL++”. In: *Proceedings of IJCAI 2019*. IJCAI. Aug. 2019.
- [2] Pei, S., Yu, L., Hoehndorf, R., and Zhang\*, X. “Semi-Supervised Entity Alignment via Knowledge Graph Embedding with Awareness of Degree Difference”. In: *The World Wide Web Conference*. WWW '19. San Francisco, CA, USA: ACM, May 2019, pp. 3130–3136.
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- [9] Hoehndorf\*, R., **Mencel, L.**, Gkoutos, G. V., and Schofield, P. N. “Large-Scale Reasoning over Functions in Biomedical Ontologies”. In: *Formal Ontology in Information Systems*. Vol. 283. Frontiers in Artificial Intelligence and Applications. IOS Press, July 2016, pp. 299–312.

- [10] **Kulmanov, M.** and Hoehndorf\*, R. “Evaluating the effect of annotation size on measures of semantic similarity”. In: *Proceedings of Bio-Ontologies SIG*. July 2016.
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#### Publications before joining KAUST

- [1] Hoehndorf, R., Dumontier, M., and Gkoutos, G. V. “Integration of knowledge for personalized medicine: a pharmacogenomics case-study”. In: *Proceedings of the Virtual Physiological Human Conference 2012 (VPH2012)*. 2012.
- [2] Hoehndorf, R. and Gkoutos, G. V. “A translational medicine approach to orphan diseases”. In: *Proceedings of the Virtual Physiological Human Conference 2012 (VPH2012)*. 2012.
- [3] Wyner, A., Riley, L., Hoehndorf, R., and Croset, S. “Argumentation to Represent and Reason over Biological Systems”. In: *Proceedings of the 3rd International Conference on Information Technology in Bio- and Medical Informatics (ITBAM 2012)*. 2012.
- [4] Gkoutos, G. V. and Hoehndorf, R. “Ontology-based cross-species integration and analysis of *Saccharomyces cerevisiae* phenotypes”. In: *Proceedings of the 3rd Workshop for Ontologies in Biomedicine and Life sciences (OBML)*. Oct. 2011.
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- [6] Loebe, F., Stumpf, F., Hoehndorf, R., and Herre, H. “Towards Improving Phenotype Representation in OWL”. In: *Proceedings of the 3rd Workshop for Ontologies in Biomedicine and Life sciences (OBML)*. Oct. 2011.

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- [9] Schulz, S., Brochhausen, M., and Hoehndorf, R. "Higgs bosons, mars missions, and unicorn delusions: How to deal with terms of dubious reference in scientific ontologies". In: *Proceedings of the Second International Conference on Biomedical Ontology*. July 2011.
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- [13] Hoehndorf, R., Oellrich, A., Dumontier, M., Kelso, J., Herre, H., and Rebholz-Schuhmann, D. "OWLDEF: Integrating OBO and OWL". In: *Proceedings of the 13th Annual Bio-Ontologies Meeting*. July 2010.
- [14] Hoehndorf, R., Oellrich, A., Dumontier, M., Kelso, J., Herre, H., and Rebholz-Schuhmann, D. "Relational patterns in OWL and their application to OBO". In: *OWL: Experiences and Directions (OWLED)*. June 2010.
- [15] Hoehndorf, R., Kelso, J., and Herre, H. "A Formal Ontology of Sequences". In: *Proceedings of the First International Conference on Biomedical Ontologies (ICBO)*. 713. Nature Publishing Group, July 2009.
- [16] Hoehndorf, R., Kelso, J., and Herre, H. "Contributions to the formal ontology of functions and dispositions: an application of non-monotonic reasoning". In: *Proceedings of the 12th Annual Bio-Ontologies Meeting*. June 2009.
- [17] Hoehndorf, R., Ngonga Ngomo, A.-C., and Herre, H. "Developing Consistent and Modular Software Models with Ontologies". In: *SoMeT*. Sept. 2009, pp. 399–412.

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- [19] Hoehndorf, R., Bacher, J., Backhaus, M., Gregorio, S. E., Loebe, F., Prüfer, K., Uciteli, A., Visagie, J., Herre, H., and Kelso, J. “BOWiki: An ontology-based wiki for annotation of data and integration of knowledge in biology”. In: *Proceedings of the 11th Annual Bio-Ontologies Meeting*. Ed. by Lord, P., Shah, N., Sansone, S.-A., and Cockerill, M. June 2008.
- [20] Hoehndorf, R., Ngonga Ngomo, A.-C., and Dannemann, M. “Towards Ontological Interpretations for Improved Text Mining”. In: *Proceedings of the Third International Symposium on Semantic Mining in Biomedicine (SMBM 2008), Turku, Finland*. Ed. by Salakoski, T., Rebholz-Schuhmann, D., and Pyysalo, S. Turku Centre for Computer Science (TUUS), Sept. 2008, pp. 165–166.
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- [22] Backhaus, M., Kelso, J., Bacher, J., Herre, H., Hoehndorf, R., Loebe, F., and Visagie, J. “BOWiki - a collaborative annotation and ontology curation framework”. In: *Proceedings of Workshop on Social and Collaborative Construction of Structured Knowledge*. May 2007.
- [23] Hoehndorf, R., Prüfer, K., Backhaus, M., Herre, H., Kelso, J., Loebe, F., and Visagie, J. “A proposal for a gene functions wiki”. In: *OTM Workshops 2006*. Ed. by Meersman, R., Tari, Z., and Herrero, P. LNCS 4277. Springer-Verlag, Nov. 2006, pp. 669–678.
- [24] Hoehndorf, R., Prüfer, K., Backhaus, M., Visagie, J., and Kelso, J. “The design of a wiki-based curation system for the Ontology of Functions”. In: *Proceedings of the Joint BioLINK and 9th Bio-Ontologies Meeting*. July 2006.

## Tutorials

- 2019 *Semantic similarity and machine learning with ontologies*. Joint Ontology Workshops (JOWO) (with Maxat Kulmanov).
- 2019 *Machine learning with ontologies*. International Conference on Biomedical Ontologies (ICBO).
- 2018 *Ontologies in Computational Biology*. University of Cambridge, Bioinformatics Training Program (with Paul Schofield).
- 2018 *Semantic Similarity*. Aberystwyth University, Bioinformatics Course.
- 2018 *Ontologies in Computational Biology*. 26th Conference on Intelligent Systems in Molecular

Biology (ISMB) (with Michel Dumontier).

- 2017 *Ontologies in Computational Biology*. 25th Conference on Intelligent Systems in Molecular Biology (ISMB) (with Michel Dumontier).
- 2016 *Bio-ontologies and their role in analyzing personal genome data*. 15th European Conference on Computational Biology (with Paul Schofield, Luke Slater, Imene Boudellioua).
- 2011 *Reasoning over biomedical ontologies*. 19th Annual International Conference on Intelligent Systems for Molecular Biology (ISMB) and 10th European Conference on Computational Biology (ECCB) (with Michel Dumontier).
- 2011 *A little semantics goes a long way: getting more from Linked Data with OWL*. OWL: Experiences and Directions (OWLED) 2011 (with Michel Dumontier).

#### Invited talks

- 2019 *Evaluating ontology modules from the perspective of machine learning*. Keynote lecture, 4th International Workshop on Ontology Modularity, Contextuality, and Evolution, Graz, Austria.
- 2019 *AI in Genomics: Analyzing large and complex datasets*. 2nd AI Week Middle East, Dubai, UAE.
- 2019 *AI in Healthcare*. MILE Leadership Forum, Madinah, KSA.
- 2019 *AI for Genomics and Health*. CIPM Seminar, King Abdulaziz University, Jeddah, KSA.
- 2019 *AI Technologies for Variant Interpretation*. Saudi Society of Human Genetics Conference, King Abdullah University of Science and Technology, Thuwal, KSA.
- 2018 *Symbolic AI in Computational Biology*. Keynote lecture, the Eighth BEAR PGR Conference & Users Forum, University of Birmingham, UK.
- 2018 *Genomics and AI*. AI Week Middle East, Dubai, UAE.
- 2018 *Learning from Semantic Biological Data*. Research Seminar, Warwick University, UK.
- 2018 *Learning from Semantic Biological Data*. Research Seminar, Swansea University, UK.
- 2018 *Learning from Semantic Biological Data*. Research Seminar, Aberystwyth University, UK.
- 2018 *Learning from Semantic Biological Data*. Research Seminar, Bangor University, UK.
- 2018 *Semantic prioritization of causative variants in oligogenic disease*. Research Seminar, Leiden University Hospital, Holland.
- 2018 *Learning from Semantic Biological Data*. Research Seminar, Northeastern University, US.
- 2018 *Symbolic AI in Computational Biology*. Bioinformatics Research Seminar, University of Cambridge, UK.



- 2017 *Combining symbolic and statistical AI methods for biomedical data analysis.* Research seminar, IIS, Tsinghua University.
- 2017 *Semantic prioritization of novel causative variants.* Research seminar, Peking University.
- 2017 *The Semantic Web – Bioinformatics applications.* Lecture in CS, Tsinghua University.
- 2017 *Symbolic AI in Computational Biology.* Special Research Seminar, Scripps Research Institute.
- 2017 *Symbolic AI in Computational Biology.* Biomedical Informatics Research Seminar, Stanford University.
- 2017 *Symbolic AI in Computational Biology.* Special Research Seminar, University of Colorado Denver.
- 2017 *Symbolic AI in Computational Biology.* Research Seminar, Maastricht University.
- 2017 *Ontologies in Biology.* Colloquium in Honor of Prof. Dr. Heinrich Herre on the Occasion of his 75th Birthday, University of Leipzig.
- 2016 *Ontologies of phenotypes and their applications in personalized medicine.* CS Seminar, University of Murcia.
- 2016 *Mobilizing and integrating phenotype data.* Biodiversity-Informatics Seminar, Senckenberg Institute for Biodiversity.
- 2013 *From ontologies to translational medicine.* CS Seminar, University of Rostock.
- 2012 *From ontologies to translational medicine.* Invited External Speaker, European Bioinformatics Institute.
- 2012 *Phenotype informatics and translational research.* IMISE Kolloquium, Institute for Medical Informatics, Statistics and Epidemiology, University of Leipzig.
- 2012 *Ontologies for integrating and analyzing phenotypes.* Department of Computer Science, University of Birmingham.
- 2012 *My ontology is better than your! Building and evaluating ontologies for integrative research.* Keynote lecture, Bio-Ontologies Meeting (co-located with ISMB 2012)
- 2011 *Exploring phenotype data for information about rare diseases.* Department of Computer Science, University of Capetown.
- 2011 *Ontologies for representing, integrating and analyzing phenotypes.* AIC Seminar, Stanford Research Institute.
- 2011 *Towards integration of biomedical ontologies and systems biology.* Computational Modeling in Biology Network (COMBINE).
- 2011 *Integrating systems biology and biomedical ontologies.* Workshop on Modelling interoperability, European Bioinformatics Institute.

- 2010 *Interoperability between biomedical ontologies.* Knowledge Representation and Knowledge Management Research Group, University Mannheim.
- 2010 *The ontology of biomedical sequences.* IMISE Kolloquium, Institute for Medical Informatics, Statistics and Epidemiology, University of Leipzig.
- 2010 *Perspectives for the ontology of phenotypes.* Ontology Interest Group, European Bioinformatics Institute.
- 2010 *An introduction to formal ontology.* Ontology Interest Group, European Bioinformatics Institute.
- 2008 *Towards interoperability between anatomy and phenotype ontologies.* Dagstuhl seminar *Ontologies and Text Mining for Life Sciences : Current Status and Future Perspectives.*
- 2007 *Interoperability, non-monotonicity and core ontologies.* Dagstuhl seminar *Towards Interoperability of Biomedical Ontologies.*

## Research funds

- 2021-2023 *IBNSINA-QI: Integrating Biomedical Networks and Semantic Information for Neural network Analysis of Quantitative Information*
- Funding body: KAUST (Competitive Research Grant)
  - PI: Robert Hoehndorf
  - Co-Investigators: Paul N Schofield, Georgios V Gkoutos
  - Amount: 400,000 USD (239,999 USD to Robert Hoehndorf)
- 2019-2021 *CompleX: Variant Prioritization in Complex Disease*
- Funding body: KAUST (Competitive Research Grant)
  - PI: Robert Hoehndorf
  - Co-Investigators: Paul N Schofield, Georgios V Gkoutos
  - Amount: 399,998 USD (240,000 USD to Robert Hoehndorf)
- 2019 *Whole genome sequencing of rare disease patients.*
- Funding body: KAUST (OSR Director's Award, Digital Health Initiative)
  - PI: Robert Hoehndorf
  - Total amount: 138,600 USD (138,600 USD to Robert Hoehndorf)
- 2018-2020 *Sequencing and computational analysis of MRSA samples.*
- Funding body: KACST

- PI: Robert Hoehndorf, Mohammed Al Fageeh
  - Co-Investigators: Takashi Gojobori, Vladimir Bajic
  - Total amount: 362,159 USD (362,159 USD to Robert Hoehndorf)
- 2018-2019 *Improvement of genetic variant prioritization technology.*
- Funding body: KAUST (Center Partnership Fund)
  - PI: Robert Hoehndorf
  - Co-Investigators: Paul Schofield, Georgios Gkoutos, Vladimir Bajic
  - Total amount: 129,715 USD (9,500 USD to Robert Hoehndorf)
- 2018-2020 *Bio2Vec: Smart analytics infrastructure for the life sciences.*
- Funding body: KAUST (Competitive Research Grant)
  - PI: Robert Hoehndorf
  - Co-Investigators: Xin Gao, Michel Dumontier, Jens Lehmann
  - Total amount: 399,986 USD (113,250 USD to Robert Hoehndorf)
- 2018-2020 *The Whale Shark 100: Applying Population Genomics to Understand Mysteries of the World's Largest Fish.*
- Funding body: KAUST (Competitive Research Grant)
  - PI: Takashi Gojobori
  - Co-Investigators: Michael Berumen, Robert Hoehndorf
  - Amount: 389,713 USD (105,838 USD to Robert Hoehndorf)
- 2016-2018 *Data integration and ontologies for microbial cell factories.*
- Funding body: KAUST (Center Competitive Funding)
  - PI: Vladimir Bajic
  - Role: WP leader
  - Amount: 4,786,036 USD (115,691 USD to Robert Hoehndorf)

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Supervision at KAUST

Primary Supervision – Masters	Primary Supervision – PhD	PostDoc supervision
Completed: 6	Completed: 3	Completed: 1
In progress: 0	In progress: 6	In progress: 3

## Research supervised

### SUPERVISION AT KAUST

#### PhD advisor

- 2015–2019 Imane Boudellioua, Computer Science; Semantic Prioritization of Novel Causative Variants (Start date: 2015, Graduated: 2019)
- First (current) position: Assistant Professor in Computer Science, King Fahd University of Petroleum and Minerals, Saudi Arabia
- 2015–2019 Mona Alshahrani, Computer Science; Multi-modal learning on biological knowledge graphs (Start date: 2015, Graduated: 2019)
- First (current) position: Assistant Professor in Computer Science, Jubail University College, Saudi Arabia
- 2015–2020 Maxat Kulmanov, Computer Science; Prediction of protein functions and phenotypes (Start date: 2015, Graduated: 2020)
- First (current) position: Postdoctoral researcher at King Abdullah University of Science and Technology (KAUST, Saudi Arabia)
- 2018–now Sarah Alghamdi, Computer Science; Ontology design patterns for biomedical data analysis (Start date: 2018, Expected graduation: 2022)
- 2019–now Sara Althubaiti, Computer Science; Variant prioritization in cancer (Start date: 2019, Expected graduation: 2023)
- 2019–now Azza Althagafi, Computer Science; Mechanistic understanding of complex disease through analysis of longitudinal health data (Start date: 2019, Expected graduation: 2023)
- 2020–now Sumyyah Toonsi, Computer Science

#### MS advisor

- 2019–2020 Sakhaa Alsaedi, Computer Science (Start date: 2017)
- 2018–2019 Abeer Almutairi, Computer Science (Start date: 2017)
- 2019 Sumyyah Toonsi, Computer Science; Automatic annotation of protein functions through text mining (Start date: 2017, Graduated: 2019)
- 2017–2018 Sarah Alghamdi, Computer Science; Ontology design patterns for aging mouse ontologies (Start date: 2017, Graduated: 2018)
- 2018 Sara Althubaiti, Computer Science; Ontology-based identification of cancer driver genes (Start date: 2018, Graduated: 2018)

2018 Azza Althagafi, Computer Science; Simulation and visualization of human genomes (Start date: 2018, Graduated: 2018)

### Postdoc supervised

2016-2018 Miguel Angel Rodriguez Garcia:

- Start date: 2016
- Field of study: Computer Science
- Departure date: 2018
- Previous institution: University of Murcia
- Current position: Research scientist, King Juan Carlos University, Spain

### University service

2020–now *Bioinformatics Hiring Committee*, King Abdullah University of Science and Technology.  
2019–now *Directed Research Evaluation Committee* (chair since 2020), King Abdullah University of Science and Technology.  
2019 *Advisory committee on AI strategy*, King Abdullah University of Science and Technology.  
2018–now *Steering committee member* of Women in Data Science and Technology, King Abdullah University of Science and Technology.

### Professional service

#### EDITORIAL WORK

Since 2014, I have been handling editor for over 50 manuscripts.

2018–2021 Member of Editorial Board: *PLoS ONE*  
2017–now Associate Editor: *Applied Ontology*  
2017–now Associate Editor: *BMC Bioinformatics*  
2016–now Member of Editorial Board: *Data Science*  
2012–now Associate Editor: *Journal of Biomedical Semantics*  
2012 Editor: Special Issue on Ontologies in Biomedicine and Life Sciences in *Journal of Biomedical Semantics*  
2011 Editor: Special Issue on Ontologies in Biomedicine and Life Sciences in *Journal of Biomedical Semantics*  
2010 Editor: Special Issue on Ontologies in Biomedicine and Life Sciences in *Journal of Biomedical Semantics*

## REVIEWER FOR FUNDING ORGANIZATIONS

I reviewed over 50 research proposal and participated in several grant review panels. I have reviewed research grant applications for

- German Federal Ministry of Education and Research (BMBF)
- German Research Foundation (DFG)
- National Research Fund Luxembourg (FNR)
- Dr Hadwen Trust
- European Commission Horizon 2020: ERA-Net for Research Programmes on Rare Diseases
- Vrije Universiteit Brussel (VUB Interdisciplinary Research Programmes)

and have been an invited panel member for grant programs at

- German Federal Ministry of Education and Research (BMBF)
  - i:DSem – Integrative Data Semantics
  - Computational Life Sciences
  - Computational Life Sciences (Deep Learning in Life Sciences)

## REVIEWER FOR JOURNALS

I reviewed over 250 manuscripts. I have reviewed manuscripts for *Applied Ontology*, *Bioinformatics*, *BMC Bioinformatics*, *BMC Complementary and Alternative Medicine*, *Briefings in Bioinformatics*, *Central European Journal of Computer Science*, *Computational and Structural Biotechnology Journal*, *Data Science*, *Database*, *Genetics in Medicine*, *Genome Medicine*, *Genomics*, *Proteomics & Bioinformatics*, *Human Mutation*, *International Journal on Semantic Web and Information Systems*, *Journal of Bioinformatics and Computational Biology*, *Journal of Biomedical Informatics*, *Journal of Biomedical Semantics*, *Journal of Engineering*, *Journal of Molecular Biology*, *Journal of Web Semantics*, *Knowledge-based Systems*, *Natural Language Engineering*, *PLoS ONE*, and *Scientific Reports*.

## CONFERENCE ORGANIZATION

- 2020 *Chair* for Bio-Ontologies SIG 2020
- 2020 *Workshop & Tutorial Chair* for International Conference on Biomedical Ontologies (ICBO) 2020
- 2020 *Industry Chair* for Formal Ontology in Information Systems (FOIS) 2020
- 2019 *Co-Chair* for Bio-Ontologies SIG 2019
- 2019 *PC Member* for Ontologies and Databases in Life Sciences (ODLS) 2019
- 2019 *PC Member* for Saudi Society of Medical Genetics (SSMG) Meeting 2019
- 2019 *PC Member* for International Semantic Web Conference (ISWC) 2019

- 2019 *PC member* of the 27th Conference on Intelligent Systems for Molecular Biology (ISMB) and the 18th European Conference on Computational Biology
- 2019 *PC member* of the Semantic Web solutions for large-scale biomedical data analytics (SeWeBMeDA-19)
- 2018 *PC member* of the 17th European Conference on Computational Biology (ECCB)
- 2018 *PC Member* for Semantic Web Applications and Tools in Health Care and Life Sciences (SWAT4HCLS) 2018
- 2018 *PC Member* for Function-SIG 2018
- 2018 *PC Member* for Data Integration in the Life Sciences (DILS 2018)
- 2018 *PC Member* for FOIS 2018: 10th International Conference on Formal Ontologies in Information Systems
- 2018 *PC member* of the Extended Semantic Web Conference (ESWC), 2018
- 2018 *PC Member* for International Semantic Web Conference (ISWC) 2018
- 2018 *PC Member and Co-Organizer* for Bio-Ontologies SIG 2018
- 2018 *PC Member* for Intelligent Systems in Molecular Biology (ISMB) 2018
- 2018 *PC Member* for Semantic Web Solutions for Large-scale Biomedical Data Analytics (SeWeBMeDA) 2018
- 2017–2020 *Steering Committee member* for International Conference on Biological and Biomedical Ontologies (ICBO)
- 2017 *PC Member* for Semantic Web Applications and Tools in Life Sciences (SWAT4LS) 2017
- 2017 *Reviewer* for the AMIA 2018 Informatics Summit, 2018
- 2017 *Organizing committee member* for the International Conference on Biomedical Ontology (ICBO) 2017
- 2017 *PC member* for the Workshop on Ontologies and Databases in Life Sciences 2017 (ODLS)
- 2017 *PC member* of the Function SIG 2017
- 2017 *PC member and Co-organizer* of the Bio-Ontologies SIG 2017
- 2017 *PC member* of the International Semantic Web Conference (ISWC), 2017
- 2017 *PC Member* for International Workshop on Biological Data Mining and Knowledge Discovery (BioKDD 2017)
- 2017 *PC Member* for 25th Conference on Intelligent Systems for Molecular Biology (ISMB) and the 16th European Conference on Computational Biology
- 2017 *PC member* of Medinfo 2017
- 2017 *PC member* of the Extended Semantic Web Conference (ESWC), 2017
- 2016 *PC Member* for Semantic Web Applications and Tools in Life Sciences (SWAT4LS) 2016
- 2016 *PC member* for the Workshop on Ontologies and Databases in Life Sciences 2016 (ODLS)
- 2016 *PC Chair* for the International Conference on Biological Ontology 2016 (ICBO)
- 2016 *PC member* for the Bio-Ontologies SIG 2016
- 2016 *PC member* for the 15th International Semantic Web Conference (ISWC)
- 2016 *PC member* of the 15th European Conference on Computational Biology (ECCB)
- 2016 *PC Member* for 24nd Annual International Conference on Intelligent Systems for Molecular Biology (ISMB)
- 2016 *PC Member* for Know@LOD 2016
- 2016 *PC Member* for FOIS 2016: 9th International Conference on Formal Ontologies in Information Systems
- 2015 *PC Member* for Semantic Web Applications and Tools in Life Sciences (SWAT4LS) 2015

2015 *PC member* for the 14th International Semantic Web Conference (ISWC)

2015 *PC member* for Bio-Ontologies SIG 2015

2015 *PC Member* for 23rd Annual International Conference on Intelligent Systems for Molecular Biology (ISMB)

2015 *PC Member* for 15th World Congress on Health and Biomedical Informatics (MEDINFO'15)

2015 *PC Member* for 4th Workshop on Knowledge Discovery and Data Mining Meets Linked Open Data (Know@LOD)

2015 *PC Member* for 29th AAI Conference on Artificial Intelligence (AAAI-2015)

2014 *PC Member* for Ontologies and Data in the Life Sciences (ODLS) 2014

2014 *PC Member* for Semantic Web Applications and Tools in Life Sciences (SWAT4LS) 2014

2014 *PC Member* for Conference and Labs of the Evaluation Forum (CLEF) 2014

2014 *Reviewer* for 22nd Annual International Conference on Intelligent Systems for Molecular Biology (ISMB)

2014 *PC member* of Bio-Ontologies SIG 2014

2014 *PC member* of the 13th European Conference on Computational Biology (ECCB)

2014 *PC member* of the 8th International Workshop on Modular Ontologies (WoMO)

2014 *Workshop chair* of FOIS 2014: 8th International Conference on Formal Ontologies in Information Systems

2014 *PC member* of CSHALS2014: Conference on Semantics in Healthcare and Life Sciences

2014 *PC member* of the International Symposium on Inconsistency Robustness 2014

2013 *PC member* of the 7th International Workshop on Modular Ontologies (WoMO)

2013 *PC member* of the 12th International Semantic Web Conference (ISWC)

2013 *Program chair* of the Fourth International Conference on Biomedical Ontologies (ICBO)

2012 *PC member* of the Third Workshop on the use of Semantic Web Technology for Mobile and Ubiquitous Applications (SWUMA)

2012 *PC member* of Bio-Ontologies SIG 2012

2012 *PC member* of the 11th European Conference on Computational Biology (ECCB)

2012 *Chair* of the 4th Workshop on Ontologies in Biology and Life Sciences (OBML)

2012 *PC member* of the 6th International Workshop on Modular Ontologies (WoMO)

2012 *PC member* of the International Symposium on Inconsistency Robustness

2012 *PC member* of Intelligent Systems in Molecular Biology (ISMB) 2012

2012 *PC member* of FOIS 2012: 7th International Conference on Formal Ontology in Information Systems

2012 *PC member* of ICBO 2012: 3rd International Conference on Biomedical Ontologies

2011 *Chair* of the 3rd Workshop on Ontologies in Biology and Life Sciences (OBML)

2011 *PC member* of the International Symposium on Inconsistency Robustness

2011 *PC member* of the Workshop on Working with Multiple Biomedical Ontologies (WoMBO)

2011 *PC member* of the 5th International Workshop on Modular Ontologies (WoMO)

2011 *PC member* of OWL: Experiences and Directions (OWLED) 2011

2011 *PC member* of the 2nd International Conference on Biomedical Ontologies (ICBO)

2010 *Program Chair* of the 2nd Workshop on Ontologies in Biology and Life Sciences (OBML)

2010 *PC member* of the NETTAB 2010 Workshop on Biological Wikis

2010 *PC member* of the Extended Semantic Web Conference (ESWC), 2010

2010 *PC member* of Intelligent Systems in Molecular Biology (ISMB) 2010

2009 *Reviewer* for the 31st Annual International Conference of the IEEE Engineering in Medicine



and Biology Society (EMBC)

2009 *PC member* of Medical Informatics Europe (MIE), 2009

2008 *PC member* of Intelligent Systems in Molecular Biology (ISMB) 2008

2008 *PC member* of Medical Informatics Europe (MIE), 2008

2007 *PC member* of Intelligent Systems in Molecular Biology (ISMB) and European Conference on Computational Biology (ECCB), 2007

Last updated: January 3, 2021 •