

HASAN BALCI

PERSONAL INFORMATION

Date of birth: 27 March 1989
Nationality: Turkish
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EDUCATION

PhD in Computer Engineering 05/09/2016 - 18/08/2022
Bilkent University, Turkey
Supervisor: Prof. Dr. Ugur Dogrusoz
Thesis Title: “Fast Compound Graph Layout with Constraint Support”
CGPA: 3.77/4.00

MS in Computer Engineering 06/09/2012 - 05/08/2015
Bilkent University, Turkey
Supervisor: Prof. Dr. Ugur Gudukbay
Thesis Title: “Sun Position Estimation on Time-lapse Videos for Augmented Reality Applications”
CGPA: 3.69/4.00

BS in Computer Engineering 27/08/2007 - 17/06/2012
Bilkent University, Turkey
CGPA: 3.58/4.00

RESEARCH INTERESTS

My research interests range from developing novel methods for the visualization and analysis of graphs to their applications in the bioinformatics field. During my PhD, my main focus was on graph layout algorithms, complexity management of large graphs, and their application on biological pathways by also developing web-based visualization tools and services. Recently, my focus has been on developing new techniques that leverage large language models (LLMs) to facilitate and expand the use of graph-based biological notations like SBGN.

RESEARCH EXPERIENCE

Postdoctoral Researcher 03/06/2024 - present
Computational Biology Branch, National Library of Medicine (NLM), NIH, USA
Supervised by Dr. Augustin Luna

- Working on layout and visualization methods specific to SBGN

Postdoctoral Researcher 30/01/2023 - 29/01/2024
Maastricht Center for Systems Biology (MaCSBio), Maastricht University, the Netherlands
Supervised by Dr. Martina Summer-Kutmon

- Worked on a project that leverages knowledge graphs on drug repurposing for COVID-19 and its long-term effects (post-COVID)
- Worked on a project that explores the innate immune response against live and inactivated SARS-COV-2 virus
- Contributed to WikiPathways biological pathway platform [2]

Postdoctoral Researcher 01/09/2022 - 25/01/2023
i-Vis Research Lab, Bilkent University, Turkey

Supervised by Dr. Ugur Dogrusoz

- Worked on design and implementation of a research project named “Effective Analysis of Big Data Through Graph Visualization with A Unified Complexity Management Framework” supported by The Scientific and Technological Research Council of Turkey (TUBITAK)

Research Assistant

05/09/2016 - 18/08/2022

i-Vis Research Lab, Bilkent University, Turkey

Supervised by Dr. Ugur Dogrusoz

- Designed and developed a layout service named SyBLaRS (Systems Biology Layout & Rendering Service) which is a web service to lay out graphs in SBGNML, SBML, GraphML and JSON formats and/or produce corresponding images of the layouts in the backend [3]
- Designed and developed fCoSE (fast Compound Spring Embedder) [4] and contributed to the design and development of CoSEP (Compound Spring Embedder with Ports) [5] layout algorithms
- Worked on design and implementation of a research project named “Efficient Layout Algorithms for Compound Graphs With Support for Ports and Constraints” supported by TUBITAK
- Participated in Google Summer of Code 2017 with a project which aims visual quality and performance improvements in CoSE (Compound Spring Embedder) layout algorithm
- Lead development and maintenance of Newt Pathway Viewer and Editor which is a web based, open source viewer and editor for pathways in SBGN, SBML and SIF formats [6]
- Contributed to the development and maintenance of various Cytoscape.js extensions including cytoscape-expand-collapse and cytoscape-view-utilities [7]

Research Assistant

06/09/2012 - 05/08/2015

Mod-Vis Research Group, Bilkent University, Turkey

Supervised by Dr. Ugur Gudukbay

- Worked on a research project named “An Augmented Reality Environment for Interactive Crowd Simulation” supported by TUBITAK and developed a method for sun position estimation and tracing in time-lapse videos [8]

Undergraduate Research

09/2011 - 06/2012

Bilkent University, Turkey

- Worked on senior design project named “Turkish Sign Language Converter via Microsoft Kinect” that converts the signs in Turkish Sign Language to textual form

PUBLICATIONS

- [1] A. Niarakis, R. Laubenbacher, G. An, Y. Ilan, ..., **H. Balci**, ... & J. A. Glazier, “Immune digital twins for complex human pathologies: applications, limitations, and challenges”, NPJ Systems Biology and Applications, 10(01), 141, 2024. DOI: [10.1038/s41540-024-00450-5](https://doi.org/10.1038/s41540-024-00450-5)
- [2] A. Agrawal, **H. Balci**, K. Hanspers, S. L. Coort, M. Martens, D. N. Slenter, ... & A. R. Pico, “WikiPathways 2024: next generation pathway database”, Nucleic Acids Research, 52(D1), D679-D689, 2024. DOI: [10.1093/nar/gkad960](https://doi.org/10.1093/nar/gkad960)
- [3] **H. Balci**, U. Dogrusoz, Y. Z. Ozgul and P. Atayev, ”SyBLaRS: A web service for laying out, rendering and mining biological maps in SBGN, SBML and more”, PLOS Computational Biology, 18(11), pp. 1-12, 2022. DOI: [10.1371/journal.pcbi.1010635](https://doi.org/10.1371/journal.pcbi.1010635)

- [4] **H. Balci** and U. Dogrusoz, "fCoSE: a fast compound graph layout algorithm with constraint support", IEEE Transactions on Visualization and Computer Graphics, 28(12), pp. 4582-4593, 2022. DOI: [10.1109/TVCG.2021.3095303](https://doi.org/10.1109/TVCG.2021.3095303)
- [5] A. Okka, U. Dogrusoz, and **H. Balci**, "CoSEP: a compound spring embedder layout algorithm with support for ports", Information Visualization, 20(2-3), pp. 151-169, 2021. DOI: [10.1177/14738716211028136](https://doi.org/10.1177/14738716211028136)
- [6] **H. Balci**, M. C. Siper, N. Saleh, I. Safarli, L. Roy, M. Kilicarlan, R. Ozaydin, A. Mazein, C. Auffray, O. Babur, E. Demir, and U. Dogrusoz, "Newt: a comprehensive web-based tool for viewing, constructing, and analyzing biological maps", Bioinformatics, 37(10), pp. 1475-1477, 2021. DOI: [10.1093/bioinformatics/btaa850](https://doi.org/10.1093/bioinformatics/btaa850)
- [7] U. Dogrusoz, A. Karacelik, I. Safarli, **H. Balci**, L. Dervishi, and M. C. Siper, "Efficient methods and readily customizable libraries for managing complexity of large networks", PLOS ONE, 13(5): e0197238, 2018. DOI: [10.1371/journal.pone.0197238](https://doi.org/10.1371/journal.pone.0197238)
- [8] **H. Balci** and U. Gudukbay, "Sun position estimation and tracking for virtual object placement in time-lapse videos", Signal, Image and Video Processing, 11(5), pp. 817-824, 2017. DOI: [10.1007/s11760-016-1027-x](https://doi.org/10.1007/s11760-016-1027-x)

CONFERENCES / WORKSHOPS / MEETINGS

BioHackathon Europe

30/10/2023 - 03/11/2023

Participated online

I worked on a project named "Extending interoperability of experimental data using modular queries across biomedical resources".

Y. Gadiya, A. Ammar, E. Willighagen, D. Martinat, A. C. Sima, **H. Balci** & T. Abbassi-Daloi, (2023). BioHackEU23 report: Extending interoperability of experimental data using modular queries across biomedical resources, 2023. DOI: [10.37044/osf.io/mhsqp](https://doi.org/10.37044/osf.io/mhsqp)

Building Immune Digital Twins Workshop

15/05/2023 - 02/06/2023

Paris, France

I was selected to join a three-week workshop that brought together researchers across disciplines for activities ranging from extended active teamwork on specific immune digital twin projects to lectures, discussion and working groups, and brainstorming sessions.

Bioinformatics & Systems Biology Conference 2023

09-10//05/2023

Egmond aan Zee, The Netherlands

Poster: From WikiPathways to Drug Repurposing for COVID-19: Utilizing Knowledge Graphs to Identify Novel Therapies

Demo: SyBLaRS: Systems Biology Layout and Rendering Service

7th Disease Maps Community Meeting

03-05//04/2023

Maastricht, The Netherlands

Member of Local Organization Committee

COMMUNITIES

Editor in

- Systems Biology Graphical Notation (SBGN) 01/2025 - present

Member of

- Disease Maps Community 02/2023 - present

- WikiPathways Community 02/2023 - present
- Immune Digital Twin RDA Working Group 01/2024 - present

STUDENT SUPERVISION

- Helped supervision of** 09/2016 - 07/2023
- Joshua Muller, BS, MaCSBio, Maastricht University
 - Osama Zafar, MS, Bilkent University
 - Mubashira Zaman, MS, Bilkent University
 - Alihan Okka, MS, Bilkent University

TEACHING EXPERIENCE

- Practical instructor / lecturer / tutor** 02/2023 - present
Maastricht University, NL
- Computer practical instructor on network biology, Bachelor Biomedical Sciences
 - Proposal writing coach, Master Systems Biology (Systems Biology course)
 - Lecturer, Master Systems Biology (Network Biology course)
 - Tutor, Master Systems Biology (Network Biology course)

- Teaching Assistant** 06/2012 - 08/2022
Bilkent University, Turkey
- CS473 - Algorithms I, CS421 - Computer Networks, CS319 - Object-Oriented Software Engineering, CS202 - Fundamental Structures of Computer Science II, CS201 - Fundamental Structures of Computer Science I, CS102 - Algorithms and Programming II, CS101 - Algorithms and Programming I

INTERNSHIPS

- Summer Intern** 06/2011 - 07/2011
ASELSAN, Turkey
- Developed a database application to be used as an inventory list by using C# and MSSQL
- Summer Intern** 06/2011 - 07/2011
The Central Bank of the Republic of Turkey, Turkey
- Developed a database application for the purchasing department by using PHP and MySQL

SKILLS

- Programming Skills** Javascript, Java, R, Python, HTML, CSS, Matlab, Cypher, SQL
- Libraries and Tools** Cytoscape.js, Node.js, React, Git, Docker, jQuery, OpenGL, Unity
- Operating Systems** Linux, Windows, MacOS
- Databases** Neo4j, MySQL

AWARDS AND HONORS

- Full Graduate Scholarship, PhD, Bilkent University 09/2016 - 08/2022
- Graduate Scholarship, The Scientific and Technological Research Council of Turkey 09/2012 - 08/2014
- Full Graduate Scholarship, MS, Bilkent University 09/2012 - 08/2015
- Graduation with High Honor Degree, BS, Computer Engineering, Bilkent University 06/2012

Senior Design Project Innovation Award

05/2012

Full Undergraduate Scholarship, Bilkent University

08/2007 - 06/2012

Achieved 1167th position in University Entrance Exam (among 1.5 million students)

06/2007