

Thomas Chris Smits

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Education

Master of Biomedical Informatics

Aug. 2021 – Mar. 2023

Harvard Medical School

- Relevant coursework: Genomic Data Manipulation, Deep Learning for Biomedical Data, Cancer Genome Data Science, Biomedical Data Visualization, Biological Systems Modeling [MIT]

Transfer program in Computer Science

Sep. 2020 – Aug. 2021

Delft University of Technology

- Relevant coursework: Object-Oriented Programming, Logic, Algorithms, Web- and Database Structures, and Microservices Software Engineering

Bachelor of Science in Life Science & Technology (*Honors & Summa cum Laude*)

Sep. 2017 – Aug. 2020

Delft University of Technology & Leiden University (*joint degree*)

- Relevant coursework: Bioinformatics, Life Sciences, Calculus, Statistics
- Honors program Beta & Life Sciences at *Leiden University* with relevant coursework in computer science
- Study abroad at the *University of British Columbia* with relevant coursework in computational neurobiology

Awards

- American Society of Hematology **Abstract Achievement Award** 2022
awarded to 659 participants, total number of participants ~25 000
- International Myeloma Society **Young Investigator Award** 2022
awarded to 25 participants, total number of participants ~2000
- **Summa cum laude** jurisdiction for BSc. Life Science & Technology 2020
top 1 out of 100 students
- HOLLAND **scholarship** 2019 for exchange at the University of British Columbia 2019
top ~10%
- Royal Holland Society of Sciences and Humanities (KHMW) **Young Talent Award** 2018
in the discipline Chemistry of Life
awarded to 67 students out of all first-year university students of the Netherlands (~100 000)
- **Summa cum laude** jurisdiction for 'propedeuse' (first year) of Life Science & Technology 2018
top 2 out of 150 students

Research Experience

Associate in Biomedical Informatics

Feb. 2023 – present

Harvard Medical School

- Department of Biomedical Informatics, HIDIVE Lab, under Dr. Nils Gehlenborg
- Key projects:
 - ❖ Creating automatic text generation for accessibility of genome-mapped data visualization with TypeScript, using genome-mapped visualization tool Gosling
 - ❖ Development of web-based interactive visualization for single-cell data with TypeScript and D3.js
 - ❖ Creating integrated analyses of spatial and single-cell data in the HuBMAP consortium Data Portal with Python
- Mentored intern from HuBMAP Underrepresented Student Internship program (2023) and intern from Summer Institute in Biomedical Informatics 2024

Graduate Student Researcher

Harvard Medical School

Mar. 2022 – Dec. 2022

- Department of Biomedical Informatics, HIDIVE Lab, under Dr. Nils Gehlenborg
- Key project: Development of automatic feature extraction in JavaScript for written descriptions of visualization in grammar-based genomic visualization tool Gosling

Dana-Farber Cancer Institute

Nov. 2021 – Dec. 2022

- Department of Data Science, multiple myeloma genomics lab, under Dr. Mehmet Samur
- Investigation into (epi)genetic modifications of multiple myeloma
- Key projects:

- ❖ Investigating the role of somatic processes and mutational burdens around hyperdiploidy in multiple myeloma with WGS in R with Bioconductor
- ❖ Investigated ChIP-seq, ATAC-seq, CLIP-seq and RNAs-seq data with differential analyses in R with Bioconductor, including conversion and peak calling from raw data

Undergraduate Researcher

Apr. – Aug. 2020

Delft Bioinformatics Lab

- Under dr. Thomas Abeel and dr. ir. Robert Mans
- Key project: Developing various models in Python for prediction of potential hosts of SARS-CoV-2 by analyzing ACE2 receptor sequences

Teaching Experience

Teaching Assistant

Harvard Medical School

Mar. – May 2023

- **Teaching assistant** for Deep Learning for Biomedical Data (BMI707) for Master in Biomedical Informatics program in a classroom setting for 50 students.
- **Teaching assistant** for Computationally-Enabled Medicine (AISC610) for Doctor of Medicine program, guiding 20 third-year medical students in a group setting.

Delft University of Technology

Jan. – Apr. 2021

- **Teaching assistant** for Biotechnology (LB1512TU) in Bachelor program Life Science & Technology. Provided set-up of course for 200 students and assisted during biweekly seminars.

Leiden University

Aug. 2018 – Nov. 2020

- **Teaching/laboratory assistant** for Biochemistry 1 (4011BIOCTY) at Bachelor program Bio-Pharmaceutical Sciences. Guided 21 students in their first laboratory experience, working with DNA vectors, antibiotic resistance, and protein purification.
- **Teaching assistant** for Calculus 2 (LB1155) in Bachelor program Life Science & Technology. Instructed 30 students in a classroom setting.
- **Student coach** at Life Science & Technology. Assisted 15 students during their first year of the program.
- **Teaching assistant** for Biotechnology summer school in Bachelor program Life Science & Technology. Intensively tutored 7 students during summer, in a classroom setting, and with individual contact.

Skills

- **Biological Data:** Single-cell genomics, epigenomics, and spatial datasets
- **Programming Languages & Tools:**
 - ❖ **Python:** Pandas, Scikit-learn, Matplotlib, Seaborn, TensorFlow, Keras
 - ❖ **R:** Tidyverse, Bioconductor (e.g., DiffBind), RCPP
 - ❖ **JavaScript/TypeScript:** Web development, React, Vite
 - ❖ **Data visualization:** D3.js, Vega-Lite, Altair, Gosling
 - ❖ **SQL:** MySQL, PostgreSQL
 - ❖ **Git:** Version control, collaborative coding.
 - ❖ **Microsoft Excel:** Data analysis and visualization for non-coders
 - ❖ **Learning Management Systems (LMS):** Canvas, Brightspace
- **Laboratory techniques:** PCR, gel analysis, mutagenesis, enzyme/chemical purification, kinetics, bioconversion, microscopy, mass/fluorescence spectroscopy, gas/liquid chromatography

Publications

- **Thomas C Smits**, Sehi L'Yi, Andrew P Mar, Nils Gehlenborg (2024). *AltGosling: Automatic Generation of Text Descriptions for Accessible Genomics Data Visualization*. <https://doi.org/10.31219/osf.io/26jvr> (in revision at *Bioinformatics*)
- **Thomas C Smits**, Sehi L'Yi, Huyen N Nguyen, Andrew P Mar, Nils Gehlenborg (2024). *Explaining Unfamiliar Genomics Data Visualizations to a Blind Individual through Transitions*. <https://osf.io/preprints/osf/v7mxz> (accepted to *IEEE VIS 2024 AccessViz Workshop*)
- Lawrence Weru, Sehi L'Yi, **Thomas C Smits**, Nils Gehlenborg (2024). *Using OpenKeyNav to Enhance the Keyboard-Accessibility of Web-based Data Visualization Tools*. <https://osf.io/preprints/osf/3wj5a> (accepted to *IEEE VIS 2024 AccessViz Workshop*)
- Sehi L'Yi, **Thomas C Smits**, Alexander Lex, Nils Gehlenborg (2023). *Digital Accessibility of Life Science Data Portals and Journal Websites*. OSF Preprints. <https://doi.org/10.31219/osf.io/5v98j>

Conference presentations

Oral presentations

- **Thomas Smits**, Sehi L'Yi, Nils Gehlenborg (2023, March). *Accessibility in Grammar-Based Genomics Visualization Language Gosling through Automatic Generation of Text Descriptions*. 9th Annual HMS Master's Programs Research Symposium, Boston, MA.
- **Thomas Smits**, Anil Aktas Samur, Romain Lannes, Mariateresa Fulciniti, Masood Shammas, Jill Corre, Kenneth Anderson, Giovanni Parmigiani, Hervé Avet-Loiseau, Nikhil Munshi, Mehmet Samur (2022, August). *OAB-017: Mutations accumulated before and after hyperdiploidy reveal timing and impact of chromosomal gains on multiple myeloma*. 19th International Myeloma Society Annual Meeting, Los Angeles, CA. [https://doi.org/10.1016/S2152-2650\(22\)00290-7](https://doi.org/10.1016/S2152-2650(22)00290-7)
- Tengteng Yu, Hailin Chen, Kenneth Wen, Tingjian Wang, Phillip Hsieh, **Thomas Smits**, Mehmet Samur, Lijie Xing, Liang Lin, Mu Hao, Lugui Qiu, Yu-Tzu Tai, Kenneth Anderson (2022, August). *OAB-031: PHF19 promotes multiple myeloma cell resistant to daratumumab/isatuximab via upregulation in immunosuppressive microenvironment and reduced CD38 target expression*. 19th International Myeloma Society Annual Meeting, Los Angeles, CA. [https://doi.org/10.1016/S2152-2650\(22\)00304-4](https://doi.org/10.1016/S2152-2650(22)00304-4)
- Chandraditya Chakraborty, Srikanth Talluri, Eugenio Morelli, Sanika Derebail, Yan Xu, Charles Epstein, **Thomas Smits**, Moritz Binder, Kenneth Anderson, Masood Shammas, Mehmet Samur, Mariateresa Fulciniti, Nikhil Munshi (2022, August). *OAB-013: Universal loss of BCL7A allows release of its binding partner IRF4 inducing its transcriptional activity promoting MM cell growth*. 19th International Myeloma Society Annual Meeting, Los Angeles, CA. [https://doi.org/10.1016/S2152-2650\(22\)00286-5](https://doi.org/10.1016/S2152-2650(22)00286-5)
- Tengteng Yu, Mu Hao, Hailin Chen, Kenneth Wen, Tingjian Wang, **Thomas Smits**, Mehmet Samur, Eugenio Morelli, Lijie Xing, Liang Lin, Jun Qi, Gang An, Nikhil Munshi, Yu-Tzu Tai, Lugui Qiu, Kenneth Anderson (2022, December). *PHF19 Inhibits Multiple Myeloma Cell Response to Immunotherapy Via Promoting Immunosuppressive Microenvironment*. 64th ASH Annual Meeting and Exposition, New Orleans, LA. <https://doi.org/10.1182/blood-2022-159137>

Poster presentations

- **Thomas Smits**, Nikolay Akhmetov, Lisa Choy, John Conroy, Mark Keller, Tiffany Liaw, Juan Puerto, Samson Toor, Morgan L. Turner, Philip Blood, Nils Gehlenborg (2023, December). *Workspaces in Portal: Data Linking and Templates in Jupyter Lab*. HuBMAP. HuBMAP Demo Day, remote.
- **Thomas Smits**, HuBMAP Harvard HIVE-TC, HIDIVE Lab (2023, May). *Workspaces in Portal (in progress): templates allow for easy cell type composition exploration*. HuBMAP Annual Meeting, Nashville, TN.
- **Thomas Smits**, Anil Aktas Samur, Romain Lannes, Mariateresa Fulciniti, Masood Shammas, Jill Corre, Kenneth Anderson, Giovanni Parmigiani, Hervé Avet-Loiseau, Nikhil Munshi, Mehmet Samur (2022, December). *Somatic Changes Prior to the Development of Hyperdiploidy Expose Mutation Accumulation Rate and Activated Processes in Multiple Myeloma*. 64th ASH Annual Meeting and Exposition, New Orleans, LA. <https://doi.org/10.1182/blood-2022-168837>