Leah L. Weber

Urbana-Champaign, IL | leahlw2@illinios.edu

Education

University of Illinois Urbana-Champaign, PhD Computer Science **expected 2024**

Advisor: Mohammed El-Kebir

Thesis: *Cancer phylogenetics for single-cell DNA sequencing*

University of British Columbia, MM Operations Research **2014**

Advisor: Martin L. Puterman

Thesis: *Improving chemotherapy patient scheduling via implementation of an integer programming model*

Georgia Institute of Technology, BS Industrial Engineering **2004**

GPA: 3.84 | Highest Honors

Professional Experience

University of Illinois Urbana-Champaign | Research & Teaching Assistant **2019 - Present**

- Translated complex biological challenges into innovative computational solutions
- Designed and implemented novel algorithms and models to analyze NGS data
- Analyzed and interpreted high-throughput sequencing data using bioinformatics tools
- Authored and prepared manuscripts for publication in scientific journals and conferences
- Disseminated research findings through presentations at scientific conferences and meetings
- Mentored eleven high-school, undergraduate and junior graduate students on research projects
- Assisted in the delivery of introductory bioinformatics courses aimed at advanced undergraduates

BC Cancer | Project Manager **2016 - 2019**

- Developed a chemotherapy patient scheduling tool, optimizing the daily treatment schedule
- Created a Cancer Incidence & Mortality dashboard, raising awareness of epidemiological trends
- Performed advanced statistical analyses to identify risk factors for multiple myeloma

BC Cancer | Operation Research Scientist & Team Lead **2014 - 2016**

- Developed simulation models to guide capacity planning, improving operational efficiency
- Created an accurate forecasting model, aiding in budgeting for chemotherapy drug costs
- Supported strategic planning regarding the placement of the next provincial cancer center

Military Experience

United States Marine Corps | Captain | Aviator **2004 - 2012**

Electronic Countermeasures Officer in the EA-6B Prowler Tactical Jet Aircraft

- Logged 1300+ flight hours while proficiently engaging in combat and training missions

- Led combat flight planning and execution, coordinating diverse ground and aviation units
- Aided in multiple squadron logistical deployments/detachments as Assistant Logistics Officer
- Developed effective training materials, enhancing the mission commander training program
- Optimized the daily flight schedule, ensuring squadron readiness for combat deployments

Software

TRIBAL | Python [link] **|** B Cell lineage inference for single-cell RNA sequencing data
Phertilizer | Python [link] **|** Clonal tree inference for single-cell DNA data of tumors
doubletD | Python [link] **|** Doublet detection for single-cell DNA data
PhyDOSE | R package [link**] |** Experimental design for single-cell DNA sequencing
Phyolin | C++ [link] **|** Statistical hypothesis test for linear tumor evolution in single-cell data

Technical Skills

Programming | R, Python, C++, Snakemake, bash, Git/GitHub, AWS, UNIX/LINUX
Bioinformatics | NGS Data Analysis,Variant calling, Phylogenetics
Techniques | Combinatorial Optimization, Probabilistic/Statistical Modeling, Data Visualization

Publications

Weber LL., Zhang C, Ochoa I, El-Kebir M. (2023) Phertilizer: Growing a clonal tree from ultra-low coverage single-cell DNA sequencing of tumors. PLoS computational biology. Oct 11;19(10):e1011544 [link]

Weber, LL., Sashittal, P., & El-Kebir, M. (2021). doubletD: detecting doublets in single-cell DNA sequencing data. Bioinformatics, 37(Supplement_1), i214-i221[link]

Weber, LL., & El-Kebir, M. (2021). Distinguishing linear and branched evolution given single-cell DNA sequencing data of tumors. Algorithms for Molecular Biology,16, 1-12 [link]

Weber LL., Aguse N., Chia N., El-Kebir M. (2020) PhyDOSE: Design of follow-up single-cell sequencing experiments of tumors. PLoS computational biology 16(10): e1008240 [link]

Weber, LL., & El-Kebir, M. (2020). Phyolin: Identifying a Linear Perfect Phylogeny in Single-Cell DNA Sequencing Data of Tumors. In 20th International Workshop on Algorithms in Bioinformatics (WABI 2020). Schloss Dagstuhl-Leibniz-Zentrum für Informatik [link]

Liu, E., Ma, X., Sauré, A., Weber, L., Puterman, M. L., & Tyldesley, S. (2019). Improving access to chemotherapy through enhanced capacity planning and patient scheduling. IISE Transactions on Healthcare Systems Engineering, 9(1), 1-13 [link]

Weber, L., Song, K., Boyle, T., Gaudreau, É., Lai, A., Sutherland, H. J., ... & Spinelli, J. J. (2018). Organochlorine Levels in Plasma and Risk of Multiple Myeloma. Journal of occupational and environmental medicine, 60(10), 911-916 [link]

Liu, E., Santibáñez, P., Puterman, M. L., Weber, L., Ma, X., Sauré, A., ... & Tyldesley, S. (2015). A quantitative analysis of the relationship between radiation therapy use and travel time. International Journal of Radiation Oncology* Biology* Physics, 93(3), 710-718 [link]

Conference Presentations

Weber, LL., Reiman, D., El-Kebir M., Khan, A.A. (2023) TRIBAL: Tree Inference of B cell Clonal Lineages. 13th International Conference on Research in Computational Molecular Biology – Biological Sequence Analysis (RECOMB-SEQ 2023)

Weber, LL., Zhang, C., Ochoa, I., El-Kebir M. (2023) Phertilizer: Growing a Clonal Tree from Ultra-low Coverage Single-cell DNA Sequencing. 15th International Conference on Research in Computational Molecular Biology - Computational Cancer Biology Satellite (RECOMB-CCB 2023)

Weber, LL., Aguse N., Chia N., El-Kebir M. (2021) Designing follow-up single-cell sequencing experiments of tumors. Cell-NCI Symposium: Beyond Cancer Genomics Toward Precision Oncology. [link]

Weber, LL., Sashittal, P., & El-Kebir, M. (2021). doubletD: detecting doublets in single-cell DNA sequencing data. 29th Conference on Intelligent Systems for Molecular Biology (ISMB/ECCB 2021)

Weber, LL., Aguse, N., Chia, N., & El-Kebir, M. (2020). PhyDOSE: Design of Follow-up Single-cell Sequencing Experiments of Tumors. 12th International Conference on Research in Computational Molecular Biology - Computational Cancer Biology Satellite (RECOMB-CCB 2020).

Weber, L., Chang, T. & Salley-Clyne, S. (2019). Chemo Smartbook 2.0: Optimizing Chemotherapy Scheduling with Constraint Programming. Accepted talk at the 2019 INFORMS ALIO International Conference, Cancun, Mexico.

Spinelli, J. J, Weber, L., Abanto, Z., LeBlanc, A., Boyle, T., Lai, A., … & Song, K. W. (2016) Organochlorine levels in plasma and risk of multiple myeloma. Poster presented at the International Society for Environmental Epidemiology Annual Conference, Rome, Italy.

Weber, L., Lui, E., & Puterman, M.L. (2014). Chemotherapy Capacity Planning. Accepted talk at the 2014 INFORMS Annual Meeting, San Francisco, CA.

Awards and Fellowships

Surge Fellowship | 2019-2024

Awarded to outstanding incoming doctoral students in The Grainger College of Engineering, University of Illinois Urbana-Champaign from underrepresented communities in engineering

Debra and Ira Cohen Fellowship | 2022, 2023, 2024

Awarded to University of Illinois Urbana-Champaign students performing research in bioinformatics

Presidential Unit Citation | 2011

Awarded to joint task force members for extraordinary heroism and outstanding performance of duty in action against enemy forces in support of Operation Enduring Freedom

Air Medal Strike/Flight Air Medal (15 awards) | 2008-2011

Awarded to aviators for meritorious achievement while participating in sustained aerial flight operations in support of Operation Iraqi Freedom and Operation Enduring Freedom