

# Leonardo Torres

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## Education

<sup>†</sup> *Indicates expected*

- 2016–2021<sup>†</sup> **Ph.D. Network Science, Northeastern University**  
Focus: *Spectral Aspects of Mining Complex Networks*  
Advisor: *Tina Eliassi-Rad*  
Dissertation Proposal: *November 2019*  
Dissertation Committee: *Rose Yu, Dmitri Krioukov, Cristopher Moore, Tina Eliassi-Rad (Chair)*  
Boston, MA, USA
- 2009–2015 **B.Sc. Mathematics, Pontificia Universidad Católica del Perú**  
Lima, Perú
- 2013–2014 **College of The Holy Cross**  
Study abroad & Spanish teaching assistant  
Worcester, MA

## Selected Honours and Awards

- July 2019 LANET'19 Scholarship for young researchers  
Financial aid for attendance to the LANET'19 conference
- May 2019 Network Science Institute Travel Grant  
Financial aid for academic travel in Summer 2019
- 2015 *Pontificia Universidad Católica del Perú*  
Grades within top 3% in the 75-year history of the Sciences and Engineering Department

## Research Articles

### Published Articles

- L. Torres, K. S. Chan, and T. Eliassi-Rad. **GLEE: Geometric Laplacian Eigenmap Embedding**. Journal of Complex Networks, Volume 8, Issue 2, April 2020, cnaa007. [\[link\]](#)
- L. Torres, P. Suárez-Serrato and T. Eliassi-Rad. **Non-backtracking Cycles: Length Spectrum Theory and Graph Mining Applications**. Appl Netw Sci (2019) 4: 41. [\[link\]](#)

### Preprints

- L. Torres, A. S. Blevins, D. S. Bassett, T. Eliassi-Rad. **The why, how, and when of representations for complex systems**. Preprint. arXiv:2006.02870 (2020). [\[link\]](#)
- B. Klein, T. LaRock, S. McCabe, L. Torres, L. Friedland, F. Privitera, B. Lake, M. U. G. Kraemer, J. S. Brownstein, D. Lazer, T. Eliassi-Rad, S. V. Scarpino, A. Vespignani, and M- Chinazzi. **Reshaping a nation: Mobility, commuting, and contact patterns during the COVID-19 outbreak**. Technical report (2020). [\[link\]](#)
- B. Klein, T. LaRock, S. McCabe, L. Torres, F. Privitera, B. Lake, M. U. G. Kraemer, J. S. Brownstein, D. Lazer, T. Eliassi-Rad, S. V. Scarpino, M- Chinazzi, and A. Vespignani. **Assessing changes in commuting and individual mobility in major metropolitan areas in the United States during the COVID-19 outbreak**. Technical report (2020). [\[link\]](#)
- L. Torres, K. S. Chan, H. Tong and T. Eliassi-Rad. **Node Immunization with Non-backtracking Eigenvalues**. Preprint. arXiv:2002.12309 (2020). [\[link\]](#)

## Academic Presentations

### Invited Presentations

- **Non-Backtracking Cycles: Length Spectrum Theory and Graph Mining Applications**. L. Torres, P. Suárez-Serrato, and T. Eliassi-Rad. MiDAS Research Group Seminar, Boston University. Boston, MA, USA. November 2019.

### Contributed Presentations

- **The Largest Non-Backtracking Eigenvalue under Node Removal**. L. Torres, T. Eliassi-Rad. Student Research Symposium of the Network Science Institute. Boston, MA, USA. November 2019. [\[slides\]](#)
- **GLEE: Geometric Laplacian Eigenmap Embedding**. L. Torres, K. S. Chan, and T. Eliassi-Rad. Latin American Conference on Complex Networks (LANET'19). Cartagena, Colombia. August 2019. [\[slides\]](#)
- **GLEE: Geometric Laplacian Eigenmap Embedding**. L. Torres, K. S. Chan, and T. Eliassi-Rad. The 2019 International Conference on Network Science (NetSci'19). Burlington, VT, USA. May 2019. [\[slides\]](#)

- **Graph Distance from a Topological View of Non-Backtracking Cycles.** L. Torres, P. Suárez Serrato, T. Eliassi-Rad. Student Research Symposium of the Network Science Institute. Boston, MA, USA. November 2018. [\[slides\]](#)
- **A Bridge Between Homotopy Theory and Network Science.** L. Torres, P. Suárez Serrato, T. Eliassi-Rad. SIAM Workshop on Network Science 2018 (SIAMNS'18). Portland, OR, USA. July 2018. [\[slides\]](#)
- **A Study of Cycle Length Spectra.** L. Torres, P. Suárez Serrato, T. Eliassi-Rad. The 2018 International Conference on Network Science (NetSci'18). Paris, France. June 2018. [\[slides\]](#)

## Tutorials

- Co-tutor for part 3 of Tutorial on **Graph Metric Spaces**. SIAM International Conference on Data Mining (SDM19), Calgary, Canada. May 2019. <https://neu-spiral.github.io/GraphMetricSpaces/>
- Co-tutor for part 3 of Tutorial on **Graph Metric Spaces**. International Conference on Knowledge Discovery and Data Mining (KDD18), London, UK. August 2018. <https://neu-spiral.github.io/GraphMetricSpaces/>

## Posters

- **The why, how, and when of representations for complex systems.** L. Torres and A. Sizemore Blevins, D. S. Bassett and T. Eliassi-Rad. The 2019 International Conference on Network Science (NetSci'19). Burlington, Vermont, USA. May 2019. [\[poster\]](#)
- **GLEE: Geometric Laplacian Eigenmap Embedding.** L. Torres, K. S. Chan, and T. Eliassi-Rad. New England Machine Learning Day 2019 (NEML'19). Boston, MA, USA. May 2019. [\[poster\]](#)
- **GLEE: Geometric Laplacian Eigenmap Embedding.** L. Torres, K. S. Chan, and T. Eliassi-Rad. Graph Exploitation Symposium (GraphEx'19). Dedham, MA, USA. April 2019. [\[poster\]](#)
- **Graph Distance from the Topological Perspective of Nonbacktracking Cycles.** L. Torres and T. Eliassi-Rad. New England Machine Learning Day 2018 (NEML'18). Cambridge, MA, USA. May 2018. [\[poster\]](#)
- **A Bridge between Homotopy Theory and Network Science.** L. Torres and T. Eliassi-Rad. Graph Exploitation Symposium (GraphEx'18). Dedham, MA, USA. April 2018. [\[poster\]](#)
- **A Study of Cycle Length Distributions: Asymptotics, Applications, and Links to Homotopy Theory.** L. Torres and T. Eliassi-Rad. The 9th International Conference on Complex Networks (CompleNet'18). Boston, MA, USA. March 2018. [\[poster\]](#)

## Service

### Conferences and Symposia

- Co-organizer of the **Diversify NetSci** conference satellite. NetSci'20. September 2020. Rome, Italy.
- Co-organizer of the **Diversify NetSci** conference satellite. NetSci'19. May 2019. Burlington, VT, USA. <https://www.networkscienceinstitute.org/diversifynetsci2019>
- Co-organizer of the first **Student Research Symposium of NetSI**. Network Science Institute, Northeastern University. November 2018. Boston, MA, USA.
- Co-organizer and lecturer of Linear Algebra at the **Network Science Institute Bootcamp for incoming PhD students**. August 2018. Boston, MA, USA.
- Co-organizer of the **Society of Young Network Scientists** pre-conference event. CompleNet'18. March 2018. Boston, MA, USA.
- Co-organizer of the first **Symposium for the Society of Young Network Scientists**. NetSci'17. June 2017. Indianapolis, IN, USA.
- Co-organizer and lecturer of Linear Algebra at the first **Network Science Institute Bootcamp for incoming PhD students**. August 2017. Boston, MA, USA.

### Journal Referee

- IEEE Transactions on Knowledge and Data Engineering (TKDE).
- Journal of Machine Learning Research (JMLR).
- Proceedings of the Royal Society A (Proceedings A).
- Random Matrices: Theory and Applications (RMTA)

### Published Software (non peer-reviewed)

- **netrd** [\[link\]](#) netrd is a multi-purpose library with dozens of state-of-the-art implementations of algorithms for simulating dynamics on networks, measuring the distance between networks, and reconstructing networks from temporal data.
- **sunbeam** [\[link\]](#) sunbeam is a library that uses the non-backtracking matrix to provide functionality for graph mining such as graph distance and graph embedding.
- **glee** [\[link\]](#) glee is a library that uses the simplex geometry of the Laplacian matrix to compute a geometric embedding of an undirected graph.
- **decu** [\[link\]](#) decu is a suite of command line tools to automate the menial tasks involved in the development of experimental computation projects.
- **erdos** [\[link\]](#) erdos is an educational site for learning about and practicing Network Science through programming exercises.

## Professional Experience

- Summer 2019    **Research Intern – Yahoo! Research** (New York, NY, USA)  
Machine learning intern under the supervision of Yifan Hu.
- Spring 2016    **Attendant – Recurse Center** (New York, NY, USA)  
Spent twelve weeks at a programmers’ retreat focusing full-time on developing programming skills in a self-directed way. Focus on algorithm design and high-quality code writing standards.
- Spring 2015    **Calculus Teaching Assistant** – *Pontificia Universidad Católica del Perú* (Lima, Perú)  
Proctored and graded exams.
- Spring 2015    **First Real Analysis Summer School** – *Pontificia Universidad Católica del Perú* (Lima, Perú)  
Main organizer; taught real analysis at the undergraduate level, designed and graded homework, gave lectures, supervised presentations.
- 2013 – 2014    **Foreign Language Assistant** – College of The Holy Cross (Worcester, MA, USA)  
Directed Spanish conversation lessons focusing on speaking, listening, and cultural sharing. Basic, intermediate, and advanced levels.
- 2012 - 2014    **Research Programmer** – Wolfram Research South America (Lima, Perú)  
Content development for the Wolfram|Alpha knowledge engine.

## Miscellaneous

- Languages: Spanish (native), English (bilingual), French (beginner).
- Computer skills: Python (expert), Mathematica, Linux, LaTeX (advanced), MATLAB, C/C++, R, Javascript, lua, LISP (intermediate).
- Advocacy: Open {Science, Source, Data}, inclusion and diversity.