

Washington University in St. Louis

Washington University Open Scholarship

Volume 12

Washington University
Undergraduate Research Digest

Spring 2017

Matrix Completion: Climate Field Reconstruction Using Tree Rings

Timothy Chen

Washington University in St. Louis

Follow this and additional works at: https://openscholarship.wustl.edu/wuurd_vol12

Recommended Citation

Chen, Timothy, "Matrix Completion: Climate Field Reconstruction Using Tree Rings" (2017). *Volume 12*. 31.

https://openscholarship.wustl.edu/wuurd_vol12/31

This Abstracts A-I is brought to you for free and open access by the Washington University Undergraduate Research Digest at Washington University Open Scholarship. It has been accepted for inclusion in Volume 12 by an authorized administrator of Washington University Open Scholarship. For more information, please contact digital@wumail.wustl.edu.

MATRIX COMPLETION: CLIMATE FIELD RECONSTRUCTION USING TREE RINGS

Timothy Chen

Mentor: Arye Nehorai

The premise behind matrix completion is that given existing data entries in a matrix, we are able to interpolate missing data entries of the matrix, provided that the matrix is low rank. We use a particular method of matrix completion, called the Singular-Value-Thresholding (SVT) algorithm, to reconstruct a full climate field based on tree ring proxy data. As tree rings form year-to-year, they are a good indicator of the climate and temperature around its environment. However, existing tree ring data are sparse due to missing entries. Using existing tree ring data from North America, we build a complete tree ring matrix using the SVT algorithm. The complete tree matrix will subsequently be used to solve the temperature matrix using a singular value decomposition-based approach, and compared to previous reconstructions done using the incomplete data set.