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Megan Owen* (megan.owen@lehman.cuny.edu). *Computing the Frechet Mean in Billera-Holmes-Vogtmann Treespace*. Preliminary report.

Data generated in such areas as evolutionary biology and medical imaging are frequently tree-shaped, and thus non-Euclidean in nature. As a result, standard techniques for analyzing data in Euclidean spaces become inappropriate, and new methods must be used. One such framework is the Billera-Holmes-Vogtmann continuous space of metric trees. This space is a non-positively curved, or CAT(0), polyhedral cone complex, with a unique geodesic (shortest path) between any two trees, and a well-defined and unique Frechet mean. The Frechet mean can be approximated using an iterative algorithm, but no known exact polynomial algorithm exists. Using the log map, we derive inequalities on the input tree edge lengths that the mean tree must satisfy. These inequalities lead to an algorithm that is fixed-parameter tractable in the number of different splits in the set of input trees. This is joint work with M. Anaya, O. Anipchenko-Ulaj, A. Ashfaq, J. Chiu, M. Kaiser, M. Shoji Ohsawa, E. Pavlechko, K. St. John, S. Suleria, K. Thompson, and C. Yap as part of the Fall 2015 Treespace REU at Lehman College, CUNY. (Received January 19, 2018)