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Walter Zhen Cai* (wzc2@cornell.edu), 408 Dryden Rd., APT 2, Ithaca, NY 14850. *On the optimization of 1-cycle persistence under the Vietoris-Rips complex.*

Given a finite discrete point set $X \subset \mathbb{R}^n$ and distance parameter δ , we may generate the Vietoris-Rips Complex $R_\delta(X)$; the simplicial complex where a simplex $[x_i]_{i \in I} \in R_\delta(X)$ if $|x_i - x_j| \leq \delta$ for all $i, j \in I$. Given arbitrary 1-cycle σ appearing in the Rips Complex, we may define the birth and death of σ as $\alpha = \min(\delta : \sigma \in C_1(R_\delta(X)))$ and $\gamma = \min(\delta : \sigma \equiv 0 \in H_1(R_\delta(X)))$ respectively.

We seek to maximize γ with respect to α . In order to do so we consider a specific class of finite point sets $X = \{x_i\}_{0 \leq i \leq n}$ where the cycle in question is $\sigma = \sum_{i=0}^{n-1} [x_i, x_{i+1}] + [x_n, x_0]$. We conjecture a possible optimal configuration occurring when the vertices of X are equally spaced on the circle. Our algorithms focus on the manipulation of the original X , incrementally increasing γ while maintaining a constant α . These processes operate by finding subsets of X and through reflection and angular splitting, spread out the vertices in the pursuit of a more circular distribution. (Received September 12, 2013)