Meeting: 1004, Bowling Green, Kentucky, SS 8A, Special Session on Topology, Convergence, and Order, in Honor of Darrell Kent

1004-55-262 **Anne Collins*** (collins@centre.edu), Mathematics, Centre College, Danville, KY 40422, **Gunnar Carlsson**, Mathematics, Stanford University, **Afra Zomorodian**, Computer Science, Stanford University, and **Leo Guibas**, Computer Science, Stanford University. *A Topological Approach to Shape Classification.*

In order to classify objects from among a large collection, it is desirable to represent each object as compactly as possible. Our shape descriptor consists of a set of topological invariants associated with the object itself as well as with certain derived spaces. By working with the tangent complex of the object, we can also incorporate some geometric information into our descriptor. In addition, we consider several filtrations of these spaces obtained by ordering the points according to height, curvature, or density. We then compute the persistent homology of each filtration, to obtain a finite collection of intervals. As points are added in the specified order, the homology of the intermediate shape changes; each interval corresponds to a single homology class, whose birth and death times are recorded at the endpoints. For example, the zeroth persistent homology intervals encode information about the evolution of the number of connected components. Note that if we filter by curvature we can distinguish topologically between a circle and an ellipse. (Received January 25, 2005)