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Abhishek Jayantilal Rathod* (arathod@stanford.edu), Bldg 226, Apt 305, Ayrshire Farm Lane, Rains Residences., Stanford University, Stanford, CA 94305. *Excursions in Computational and Discrete Morse Theory.*

Morse Theory has, in recent times, generated a lot of interest in the Computer Graphics research community. It also has some potential Biomedical and Molecular Biology applications. This new development has inspired a lot of ideas in Computational and Discrete Morse Theory. An important theoretical challenge in any discrete version of Morse Theory is a suitable definition of integral lines (and an accompanied framework) that could closely resemble the mechanisms observed in Smooth Morse Theory. An important practical consideration in using Computational Morse Theory is the inherent curse of dimensionality faced in higher dimensional data sets. With an eye towards computation of the Morse-Smale Complex, this paper will address each of these issues. We will also present a randomized approximation algorithm to compute a near optimal Morse function in absence of a natural (or given) Morse function on a PL-manifold. (Received July 11, 2007)