VLZ 10 prof. James Damon

2. *"Use of Shape for Analyzing Objects and Their Configurations in Medical Images"*

In 2 and 3-dimensional medical images are numerous types of objects such as organs, bones structures, etc which medical workers wish to analyze and compare for medical diagnosis and treatment. What is required is a method to describe and compare the physical properties of such objects, especially among a population of patients, where statistical methods can be brought to bear. Furthermore, there are frequently collections of physically proximate objects whose relations are also important. We explain a method for representing shapes of objects via "medial representations" which are "skeletal-type structures" that encode the local, global and "relative geometry" of objects. Many properties of this representation are derived from basic results of singularity theory combined with extensions of classical differential geometry. Furthermore, we indicate a new method for using medial structures for analyzing multi-object configurations. These representations allow the introduction of statistical analyses of shapes and their relations for medical imaging.