Séminaire d'algèbre, géométrie et topologie
Lundi 13 juin à 14h
Salle I

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Medial/skeletal Linking Structures for Multi-Region Configurations

The talk concerns the geometry of a configuration of regions in $\mathbf{R}^n$, where the regions may share boundaries and so have singular boundaries. For example, in 2D and 3D medical images, we encounter collections of objects which might be organs, glands, arteries, bones, etc. Researchers have already begun to recognize the importance of using the relative positions of objects in medical images to aid in analyzing physical features for diagnosis and treatment.

The "shapes" of the regions capture both the local and global geometry as well as the topology of the regions. The overall "positional geometry" of the configuration involves such information as : the measure of relative closeness of portions of regions, characterization of "neighboring regions", and the "relative significance" of an individual region within the configuration. Such properties are not captured by single numerical values such as the Gromov-Hausdorff distance between such configurations nor by invariants that would be appropriate for a collection of points. The added structure consists of a multivalued "linking function" defined on the skeletal set M for each region Ω_i and a refinement of the Whitney stratification of M on which it is stratawise smooth. The linking functions together with the radial vector fields yield multivalued "linking vector fields", which satisfy certain linking conditions. An adapted transversality theorem is proven and used to describe the generic situations.