An elimination-based framework for computing planar and spatial bisectors

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The bisector of two geometric objects (points, curves, surfaces, etc.) is the locus of points equidistant with respect to those objects. Computing bisectors is usually difficult, even for simple geometrical elements, since determining bisectors involves solving a system of nonlinear equations. Bisector construction arises in many geometric computations (Voronoi diagrams, shape analysis of areas and volumes, collision-avoidance motion planning, etc.).

Since the computation of bisectors can be managed as a locus problem, the talk describes how an algebraic locus-finding algorithm that I proposed some years ago in ACA 2002 can be used as the basis of a uniform framework for such computations. Furthermore, an automated treatment of envelopes is also employed to generalize point/curve and point/surface bisectors to obtain curve/curve and surface/surface bisectors.

A working implementation under Sage will be provided. Preliminary results on generalizing the bisector concept will also be discussed.

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