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The trifocal variety

In Computer Vision the multi-view variety is constructed by considering several cameras in general position in space, all focused on the same point. Given lines in all camera planes, how can I tell if the cameras were all looking at the same point? This question can be answered by finding implicit defining equations for the multi-view variety. We may also be interested in the algebraic problem to find the minimal generators of the defining ideal of the multi-view variety. The case of 3 cameras, the trifocal variety, is already interesting. In this talk I will explain our use of symbolic and numerical computations aided by Representation Theory and Numerical Algebraic Geometry to study the ideal of the trifocal variety. Our work builds on the work of others (such as Hartley-Zisserman, Alzati-Tortora and Papadopoulo-Faugeras) who have already considered this problem set-theoretically. This is joint work with Chris Aholt (Washington).