



THE UNIVERSITY OF CHICAGO

Department of Statistics

SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

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Auburn University

Algebraic Vision: The Quadrifocal Variety

THURSDAY, March 10, 2015 at 4:30 PM
133 Eckhart Hall, 5734 S. University Avenue

ABSTRACT

In Computer Vision and especially the subfield of Multiview Geometry many interesting algebraic varieties arise naturally. I will focus on one of them: the quadrifocal variety. The quadrifocal variety is a 39-dimensional algebraic subvariety of the 80-dimensional projective space of 3 by 3 by 3 by 3 tensors. I will discuss how to use symmetry to study the ideal of polynomial equations vanishing on the quadrifocal variety. Despite being of high dimension and codimension, it is still possible to compute its ideal up to degree 9 using classical invariant theory and modern computing. I will explain these symmetry-enhanced massively parallel computations and their distributed implementation in Maple. Further analysis using Macaulay2 (and the package "SchurRings") allows us to rule out certain syzygies, giving a lower bound for the number of minimal generators. Led by these computations we conjecture that the ideal of the quadrifocal variety is minimally generated in degree at most 9.

Organizers:

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