Invariants, cones, and bases

Jiarong Che, Cody Djuric, Joseph Frias

MEGL, George Mason University

5/12/17

Motivation

- We are looking to find bounds for how complicated a certain ring is. The problem is that it is very hard to "look" at it, so we have to consider a ring that we can easily access and is also "close" to the original.
- These rings in question are related to polyhedral cones, for which we can find data. There are the integer lattice points of the cone, and the relations among the generators of said lattice. These are both finitely generated, and bound the complexity of our polynomial ring.

Polyhedral Cones

- These arise out of linear inequalities, and if we use rational coefficients we can get a lattice of integer vectors belonging to the cone.
- This lattice is finitely generated, and the generators are called the cone's Hilbert Basis.
- These generators will have relations among them, and the minimal list of such relations that generate the entire set is called the Markov basis of the cone.

Our cones

- To make our cones, we constructed trees. The number of leaves in the tree tells us how many tensor products of polynomials we have, and the group representing the vertices of the graph tells us what kind of symmetry we need in the invariant ring. These trees are essentially details for how to glue together stacked triangles according to certain hexagonal sum rules.

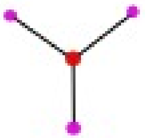

Figure 1: A Tree

Results

- TABLE

Figure 2: A Tree