ORBITOPE PRESENTATION OUTLINE

SEAN RICHARDSON

1. Intro

/*give outline, some examples of orbitopes, etc.*/

2. Ingredients to Make an Orbitope

/*on small piece of paper so can carry it around*/
INGREDIENTS:

(1) A compact group G
(2) A real vector space V
(3) A group action acting linearly on the V.S $\rho : G \times V \to V$
(4) An element of the V.S. x

STEPS:
Consider the orbit S of x by G with ρ. An orbitope is the convex hull of S.
Don't need to be comfortable with everything now...

3. Example of a Diamond

(1) $G = Z_4 =< r >$
(2) $V = \mathbb{R}^2$
(3) $(r, v) \mapsto$ /*rotation by $\pi/2$ counter clockwise*/
(4) $x = (0, 1)^T$

Show S with picture
show orbitope with separate picture

4. Octagon Example?

/*todo*/

5. Octahedron Example

/*simplify construction*/

6. A Little Representation Theory?

7. Convex Geometry

/*definition of convex as smallest convex set*/
add picture
/*definition of convex hull*/

add picture
/*Show Intersection gives existence and uniqueness*/

8. Return to Definition of an Orbitope

9. Every Platonic Solid is an Orbitope

/*outline proof*/

10. Some More Convex Geometry

/*alternative definition of convex hull*/
/*Caratheodory's theorem and intuition*/

11. Application: Protein Folding Problem

11.1. **Background and The Question.**

11.2. **Measurements an What we Know.**

11.3. **As a Mathematical Inverse Problem.**

11.4. **Construction of Orbitope.**

11.5. **What We Learn from the Orbitope.**