sage.geometry.polyhedron

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SageMath (Stein et al., 2004-) is a comprehensive open source computer algebra system, which uses Python as its interaction language and as one of its main implementation languages.

I will first give an introduction to the polyhedral computation facilities in SageMath, which are implemented by interfacing to well-known backend libraries such as the Parma Polyhedra Library (Bagnara et al., 2001-) and LattE integrale (De Loera et al., 2002-).

Then I will highlight three recent developments in SageMath:

1. A computational backend using Normaliz (Bruns et al., 1998-), recent versions of which have emerged as a next-generation polyhedral computation tool. I illustrate its performance using a family of polyhedra from the theory of subadditive functions, on which Normaliz outperforms a previous generation of codes such as PPL, cddlib (Fukuda et al. 1999-), lrslib (Avis et al., 2000-) by orders of magnitude.
2. An interface to the comprehensive system polymake (Joswig et al., 1997-), enabling interactive computations in Python instead of using polymake's interaction language, a dialect of Perl.
3. Fast computations with polyhedra over algebraic number fields, using QNormaliz (Bruns et al., 2017-), e-antic (Delecroix, 2016-), arb (Johansson et al., 2013-), FLINT/ANTIC (Hart et al., 2013-).