Polyhedral Computations
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Applications of Polyhedral Computations to the Analysis and Verification of Hardware and Software Systems

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Abstract

Convex polyhedra are the basis for several abstractions used in static analysis and computer-aided verification of complex and sometimes mission critical systems. For such applications, the identification of an appropriate complexity-precision trade-off is a particularly acute problem, so that the availability of a wide spectrum of alternative solutions is mandatory. In this presentation, I will: survey the range of applications of polyhedral computations in this area; give an overview of the different classes of polyhedra that can be adopted, depending on the particular context; outline the main polyhedral operations required by automatic analyzers and verifiers; and look at some possible combinations of polyhedra with other numerical abstractions that have the potential to improve the precision of the analysis. Areas where further theoretical investigations can result in important contributions will be highlighted.