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Effective Whitney Stratification of Real Algebraic Varieties and Applications

Abstract

Whitney stratification is a foundational theoretic tool for the study of singular spaces and maps between them. We describe several effective algorithms to compute Whitney stratifications of real (and complex) algebraic varieties, and of polynomial maps between them, by exploiting the algebraic structure of certain polar varieties and conormal spaces. Time permitting, we also explore applications of this new map stratification algorithm in real algebraic geometry and in physics. In the later context we, in particular, apply these tools to the study of the singularities of Feynman integrals; understanding and evaluating these integrals is a fundamental component in a wide variety of problems arising in quantum field theory.