

What is the Perron-Frobenius theorem?

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July 27, 2018

Abstract

The Perron-Frobenius theorem places constraints on the largest eigenvalues and positive eigenvectors of matrices with non-negative entries. Although the statement seems purely algebraic, the result has a deeply geometric character, and the familiar proofs of the theorem rely on analytic or topological results. Applications of the Perron-Frobenius theorem can be found wherever non-negative matrices occur - in other words, all over - making this result a very practical tool. In this talk, we will examine proofs of the Perron-Frobenius theorem with a focus on the need for an analytic input. We will then witness applications to diverse areas of mathematics, such as dynamical systems, graph theory, and quantum algebra.