ZMATH 2013c.00628

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The extraordinary SVD.

Am. Math. Mon. 119, No. 10, 838-851 (2012).

Summary: The singular value decomposition (SVD) is a popular matrix factorization that has been used widely in applications ever since an efficient algorithm for its computation was developed in the 1970s. In recent years, the SVD has become even more prominent due to a surge in applications and increased computational memory and speed. To illustrate the vitality of the SVD in data analysis, we highlight three of its lesser-known yet fascinating applications. The SVD can be used to characterize political positions of congressmen, measure the growth rate of crystals in igneous rock, and examine entanglement in quantum computation. We also discuss higher-dimensional generalizations of the SVD, which have become increasingly crucial with the newfound wealth of multidimensional data, and have launched new research initiatives in both theoretical and applied mathematics. With its bountiful theory and applications, the SVD is truly extraordinary.

Classification: H65 N35 M15
Keywords: singular value decomposition; matrix factorization; algorithm; data analysis; political positions of congressmen; growth rate of crystals; quantum computation
doi:10.4169/amer.math.monthly.119.10.838 arxiv:1103.2338