Chapter 6: Eigenvalues and Eigenvectors

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Abstract

This chapter focuses on eigenvalues and eigenvectors.

The system $A\boldsymbol{x} = \boldsymbol{b}$ is in equilibrium and steady state. Change as in time enters the picture - continuous time in a differential equation $\frac{d\boldsymbol{u}}{dt} = A\boldsymbol{u}$ or time steps in a difference equation $\boldsymbol{u}_{k+1} = A\boldsymbol{u}_k$. Using linear algebra, eigenvalues and eigenvectors allow these types of systems to be solved beautifully.

Vectors $\boldsymbol{x}$ when multiplied by A usually change direction. But there are certain exceptional vectors that maintain the same direction as $A\boldsymbol{x}$ and these are called "eigenvectors."