An introduction to the normalized Laplacian matrix

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Spectral graph theory looks at the interplay between the structure of graphs and the eigenvalues associated with some particular matrix. Different matrices give different information, so it is important to understand how the different matrices behave, and which matrix to use for which types of problems. We will give an introduction to one of the lesser known matrices, the normalized Laplacian matrix, which has ties to the probability transition matrix of a random walk. This matrix is useful in many settings, particularly for graphs which are not regular, but also has some strange quirks.