

Change in the Dynamics of a Weighted Digraph via Eigenvalues

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Digraphs have been used to model ecological systems using arcs for a variety of relationships. The current research uses digraphs to model the movement of certain subpopulations linked together by the dispersal of individuals, which is referred to as a *metapopulation*. Vertices represent the fragmented habitat patches with arcs showing the directions that the species may move. Weights may be added to the arcs to measure desired properties. In cases of potential extinction, it could become extremely important to be able to have separated subpopulations converge on one habitat patch to increase the possibility of survival. In this research, we add to previous research by introducing a *corridor* between two patches containing the same species, where a corridor is seen to enhance movement by reducing the effective distance (or cost of movement) between two patches. We observe the eigenvalues and eigenvectors of a given digraph to see what they can tell us of the feasibility of using the corridor. Specifically, we examine whether certain values can be identified that predict changes in the feasibility of the digraph. This provides the foundation to later examine bifurcation in metapopulation dynamics.