Source task and conventions

Characterize the source set Y relative to the teleport seed set S.

Conventional solution and proof

Let S be the actual positive-probability support of the teleport vector v, and assume $0 < \alpha < 1$ and a fixed row-stochastic link matrix W. The stationary vector is

$$\pi = \alpha \sum_{k=0}^{\infty} (1-\alpha)^k (W^\top)^k v.$$

Every summand is nonnegative. Thus $\pi_i > 0$ exactly when there is a positive-probability link-walk from a seed in S to i, including a zero-length walk. Consequently Y is the forward-reachable closure of S and $S \subseteq Y$. If the nominal sports list contains zero teleport weights, first replace it by $\operatorname{supp} v$. At $\alpha = 1$, link moves are absent and $Y = S$ directly. Dangling completion is part of W and can enlarge the reachable set.

Structural or analytic derivation

The nonnegative Neumann series turns stationary support into graph reachability. It also proves that an unreachable page has exactly zero topic-specific PageRank, not merely a small numerical value.