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Project 1: Page Rank Algorithm

Summary of Results

- **Convergence Factor:** Assumed to be <=1e-6
- **Damping Factor d**: Ranges from 0.75 to 0.95 with 0.05 increments.
- **Iterations Taken**: Consistently around 10, except for higher d values (0.90 and 0.95) where it increases slightly to 11.
- **Top PageRank**: Increases as the damping factor increases.

Key Observations

1. **Increasing Top PageRank with Higher d**:
    - As d increases, the top PageRank value also increases. This is expected since a higher damping factor reduces the probability of teleporting to a random page, thus more rank is retained within the structure of the web graph. More central or better-connected nodes receive and retain more of this rank.
2. **Consistency in Iteration Count**:
    - The number of iterations required to converge remains quite stable (10 or 11 iterations), which indicates that the algorithm efficiently reaches a steady state fairly quickly across different d values. The slight increase in iterations for higher d values might be due to a greater reliance on the linkage structure of the graph, requiring additional iterations to propagate the rank through all the links fully.
3. **Impact of d on Convergence and Rank Distribution**:
    - Although the number of iterations doesn't change dramatically, the increasing value of the top PageRank suggests that higher d values concentrate more rank among the top nodes. This concentration effect can make a few nodes significantly more influential, which is crucial in applications like network analysis or SEO.