Investigating the Second Eigen Value of the Power Walk Page Rank Method

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Introduction

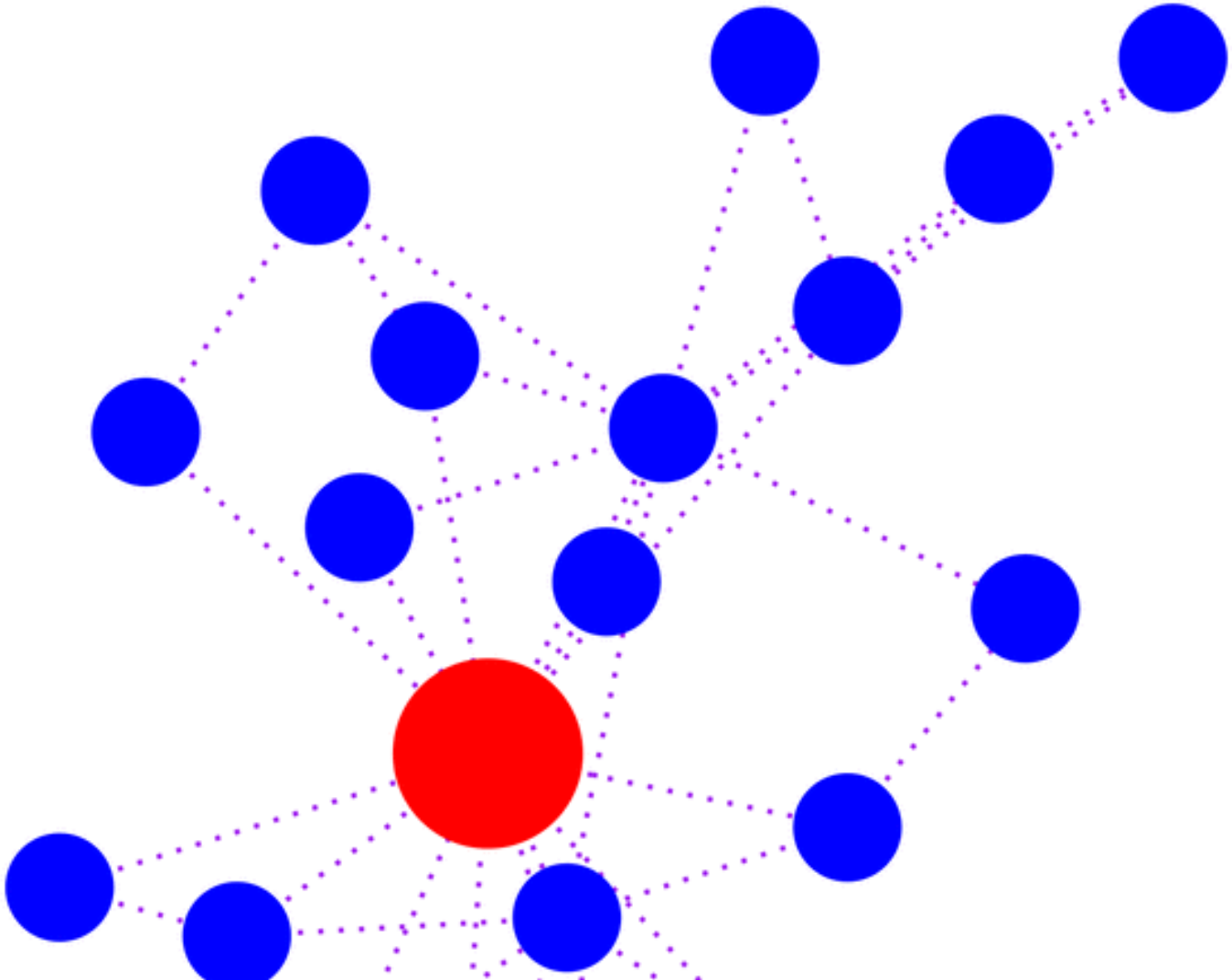
This report was concerned with building on the page range approach of measuring node centrality in a graph, by investigating the *Power Walk* method.

This required researching:

- The Mathematics of *PageRank* and relationship to Markov Chains
- How ***R*** implements:
  - Packages
  - Sparse Matrices
- Different algorithms to simulate graph structures.

What is the *PageRank*

PageRank measures node centrality by recording the frequency that nodes are traversed during a random walk, i.e. walk around a graph, for a long time and record where you went:



Mathematics of Page Rank

The Stationary Distribution of a Probability Transition Matrix

Random Surfer Model

Problems with the Stationary Distribution

Markov Chains

1. Stochastic
2. Irreducible
3. Aperiodic
4. The Fix

Limitations

Power Walk

Sparce Matrices

Implementing the Models

Implementing the Random Surfer

Implementing the Power Walk

Creating a Package

Types of Graphs

Erdos Renyi

Barabasi Albert