
Efficient Approximate PageRank 10605 15 Fall

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1 Question 1

The probability that the k -th point is the last to be eaten is $\frac{1}{n}$.

$$p(k \text{ is the last to be eaten}) = \frac{1}{n} \quad (1)$$

Before k is eaten, we must first eat the $k-1$ or $k+1$. Consider the symmetry, we can assume that it is the $k-1$ that is eaten before k . The k is the last means that the $k+1$ must be eaten already before k . This could happen if the random walk passes clockwise from $k-1$ to $k+1$ before eating k .

The probability of eats $k-1$ before $k+1$ is $\frac{1}{2}$, because the graph is symmetric. To conclude, we could see this result is reasonable. The overall probability of any point be the last one:

$$\sum_k^n p(k \text{ is the last one}) = 1 \quad (2)$$

2 Question 2

We could use several different criteria to evaluate a static-graph sampling algorithms:

In-degree and out-degree distribution.

The distribution of sizes of weakly connected and strongly connected components.

Hot-plot: The number $P(h)$ of reachable pairs of nodes at distance or less.

Hot-plot on the largest WCC.

The distribution of the first left singular vector of the graph adjacency matrix versus the rank.

The distribution of singular values of the graph adjacency matrix versus the the rank.

The distribution of the defined clustering coefficient.

3 Question 3

Place more outlinks from V would not change the PageRank score. Basically, place more outlinks would not directly increase the inlinks, therefore, would not bring direct increase. On the other hand, the self-reserved flow is not changed by the outlink numbers. In conclusion, placing more outlinks would not change the PageRank score.

Obtain more links to V would increase the PageRank score, since more links to the V website, the PageRank score would increase as defined.

