Finding stable states of Network Flow used for optimizing search engine results

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Abstract- Each and Every system in the modern world holds a saturation point above which there is no possible way to optimize the system**.** So using concepts of Markov chain and network flow the aim is to optimize browsing results. A Markov chain or Markov process is a stochastic model describing a sequence of possible events in which the probability of each event depends only on the state attained in the previous event. A network flow is a directed graph where each edge has a capacity and each edge receives a flow, in graph theory. The aim is to improve the efficiency of search engine results by using the previous state achieved.

Introduction

The network flow is a graph that connects nodes and edges and forms a flow system. It works as a transport system using network chains that have very limited space. Examples are the traffic problem on roads and the water system of the city through the connection of pipes. The nodes are connected in pairs and make a flow of data and maintain a net amount of flow.

The concept of network flow is applied at many places like in a network of wiring, the connection of sewage pipes, and fluid networks. In this case, we are specifically using the Markov Matrix to illustrate the stochastic process between two nodes.

Background

We all are familiar with web browsing and internet surfing. Have you ever wondered how Google responds so quickly to our search and provides us with results? Network flow efficiency is the reason why this is possible. Search engines spend large amounts of money on algorithms and equations to achieve maximum network flow efficiency. We are primarily using a steady-state analysis of network flow. Steady-state analysis of network flow means analyzing a flow in the network until it reaches a steady-state.

Motivation

Problems related to Network flow are considerably used in real-life scenarios.

One of the most prominent motivations was to understand the approach behind the well-known PageRank algorithm that's used by Google to rank pages. With ever-rising competition in ranking web- pages on a search engine there arises a prominent question on how these pages are ranked. Whenever we look up something on a search- engine we get millions and millions of websites and webpages as the results. Since there are millions of pages that are recovered as the result it becomes of high significance to figure out which are the most relevant pages so that the user shouldn't have to waste time looking up for results and pass through web pages and should get the asked result at the top. This process of ranking pages based on whether the user after searching significant terms relates to them stays on a webpage or is directed to some other web page. or simply moving to another webpage is useful info. This was the primary boost to discover some subtle stuff about how the theory of linear algebra is used to rank the web page.

Literature Survey

The project will be applied in Python because it consumes less time and is more effective and readable. We will be using libraries like NumPy and pandas. We will be using concepts of matrix and eigenvectors. The tools we will be using are Matlab and python libraries. With python, we will reduce our time for running the program. The problem of optimizing search results will be more efficient by solving this problem.

Contributions

AU2040250 - Deep Patel

- Documentation And Report
- Research about Markov Chain and Steady state analysis.
- Research about Eigenvalues and Eigenvectors.

AU2040253 - Ushmay Patel

- Connection of web pages
- Documentation and report
- Research about Pagerank Algorithm

AU2040019 - Vatsal Shah

- Documentation and Report
- Research about Pagerank Algorithm
- Research about Jacobi Algorithm

AU2040182 - Nihaar Patel

- Documentation and Report
- Research about Markov Chain and Steady state analysis.

References

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3) pagerank algorithm: https://www.geeksforgeeks.org/page-rank-algorithm-implementation/