**SPL-1 Project Proposal Form, 2023**

**Institute of Information Technology (IIT)**

**University of Dhaka**

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| **Student’s Name:** | **Shah Alam Abir** | | |
| **Student’s Roll:** | **1439** | **Phone:** | **+8801823168445** |
| **Project Description:** The "Implementation of Google's PageRank Algorithm" project aims to explore and implement one of the pioneering algorithms in web search and ranking – Google's PageRank algorithm, developed by Larry Page and Sergey Brin at Stanford University It is a crucial tool in modern web search and information retrieval. It evaluates a webpage's importance based on the quantity and quality of incoming links. The algorithm operates iteratively, recalculating PageRank scores for each page based on the cumulative influence of incoming links. Its impact extends beyond search engines, finding applications in social network analysis, recommendation systems, and information propagation studies. This project will guide me through the process of understanding the algorithm's core concepts and implementing its key components.  **Step 1: Introduction to PageRank Algorithm**  Provide an overview of search engine algorithms and the critical role of PageRank in modern web search. Explain the concept of PageRank as a link analysis algorithm for ranking web pages.  **Step 2: Graph Representation**  Implement data structures to represent a web graph using adjacency matrices or linked lists. Write functions to create and manipulate the graph, including adding nodes and edges.  **Step 3: Random Surfer Model**  Translate the Random Surfer Model into code, simulating the behavior of a user navigating the web graph. Calculate the probability distribution of landing on different pages.  **Step 4: Iterative Algorithm Implementation**  Develop functions for the iterative PageRank algorithm, considering the damping factor and handling dangling nodes. Implement matrix operations required for the iterative process.  **Step 5: Web Graph Input and Initialization**  Design a mechanism to input the web graph from a file or user input. Initialize the necessary data structures and variables for the algorithm.  **Step 6: Iterative PageRank Calculation**  Execute the iterative algorithm using a specified number of iterations or until convergence. Monitor the progression of PageRank scores and identify changes between iterations.  **Step 7: Analysis and Testing**  Evaluate the performance and accuracy of the implemented PageRank algorithm using sample web graphs. Compare the results with expected outcomes and analyze the effectiveness of the algorithm.  **Step 8: Conclusion and Future Enhancements**  Summarize the project's achievements, highlighting the successful implementation of the PageRank algorithm. Discuss potential enhancements or extensions, such as incorporating personalized PageRank or optimizing the algorithm's efficiency. | | | |
| **Languages or Tools to be used:** C/C++ language, Visual Studio Code, Git & Github | | | |
| **Supervisor’s Name: Dr. Ahmedul Kabir**  **Signature of the supervisor:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | | | |
| **Before the Midterm Presentation:**  I confirm that the progress is satisfactory and I am forwarding it for midterm presentation.  **Signature of the supervisor:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | | | |
| **Midterm Presentation Feedback:** | | | |