**Report: Longest Path in a Weighted Directed Acyclic Graph (DAG)**

**Overview**

This report describes the implementation of a solution to find the longest path in a Weighted Directed Acyclic Graph (DAG). The task involves calculating the longest path in the graph starting from any node.

**Problem Statement**

You are given a Directed Acyclic Graph (DAG) with n nodes, numbered from 0 to n-1. The graph is represented as an adjacency list where graph[i] is a list of tuples (j, w), representing an edge from node i to node j with weight w. The objective is to find the longest path in the graph starting from any node.

**Implementation**

The solution includes the following key steps:

1. **Topological Sort**: Compute the topological order of the nodes in the graph.
2. **Longest Path Calculation**: Use the topological order to compute the longest path distances using dynamic programming.

**Function Signature**

def longest\_path(graph: list) -> int:

* **Parameters**: graph (list) - A list of lists, where graph[i] contains tuples (j, w) representing an edge from node i to node j with weight w.
* **Returns**: int - The length of the longest path in the graph.

**Example**

**Input:**

graph = [ [(1, 3), (2, 2)], [(3, 4)], [(3, 1)], [] ]

**Output:**

7

Explanation: The longest path is from node 0 -> 1 -> 3 with a total weight of 3 + 4 = 7.

**Files in the Repository**

* main.py: Contains the longest\_path function and a script to run the function with a sample input.
* test\_main.py: Contains unit tests for the longest\_path function using the unittest framework.

**How to Run the Code**

1. **Clone the Repository**:

git clone https://github.com/your-username/your-repo-name.git

cd your-repo-name

1. **Run the Main Script**: To see the longest path length for a sample graph:

python main.py

1. **Run the Unit Tests**: To run the unit tests:

python -m unittest test\_main.py

**Conclusion**

The implementation successfully finds the longest path in a Weighted Directed Acyclic Graph (DAG). The provided unit tests validate the correctness of the solution.

**License**

This project is licensed under the MIT License.

**Acknowledgments**

This project was created as part of an assignment to find the longest path in a Weighted Directed Acyclic Graph (DAG).

**GITHUB LINK:** [**https://github.com/anirudh01k9/assignment\_thapar\_scoreme\_102003714**](https://github.com/anirudh01k9/assignment_thapar_scoreme_102003714)