**COMP90025 Parallel and Multicore Computing**

**Project 1A - Diameter of Graph Report**

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**1. Target**

Finding the diameter, which is the maximum of the shortest path lengths between all pairs of nodes of a graph. Writing an OpenMP program to read a graph from an input file and output the diameter, to improve the understanding of parallel computing.

1. **Methodology**

OpenMP: An application programming interface that supports cross-platform multi-threaded programming, where the main thread generates a series of sub-threads and divides the tasks into these sub-threads for execution. These sub-threads run in parallel and the runtime environment assigns them to different processors.

Floyd-Warshall algorithm: An algorithm for solving the shortest path between any two nodes. It can correctly handle the shortest path problem of directed graph or negative edge weights. The Fliyd-Warshall algorithm has time complexity of and space complexity of . Pseudo code for this is shown as follows:

for i = 1 to N

for j = 1 to N

if there is an edge from i to j

dist[0][i][j] = the length of the edge from i to j

else

dist[0][i][j] = INFINITY

for k = 1 to N

for i = 1 to N

for j = 1 to N

dist[k][i][j] = min(dist[k-1][i][j], dist[k-1][i][k] + dist[k-1][k][j])

The principle of the algorithm is dynamic programming. This report issue a method basing on the Floyd-Warshall algorithm, with some improvement, to meet the requirement of the target.

**3. Implementation**

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**4. Analysis**

Text

1. **Conclusions**

Concluding.

**References**