SYSC 4101: Lab 5

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A diagram of a network

Description automatically generated

1. The test requirements for the All-Nodes criterion is that TR contains all reachable nodes

TR = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

1. The test requirements for the All-Edges criterion is that TR contains each reachable path of length of up to 2

TR = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10 , (1, 4), (4, 8), (1, 5), (5, 8), (5, 9), (2, 5), (9, 6), (3, 6), (6, 2), (3, 7), (6, 10), (7, 10)}

1. The test requirements for the Prime-Path criterion is that TR contains each prime path in the graph. A prime path is a simple path (no repeating nodes) that does not appear as a sub-path of any other simple path.

TR = {[1, 4, 8], [1, 5, 8], [1, 5, 9, 6, 10], [1, 5, 9, 6, 2],

[2, 5, 9, 6, 10], [2, 5, 9, 6, 2],

[3, 6, 2, 5, 9], [3, 6, 2, 5, 8], [3, 6, 10], [3, 7, 10].

[5, 9, 6, 2, 5],

[6, 2, 5, 9, 6],

[9, 6, 2, 5, 9], [9, 6, 2, 5, 8]}

1. TS = {[1, 4, 8], [2, 5, 9, 6, 10], [3, 7, 10]}

All the nodes from 1 – 10 appear at least once in the set of paths. It is therefore All-Nodes adequate. This test suite is missing edges (1, 5), (5, 8), (6, 2), and (3, 6), therefore it is not All-Edges adequate.

1. TS = {[1, 4, 8], [2, 5, 9, 6, 10], [3, 7, 10], [1, 5, 8], [3, 6, 2, 5, 8]}

It is easy to check that each edge of the graph has been exercised by the test suite. The test suite is adequate for the All-Edges criterion. The test suite is not adequate for the All-Prime-Paths since it does not exercise the following prime paths: [1, 5, 9, 6, 2], [1, 5, 9, 6, 10], [2, 5, 9, 6, 2], [3, 6, 2, 5, 9], [3, 6, 10], [5, 9, 6, 2], [6, 2, 5, 9, 6], [9, 6, 2, 5, 9], [9, 6, 2, 5, 8]}.

1. TS = {[1, 4, 8], [2, 5, 9, 6, 10], [3, 7, 10], [1, 5, 8], [3, 6, 2, 5, 8], [1, 5, 9, 6, 10], [3, 6, 10], [1, 5, 9, 6, 2, 5, 9, 6, 2, 5, 9, 6, 10], [2, 5, 9, 6, 2, 5, 8], [3, 6, 2, 5, 9, 6, 10]}
2. [(2, 5, 9, 6, 2), (5, 9, 6, 2, 5), (6, 2, 5, 9, 6), (9, 6, 2, 5, 9)]
3. In the graph, for each node starting a round tri[ (2, 5, 6, 9), there is only one round trip for each. Therefore, satisfying Complete-RoundTrip and Simple-RoundTrip means the same thing. All of the round trips are toured by the test path: [1, 5, 9, 6, 2, 5, 9, 6, 2, 5, 9, 6, 10]. Therefore, this test suite is adequate for both round trip criteria.
4. For All-Edge-Pairs we need to consider paths of length up to 2, meaning we include nodes and edges in addition to pairs of edge (paths of length 2). This can includes pairs of edges.

TR = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 1, 4,

(1, 4), (4, 8), (1, 5), (1, 5, 9),(5, 8), (5, 9), (2, 5), (9, 6), (3, 6), (6, 2), (3, 7), (6, 10), (7, 10),

[1, 4, 8], [1, 5, 8], [1, 5, 9],

[2, 5, 8], [2, 5, 9],

[3, 6, 2], [3, 6, 10], [3, 7, 10]

[5, 9, 6],

[6, 2, 5],

[9, 6, 10], [9, 6, 2]}

1. Recall TS = {[1, 4, 8], [2, 5, 9, 6, 10], [3, 7, 10], [1, 5, 8], [3, 6, 2, 5, 8]}

The test suite misses the following paths of length 2: [1, 5, 9], [3, 6, 10], [9, 6, 2]. We can complement the test suite with the following paths: [1,5,9,6,2,5,8], [3,6,10].  
The All-Edge-Pairs adequate test suite is TSEPC = { [1,4,8], [2,5,9,6,10], [3,7,10], [1,5,8], [3,6,2,5,8],  
[1,5,9,6,2,5,8], [3,6,10] }