Software Testing

Meenakshi D'Souza
IIIT-Bangalore

Assignment: Week 2
Maximum marks: 10.

This assignment is on structural coverage criteria over graphs. A video illustrating how to solve the questions in this assignment will be available as a part of the videos of the third week. Answer all the questions below.

1. Which of the following depicts a correct order of subsumption amongst the various listed structural coverage criteria on graphs? Read the notion $\rightarrow$ below as "subsumes". [1 mark]

   (a) Prime path coverage $\rightarrow$ edge coverage $\rightarrow$ node coverage.

   (b) Node coverage $\rightarrow$ edge-pair coverage $\rightarrow$ edge coverage.

   (c) Edge coverage $\rightarrow$ node coverage $\rightarrow$ complete path coverage.

   (d) Node coverage $\rightarrow$ complete path coverage $\rightarrow$ prime path coverage.

   Answer: First option above.

2. The requirement of length ..... is added to edge coverage to make it subsume node coverage. [1 mark]

   Answer: Upto 1.

3. Tours with ..... and ..... are added to test paths to make infeasible test requirements feasible. [1 mark]

   Answer: Side trips and detours.

4. A prime path is a ..... length simple path. [1 mark]

   Answer: Maximal.

   For the questions below, consider the following graph $G = (V, E, \{1\}, \{7\})$, with 1 being the initial vertex and 7 being the only final vertex:

   - $V = \{1, 2, 3, 4, 5, 6, 7\}$.
   - $E = \{(1, 2), (1, 7), (2, 3), (2, 4), (3, 2), (4, 5), (4, 6), (5, 6), (6, 1)\}$.

Answer the following questions for the above graph.

5. List test paths that satisfy node coverage but not edge coverage on the graph G. Explain why. [2 marks]

   Answer:

   Test path for node coverage but not edge coverage:
   $\{[1,7],[1,2,3,2,4,5,6,1,7]\}$. This doesn't cover the edge $(4,6)$.

6. Choose one set of test paths that satisfies edge coverage on the graph. [2 marks]

   (a) $\{[1,2,3,2,4,5,6,1,7]\}$
   (b) $\{[1,2,3,2,4,5,6,1,7],[1,2,4,6,1,7]\}$
   (c) $\{[1,7],[1,2,3,2,4,6,1,7],[1,2,4,5,6,1,7]\}$
   (d) $\{[1,7],[1,2,3,2,4,5,6,1,2,4,6,1,7]\}$
   (e) $\{[1,7],[1,2,3,2,4,6,1,2,4,5,6,1,7]\}$
   (f) $\{[1,2,3,2,4,5,6,1,7]\}$

   Answer:

   The possible correct answers could be given are any one of the options 2, 3, 4, 5. Full marks can be given for any of these options.

7. Consider the simple path $[3,2,4,5,6]$ and the test path $[1,2,3,2,4,6,1,2,4,5,6,1,7]$. Does the test path tour the simple path directly or with a side trip? If it tours with a side trip, identify the side trip. [1+1 = 2 marks].

   (a) Yes, the test path tours the simple path with a side trip [4,6].
   (b) Yes, the test path tours the simple path with a side trip [2,4,6,1].
   (c) Yes, the test path tours the simple path with a side trip [[3,2,4,6,1,2].
   (d) No, the test path tours the simple path directly.

   Answer:

   Correct answer options are second and third. Full marks can be given for any of these choices.