

CSE 4321, HW 8

Topic: Regression Testing

Note that for the following problems, you must show intermediate steps in order to get full credits.

1. (20 points) Suppose program P has been executed against a test suite T consisting of six tests, t1, t2, t3, t4, t5 and t6. A total of six entities are covered by the tests as shown in the following table: 0 (or 1) in a column indicates that the corresponding entity is not covered (or covered). The entities could be basic blocks in the program, functions, def-uses, or any other testable element of interest. Follow procedure CMIMX to find the minimal cover set for the six entities.

	1	2	3	4	5	6
t1	0	1	0	1	0	1
t2	1	0	0	0	1	0
t3	1	1	0	1	0	0
t4	1	0	1	0	0	0
t5	0	1	0	1	1	0
t6	1	0	0	0	0	0

$\text{minCov} = \emptyset$, $\text{yetToCover} = 6$

$\text{LC} = \{3, 6\}$, find $s = t1$

$\text{minCov} = \{t1\}$, $\text{markedCols} = \{2, 4, 6\}$, $\text{yetToCover} = (6-3) = 3$

$\text{LC} = \{3\}$, find $s = t4$

$\text{minCov} = \{t1, t4\}$, $\text{markedCols} = \{2, 4, 6, 1, 3\}$, $\text{yetToCover} = (3-2) = 1$

$\text{LC} = \{5\}$, find $s = t2$ (or $t5$)

$\text{minCov} = \{t1, t4, t2\}$ (or $\{t1, t4, t5\}$), $\text{markedCols} = \{2, 4, 6, 1, 3, 5\}$, $\text{yetToCover} = (1-1) = 0$

So, the minimal cover set can be either $\{t1, t2, t4\}$ or $\{t1, t4, t5\}$.

2. (20 points) Suppose that there is an application P consisting of 8 methods, $m_1 \dots m_8$. Also suppose that there is a regression-test set $T = \{t_1, t_2, t_3, t_4, t_5\}$. The methods covered by each test in T are listed in the following table. Follow procedure PrTest to obtain a prioritized list of tests based on residual coverage.

 Test (t) Methods covered (cov(t)) |cov(t)|

t1 m_1, m_3, m_5, m_6, m_8 5

t2 m_1, m_7, m_8 3

t3 m_1, m_2, m_3, m_5 4

t4 m_1, m_2, m_3, m_4 4

t5 m_1, m_5, m_8 3

$X' = \{t_1, t_2, t_3, t_4, t_5\}$, find $t = t_1$ since $|cov(t_1)| = 5$ is the maximum

$PrT = \langle t_1 \rangle$, $X' = \{t_2, t_3, t_4, t_5\}$, $entitiesCov = \{m_2, m_4, m_7\}$

Compute residual coverage for each test in X' :

$$resCov(t_2) = |\{m_2, m_4, m_7\} \setminus (\{m_1, m_7, m_8\} \cap \{m_2, m_4, m_7\})| = |\{m_2, m_4\}| = 2$$

$$resCov(t_3) = |\{m_2, m_4, m_7\} \setminus (\{m_1, m_2, m_3, m_5\} \cap \{m_2, m_4, m_7\})| = |\{m_4, m_7\}| = 2$$

$$resCov(t_4) = |\{m_2, m_4, m_7\} \setminus (\{m_1, m_2, m_3, m_4\} \cap \{m_2, m_4, m_7\})| = |\{m_7\}| = 1$$

$$resCov(t_5) = |\{m_2, m_4, m_7\} \setminus (\{m_1, m_5, m_8\} \cap \{m_2, m_4, m_7\})| = |\{m_2, m_4, m_7\}| = 3$$

find $t = t_4$ since $resCov(t_4) = 1$ is the minimum

$PrT = \langle t_1, t_4 \rangle$, $X' = \{t_2, t_3, t_5\}$, $entitiesCov = \{m_7\}$

Compute residual coverage for each test in X' :

$$resCov(t_2) = |\{m_7\} \setminus (\{m_1, m_7, m_8\} \cap \{m_7\})| = 0$$

$$resCov(t_3) = |\{m_7\} \setminus (\{m_1, m_2, m_3, m_5\} \cap \{m_7\})| = 1$$

$$resCov(t_5) = |\{m_7\} \setminus (\{m_1, m_5, m_8\} \cap \{m_7\})| = 1$$

find $t = t_2$ since $resCov(t_2) = 0$ is the minimum

$PrT = \langle t_1, t_4, t_2 \rangle$, $X' = \{t_3, t_5\}$, $entitiesCov = \emptyset$

So, a prioritized list of tests can be either $\langle t_1, t_4, t_2, t_3, t_5 \rangle$ or $\langle t_1, t_4, t_2, t_5, t_3 \rangle$.