

Fault-Localization Using Dynamic Slicing and Change-Impact Analysis

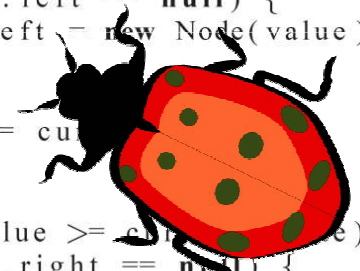
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BST

```
1      class BST {
2          Node root; int size;
3          static class Node {
4              int value; Node left, right;
5              Node(int value) {
6 *,cd,d          this.value = value;
7              }
8          }
9          void insert(int value) {
10 *,cd          if (root == null) {
11 *,cd              root = new Node(value);
12 *,cd,d          size++;
13                  return;
14 *,cd          } Node current = root;
15 *,cd          while (true) {
16                  if (value < current.value) {
17                      if (current.left == null) {
18                          current.left = new Node(value);
19                          break;
20                      } else {
21                          current = cu
22                      }
23 V1          /* } else { */
23 V2,*,cd          } else if (value >= current.value) {
24 *,cd          if (current.right == null) {
25 *              current.right = new Node(value);
26 *,cd          break;
27                  } else {
28                      current = current.right;
29                  }
30 V1          /* } */
30 V2          } else { return; }
31          }
32 *,cd,d          size++;
33          }
34      }
```



Spectrum-based Fault-Localization

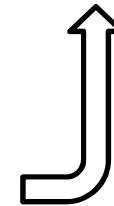
Tarantula [Jones et al., 2002]

t1
t2
t3
t4
t5

BST

Stmt	Test Cases								Susp.	Ranks		
	5	4	3	2	6	7	8	3		3	R0	
6	•				•				•	0.500	13	
10	•				•				•	0.500	13	
11	•				•				•	0.500	13	
12	•				•				•	0.500	13	
13	•				•				•	0.500	13	
14					•				•	0.577	8	
15					•				•	0.577	8	
16					•				•	0.577	8	
17										0.000	20	
18										0.000	20	
19										0.000	20	
20										0.000	20	
21										0.000	20	
23									•	0.707	4	
24									•	0.707	4	
25									•	0.707	4	
26									•	0.707	4	
27										0.000	20	
28										0.000	20	
32					•				•	0.577	8	

$$susp(s) = \frac{failed(s)}{\sqrt{totfailed * (failed(s) + passed(s))}}$$



Problem

- Several unrelated statements can appear high in the reported ranking

Our Goal: Improve cost of spectrum-based fault localization.

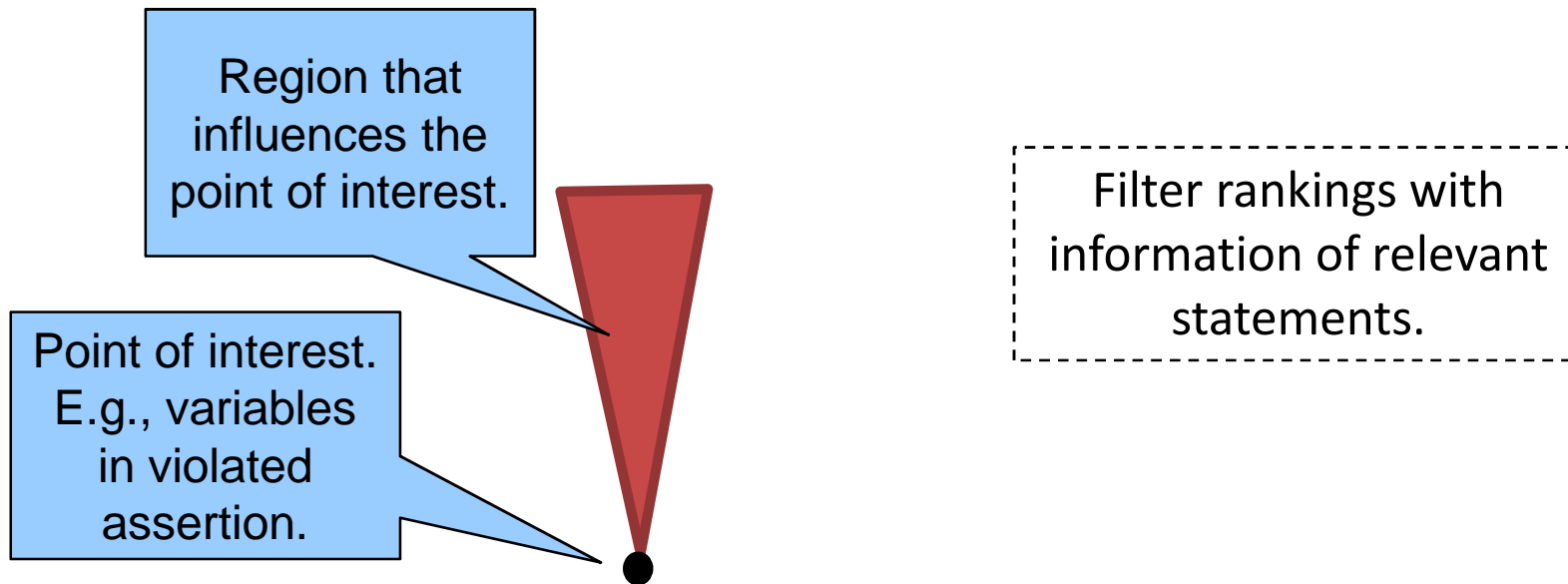
Approach

- Use dependency information
 - **Dynamic Slicing** and Change-Impact Analysis

Filter rankings with
information of relevant
statements.

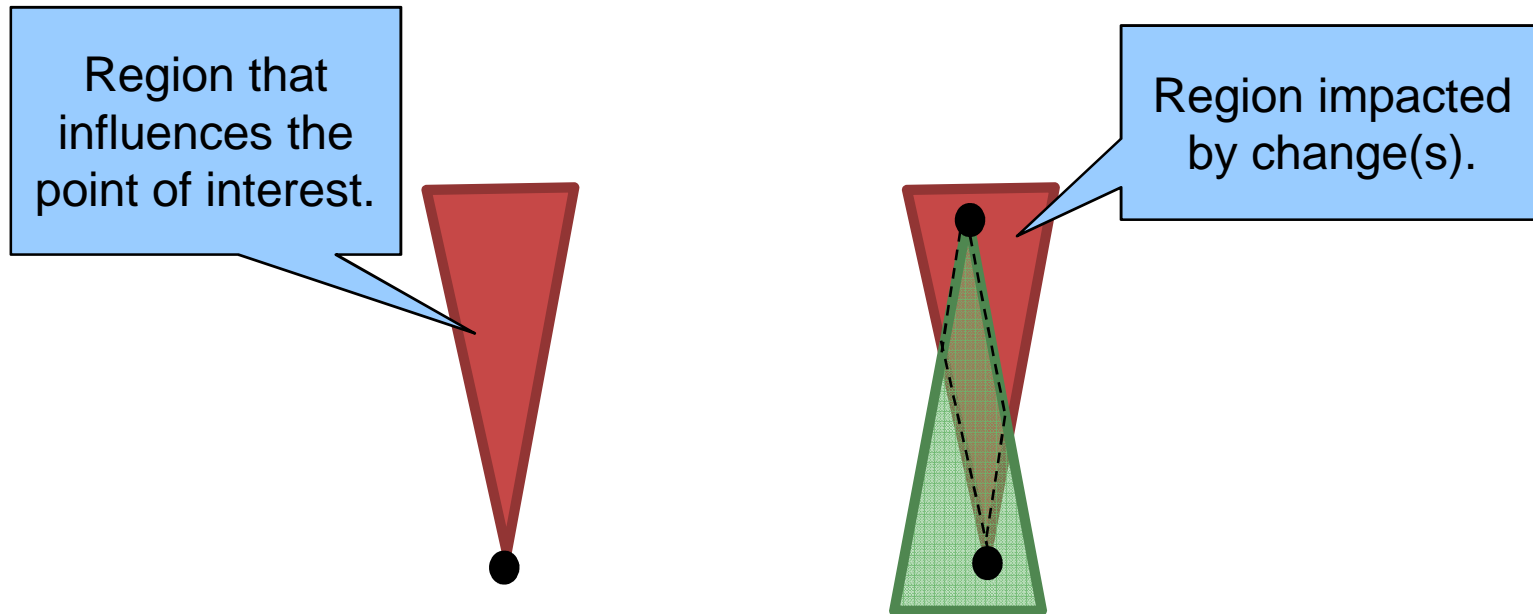
Approach

- Use dependency information
 - **Dynamic Slicing** and Change-Impact Analysis



Goal

- Use dependency information
 - Dynamic Slicing and **Change-impact analysis**



Results

- Dynamic dependency is helpful to improve spectrum-based fault-localization

Details on poster session.