《SMFL integrating spectrum and mutation for fault localization》	2019	DSA
《Technique of software fault localization based on hierarchical slicing spectrum》	2013	Journal of Software
《HSFal: Effective fault localization using hybrid spectrum of full slices and execution slices》	2015	JSS
《Lightweight fault-localization using multiple coverage types》	2009	ICSE
《Cleansing test suites from coincidental correctness to enhance fault-localization》	2010	ICST

Cleansing Test Suites from Coincidental Correctness to Enhance Fault-Localization

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Coincidental Correctness

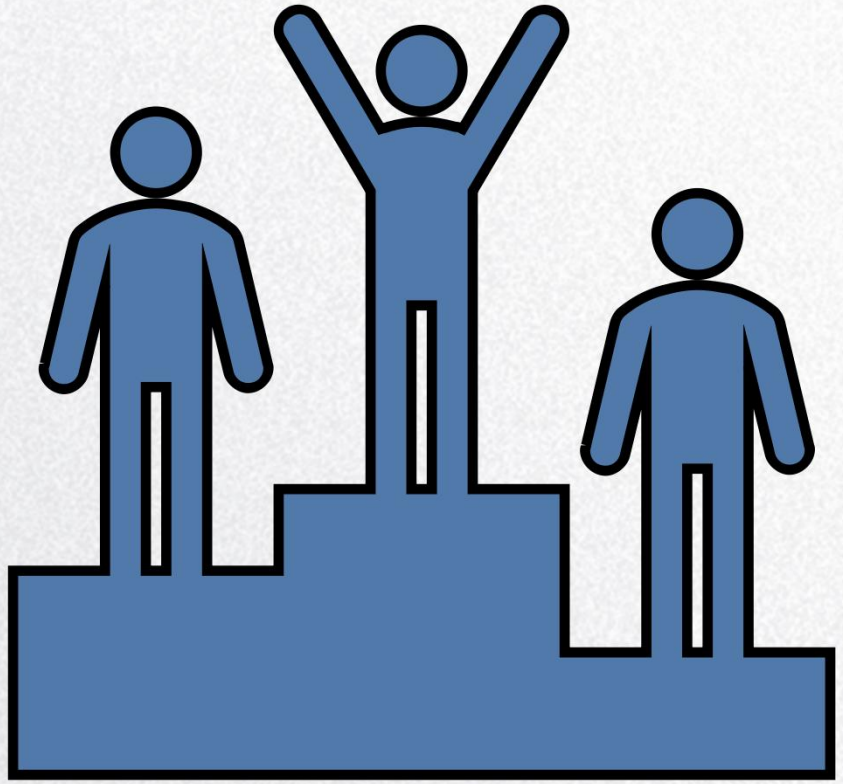
1) The defect is executed or reached

2) The program has transitioned into an infectious state

3) The infection has propagated to the output

Motivation

- The prevalence of coincidental correctness
- Its safety reducing effect on fault localization



Technique-I

```
1.    CCE ← ∅
2.    for each e in ⋃_{t∈T} E(t)
3.          if f_T(e)=1.0 and p_T(e) ≤ θ
4.                CCE ← CCE ∪ {e}
5.    CCT ← ∅
6.    for each t in T
7.          if E(t) ∩ CCE ≠ ∅
8.                CCT ← CCT ∪ {t}
```

T_F T_P T_{CC}

CCE：the set of program elements

CCT： any test that induces one or more CCE

False Negative: $$\frac{|T_{CC} - CCT|}{|T_{CC}|}$$

False Positive: $$\frac{|(T_P - T_{CC}) \cap CCT|}{|T_P - T_{CC}|}$$

Program	Fault Type	$\|T\|$	$\|T_F\|$	$\|T_P\|-\|T_{CC}\|$	$\|T_{CC}\|$	$\|T_{CC}\|/\|T_P\|$
print_tokens_v1	wrong case	4070	6	3645	419	0.10
print_tokens_v2	added code	4070	48	3590	432	0.18
print_tokens_v5	missing assignment	4070	150	2670	1250	0.32
print_tokens_v6	constant mutations	4070	186	2953	931	0.24
tot_info_v4	altered conditional	1052	33	822	197	0.19
tot_info_v5	altered statement	1052	29	858	165	0.16
tot_info_v7	altered conditional	1052	123	923	6	0.01
tot_info_v9	altered statement	1052	37	831	184	0.18
tot_info_v11	altered statement	1052	199	824	29	0.03
tot_info_v12	altered return	1052	33	323	696	0.68
tot_info_v13	altered conditional	1052	128	917	7	0.01
tot_info_v15	altered conditional	1052	199	824	29	0.03
tot_info_v17	altered statement	1052	44	384	624	0.62
tot_info_v23	wrong initialization	1052	71	384	597	0.61
schedule_v2	altered statement	2650	210	1263	1177	0.48
schedule_v3	altered statement	2650	159	2345	146	0.06
schedule_v4	altered conditional	2650	294	1740	616	0.26
schedule_v8	deleted code	2650	31	2457	162	0.06

Subject Programs

18 seeded versions that are part of the Siemens test suite

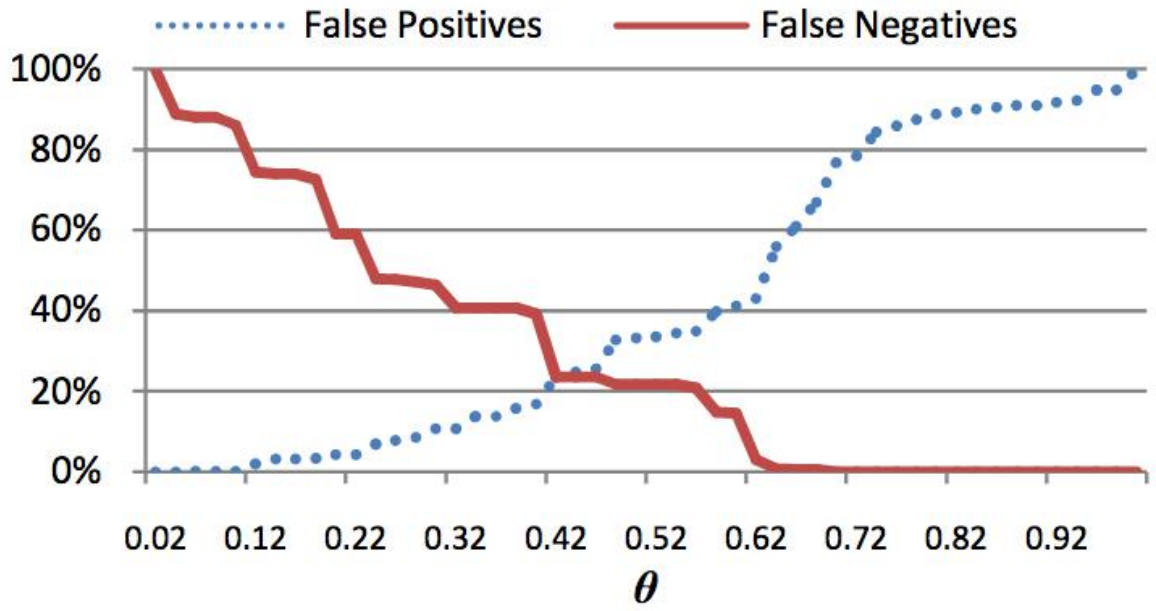


Figure 3. Cleansing accuracy w.r.t. θ

Technique-II

Assumption: *a cct containing a large number of cce's and/or cce's with a high average weight is more likely to be a coincidentally correct test than another that does not.*

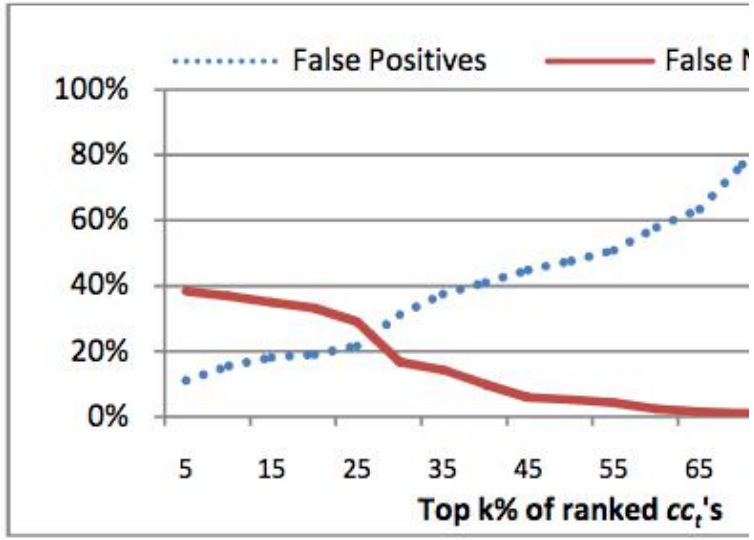


Figure 5. Cleansing accuracy w.r.t. top ranked c (using $\theta = 0.7$)

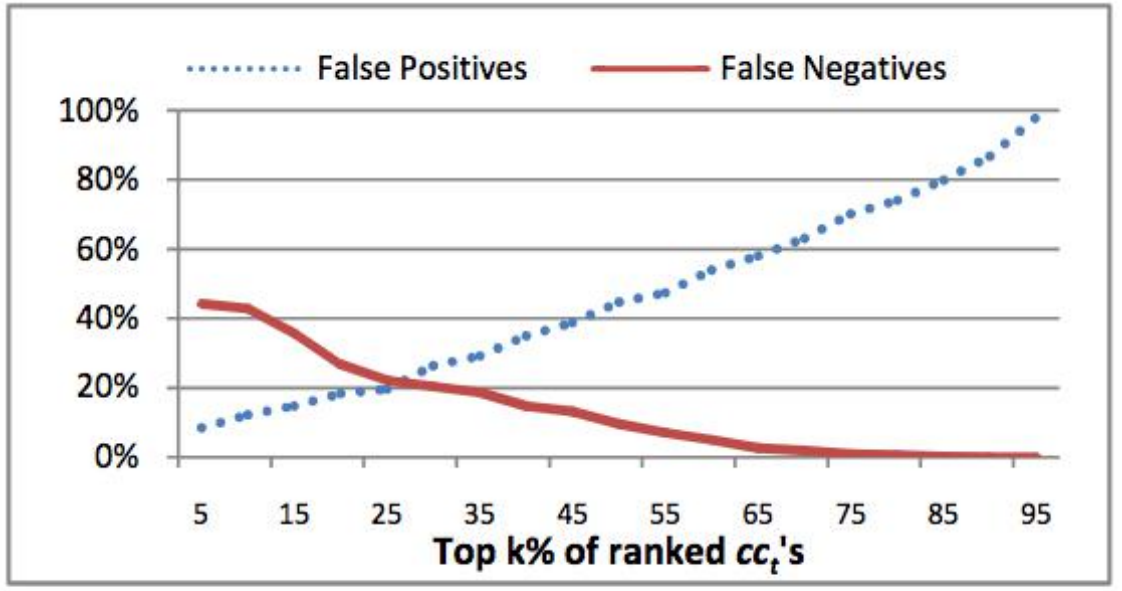
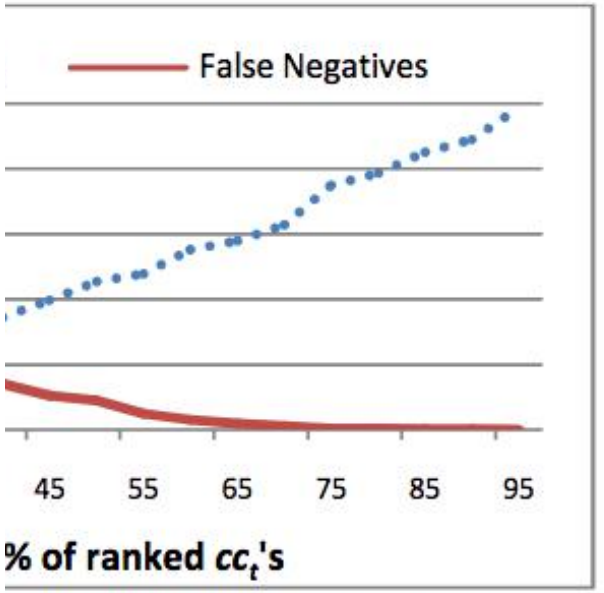


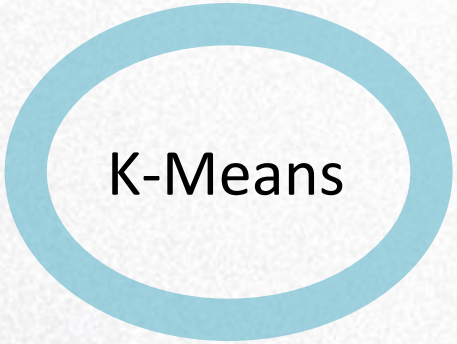
Figure 7. Cleansing accuracy w.r.t. top ranked cc_t's considered (using $\theta = 0.9$)



w.r.t. top ranked cc_t's considered
$\theta = 0.8$)

Technique-III

Assumption: *coincidentally correct tests will cluster together .*



Program		$\theta = 0.7$						$\theta = 0.8$						$\theta = 0.9$					
		Selection		# C	# CC	%FN	%FP	Selection		# C	# CC	%FN	%FP	Selection		# C	# CC	%FN	%FP
		expect	actual					expect	actual					expect	actual				
print_tokens_1	c_1		✓	3309	0	100	90.8	✓	✓	2757	306	27	75.6			1422	142	33.9	61
	c_2	✓		194	419					888	113			✓	✓	2223	277		
print_tokens_2	c_1			1758	0	0	1.1			1758	0	0	1.1			1758	0	0	1.1
	c_2	✓	✓	39	432			✓	✓	39	432			✓	✓	39	432		
print_tokens_5	c_1	✓	✓	0	1210	3.2	0			2380	0	0	0			2590	0	0	0
	c_2			7	40			✓	✓	0	1250			✓	✓	0	1250		

Comparison

False Negative	Technique I > Technique II > Technique III
Safety	Technique I > Technique II ≈ Technique III
Precision	Technique III > Technique II

THANK YOU FOR YOUR LISTENING.

谢谢您的聆听