An Investigation of Compression Techniques to Speed up Mutation Testing

Qianqian Zhu
Ph.D. student

Co-authors: Annibale Panichella and Andy Zaidman

Software Engineering Research Group,
Delft University of Technology, Netherlands

ICST 2018, April 9th, 2018

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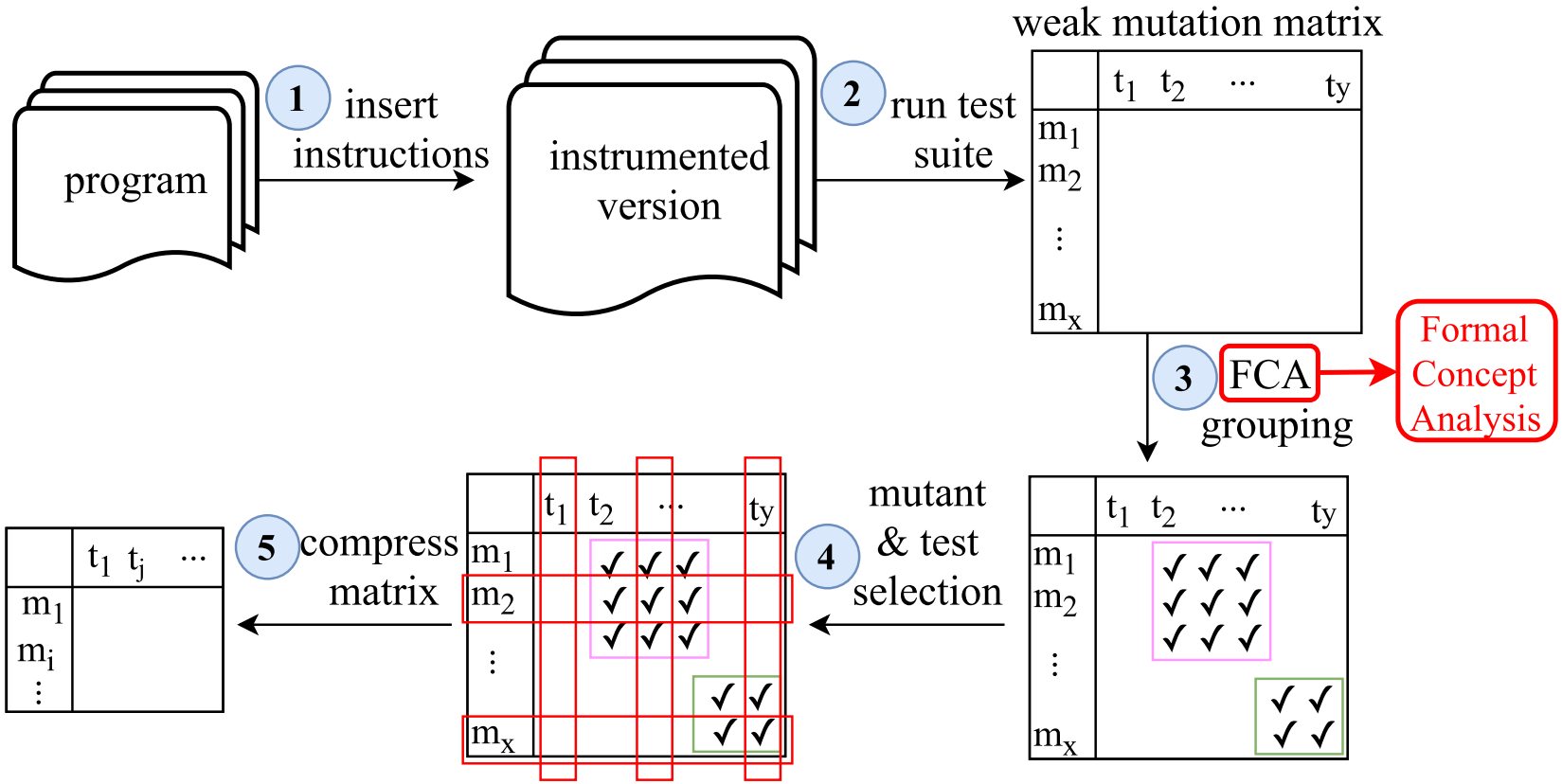
Assumption: mutants which have high similarity in weak mutation are very likely to have the same outcome in strong mutation.



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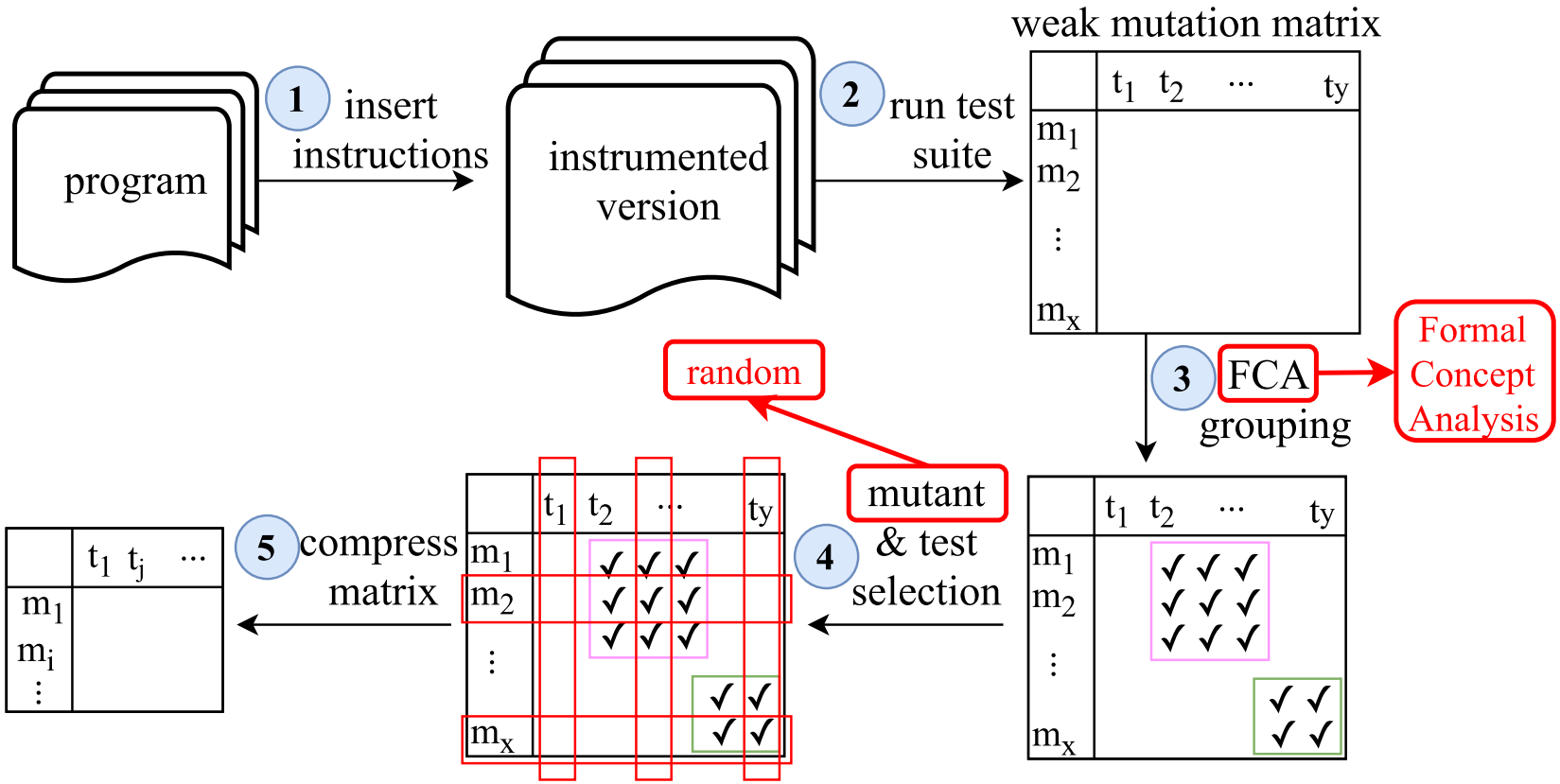

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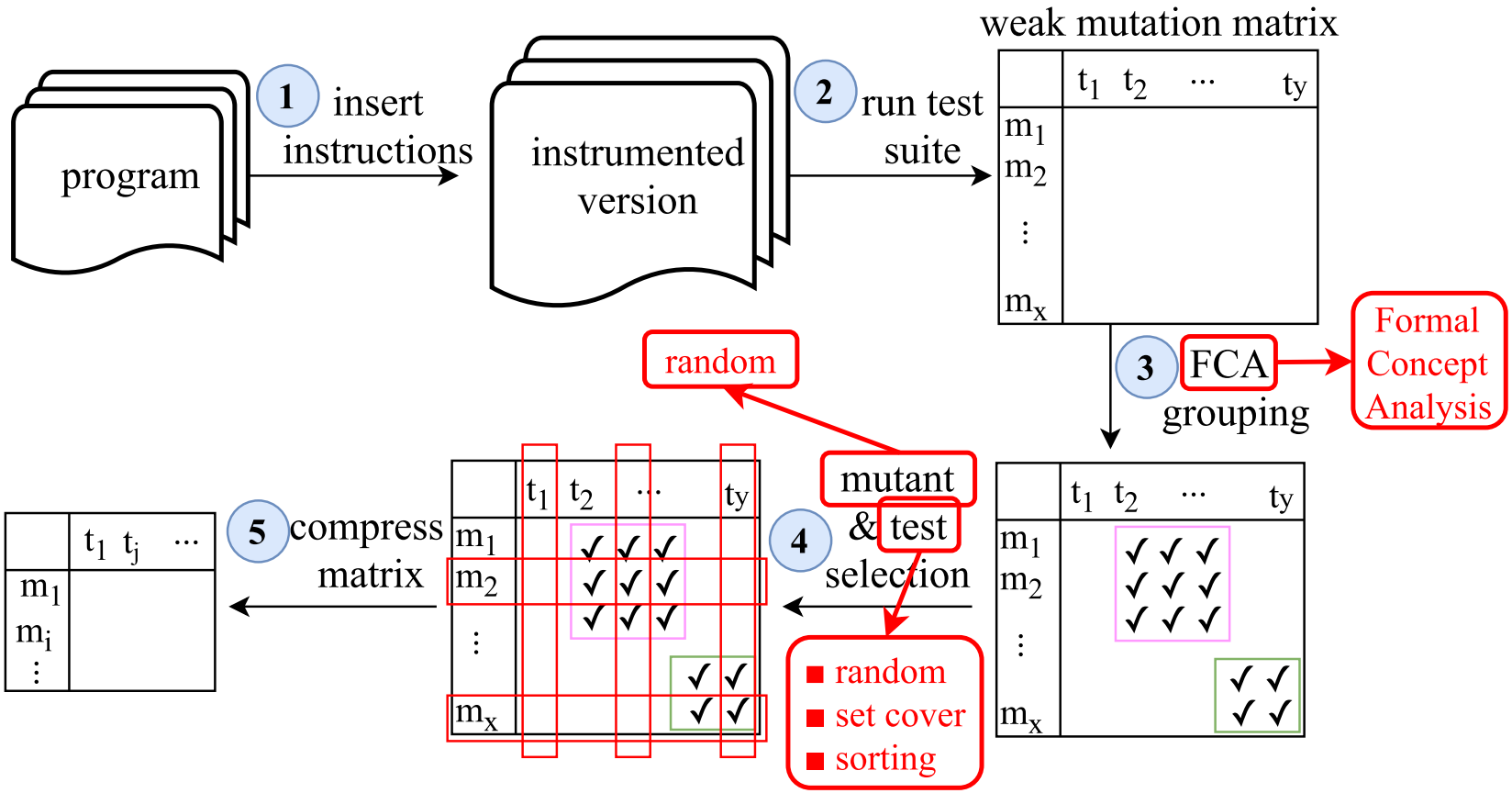


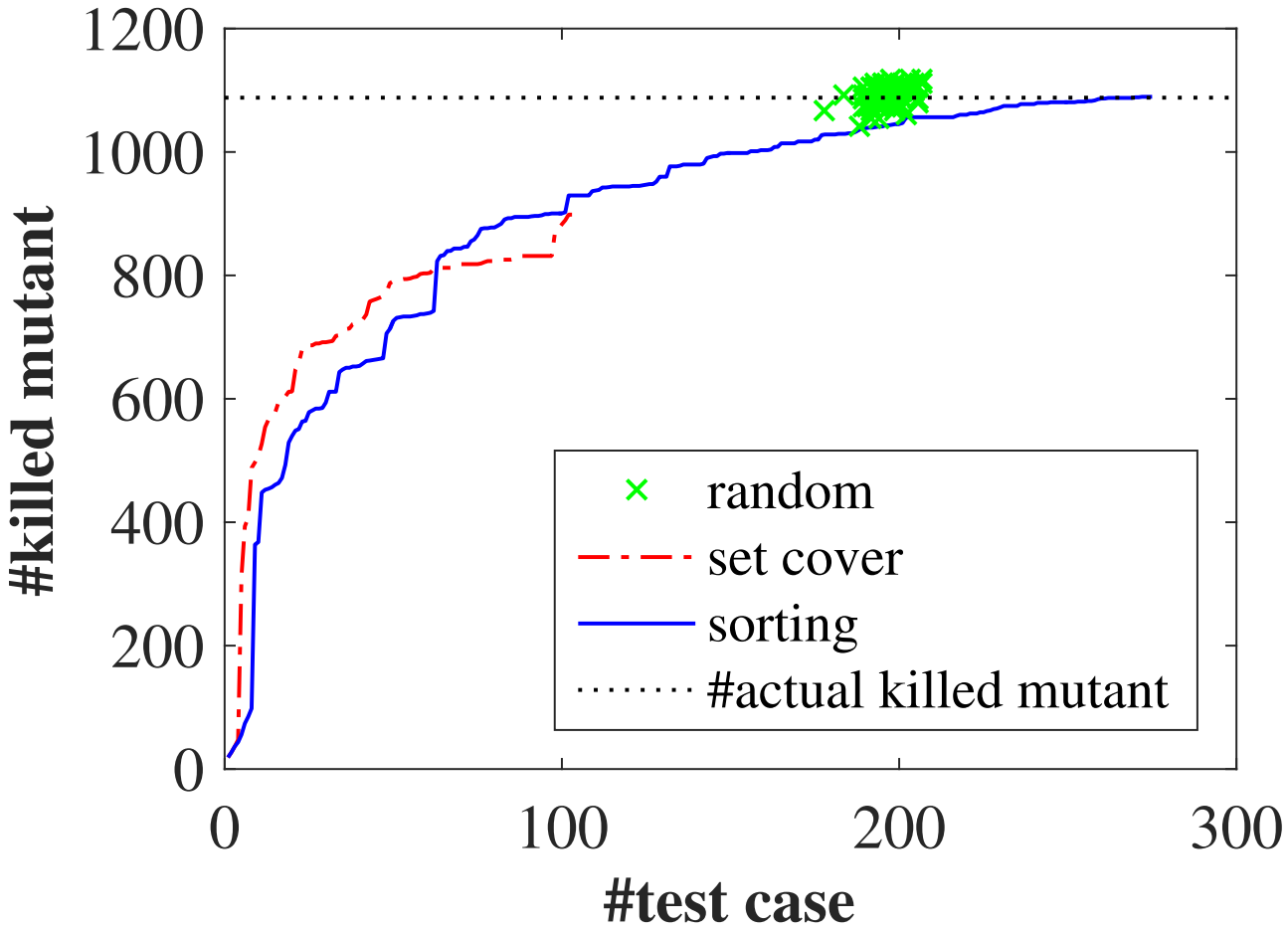
Experimental study

- **6 open-source projects**
- **automatically generated test suites (by Evosuite)**
- **comparison of test case selection**
  random, set cover, sorting
- **ComMT vs. other optimisations**
  coverage-based, infection-based

Results of experimental study

Comparison of test case selection in each stage for `jsecurity`

Based on random mutant selection



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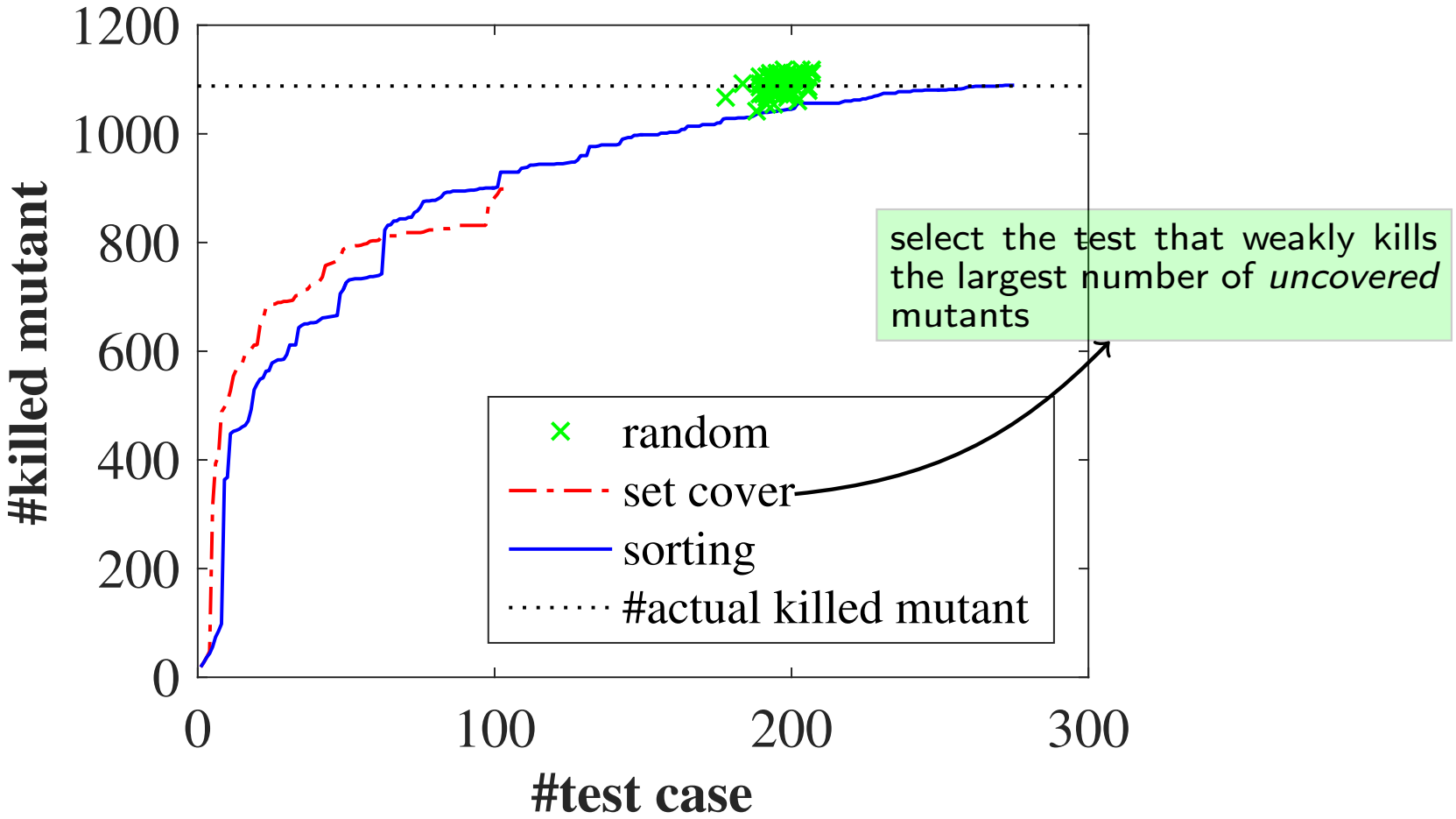

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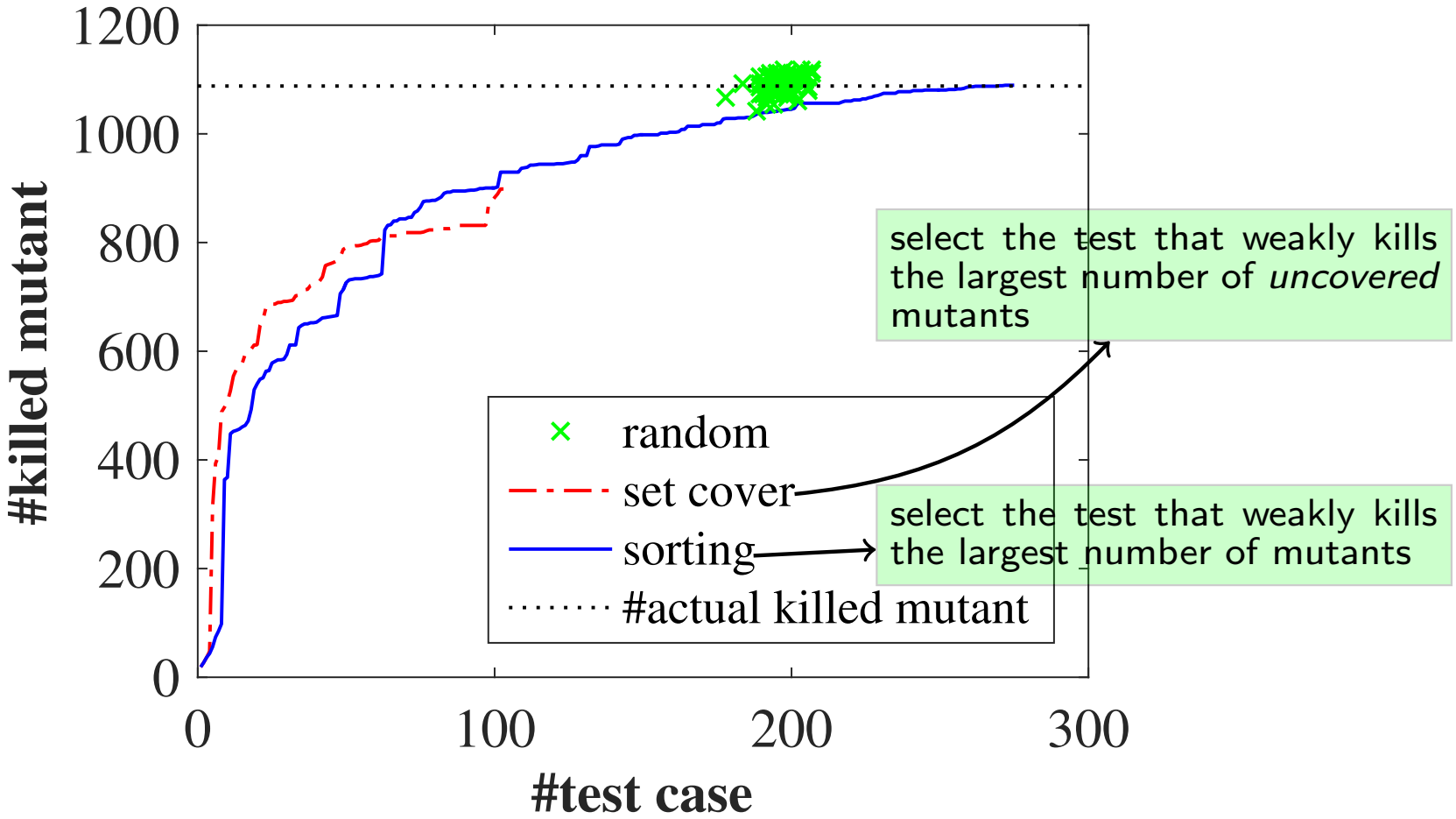

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mutant	test	red.	err.
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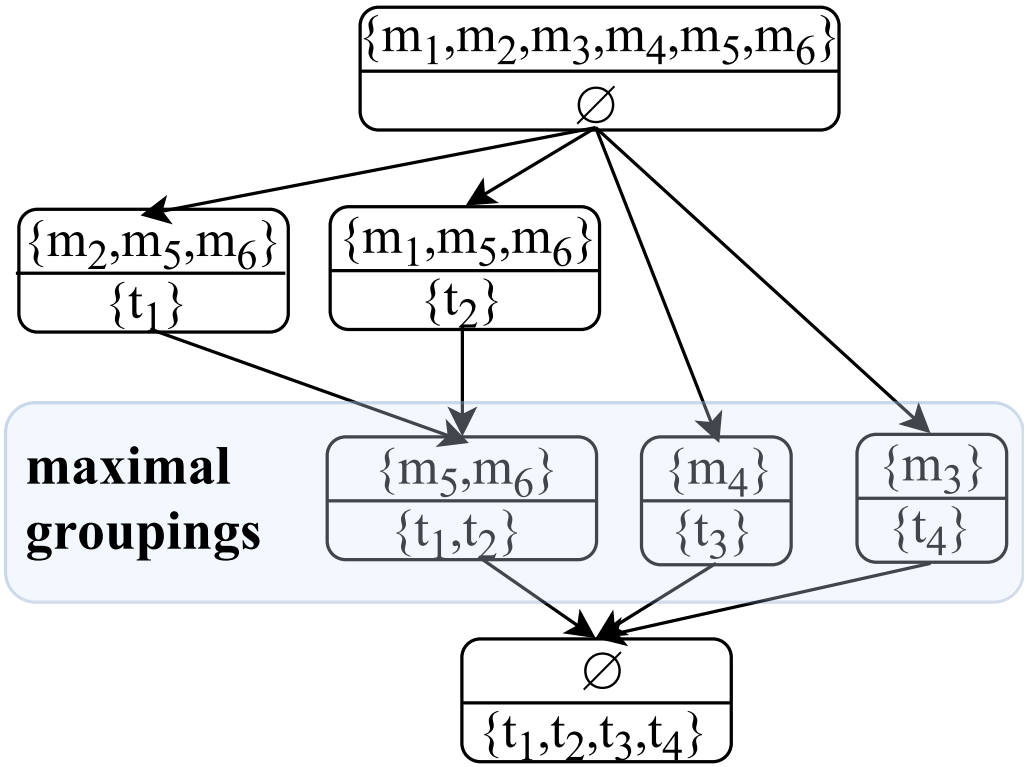
  E.g. explore the relationships between clustering accuracy and other metrics
- **Implement on top of an existing mutation tool**

FCA grouping

	t_1	t_2	t_3	t_4
m_1	0	1	0	0
m_2	1	0	0	0
m_3	0	0	0	1
m_4	0	0	1	0
m_5	1	1	0	0
m_6	1	1	0	0



Results of experimental study

- **Trade-offs between execution time reduction and error rate (%):**

baseline

Project	Cov. based	Inf. based	ComMT							
			No selection		Set cover		Random		Sorting	
	Exec.	Red.	Red.	Err.	Red.	Err.	Red.	Err.	Red.	Err.
jsecurity	1.39 min	16.78	87.71	0.13	90.27	-17.42	88.55	-2.46	87.31	-0.04
summa	1.54 min	13.57	90.97	0.74	93.58	-14.1	92.18	-2.25	90.87	0.69
db-everywhere	0.02 min	3.65	59.29	-0.26	80.81	-18.83	70.43	-6.22	63.95	-0.26
noen	1.58 min	6.09	88.52	0.30	91.08	-30.69	89.52	-7.29	87.98	0.14
jtailgui	0.31 min	18.7	87.66	0.07	91.33	-13.11	89.86	-3.42	87.89	0.07
caloriecount	19.21 min	9.39	89.44	0.04	91.83	-21.99	90.5	-6.89	89.06	-0.38
Mean	-	11.37	83.93	0.257	89.82	-19.36	86.84	-4.76	84.51	0.262