Retrospective Mutant Reduction

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Motivation

Quality software?
Motivation

Regression Test Suite
Motivation

Regression Test Suite

$T = \langle t_1, t_2, \ldots, t_n \rangle$
Motivation

Pass

Fail
Motivation

Pass

Fail
Motivation
Motivation

Use testing to assess quality?
Motivation

Trivial test suite?
Background

Mutation Testing!
Mutation Testing

Original

Mutant
Mutation Testing

Original

Mutant
Mutation Testing

\[ a > b \]
Mutation Testing

Relational Operator Replacement (ROR)
Mutation Testing

Relational Operator Replacement (ROR)

- $a \geq b$
- $a \leq b$
- $a == b$
- $a != b$
Mutation Testing

Alive

Killed
Mutation Testing

 Alive

 Killed
Mutation Testing

[Diagram showing two documents, one marked as 'Alive' and the other marked as 'Killed']
Mutation Testing

\[ MS_T = \frac{\text{Killed}}{\text{Total}} \]
Mutation Testing

\[ MST_T = \frac{\text{Killed}}{\text{Total}} \]
Mutation Testing

\[ M_{ST} = \frac{\text{Killed}}{\text{Total}} \]
Mutation Testing

\[ MS_T = \frac{\text{Killed}}{\text{Total}} \]

\[ MS_T \in [0,1] \]
Mutation Testing

\[ MS_T = \frac{\text{Killed}}{\text{Total}} \]

\[ MS_T \in [0, 1] \]

HIB
Mutation Testing
Silver Bullet?
Mutation Testing

Limitations
Mutation Testing
Mutation Testing

\[ T = \langle t_1, t_2, \ldots, t_n \rangle \]
Mutation Testing

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Mutation Testing

\[ T = \langle t_1, t_2, \ldots, t_n \rangle \]
Mutation Testing

Still . . .
Mutation Testing

Still . . . limitations
Mutation Testing
Mutation Testing

Understand system intricacies
Mutation Testing

Understand system intricacies
Mutation Testing

Retrospective

Mutant

Reduction
Mutation Testing

Retrospective Mutant Reduction
mrstudyr

mccurrdyc/mrstudyr

Data → Reduce → Remove

X  " Remove"
Input

Database

Schema

Mutants
Demonstration

Demonstration!
Motivation

Random Sampling
## Output

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<th>Correlation</th>
<th>MAE</th>
<th>RMSE</th>
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Conclusion

Program Quality
Conclusion

Program Quality

Regression Test Suite
Conclusion

- Program Quality
- Regression Test Suite
- Mutation Testing
Conclusion

Program Quality

Regression Test Suite

Mutation Testing

Reduction Techniques
Conclusion

Program Quality

Regression Test Suite

Mutation Testing

Reduction Techniques

mrstudyr
Conclusion

Reduced
Conclusion

Reduced 10%
Conclusion

Reduced 10%