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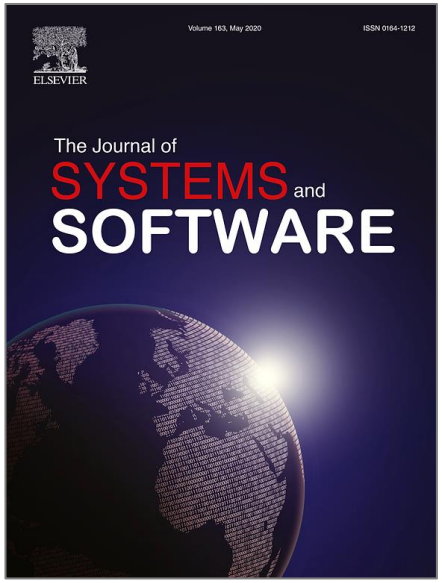
Universidad Sevilla

Sergio Segura, José A. Parejo



Special issue on Metamorphic Testing

Journal Metrics

- CiteScore: **4.25**
- Impact Factor: **2.559**
- 5-Year Impact Factor: **2.774**
- Source Normalized Impact per Paper (SNIP): **2.267**
- SCImago Journal Rank (SJR): **0.550**
- View More on Journal Insights

- Paper submission: **October 30, 2020**
- First-round notification: February 28, 2021
- Submission final revised version: July 31, 2021

ACM Student Research Competition
SRC@ICSE'21

Important Dates	AoE (UTC-12h)	
Mon 4 Jan 2021 Paper submission		new
Mon 8 Feb 2021 Notification		new
Mon 22 Feb 2021 Camera ready		new
Tue 25 - Thu 27 May 2021 Student Research Competition presentations at ICSE		new

1st round: Two-page paper submission

2nd round: Poster presentation

3rd round: Presentation

ICSE Winners

People

- Sergio Segura (coordinador)
- José Antonio Parejo
- Javier Troya
- Ana B. Sánchez
- Beatriz Bernárdez
- Antonio Ruiz
- Carmelo Del Valle
- Irene Barba
- Andrés Jiménez
- María Martínez
- David Benavides

Research lines

Search-based software engineering

Optimization · Metaheuristics · Artificial intelligence

Software testing

Test automation · Test data generation · Oracle problem

Software Engineering product lines

Highly Configurable Systems

Empirical software engineering

Replicability · Experimentation · Automated analysis

Service engineering

Microservices architecture · SLA-Driven Governance – SLA managemente · Cloud · Monitoring · Biiling . Blockchain

Business process management

Performance · SLAs · Human analytics · Predictive Monitoring · Resource Management · Compliance

Search-Based Software Testing

Software Product Lines

Many-Objective Test Suite Generation for Software Product Lines

ROBERT M. HIERONS, The University of Sheffield
MIQING LI, The University of Birmingham
XIAOHUI LIU, Brunel University
JOSE ANTONIO PAREJO and SERGIO SEGURA, Universidad de Sevilla
XIN YAO, Southern University of Science and Technology and The University of Birmingham

A Software Product Line (SPL) is a set of products built from a number of features, the set of valid products being defined by a feature model. Typically, it does not make sense to test all products defined by an SPL and one instead chooses a set of products to test (test selection) and, ideally, derives a good order in which to test them (test prioritisation). Since one cannot know in advance which products will reveal faults, test selection and prioritisation are normally based on objective functions that are known to relate to likely effectiveness or cost. This article introduces a new technique, the grid-based evolution strategy (GrES), which considers several objective functions that assess a selection or prioritisation and aims to optimise on all of these. The problem is thus a many-objective optimisation problem. We use a new approach, in which all of the objective functions are considered but one (pairwise coverage) is seen as the most important. We also derive a novel evolution strategy based on domain knowledge. The results of the evaluation, on randomly generated and realistic feature models, were promising, with GrES outperforming previously proposed techniques and a range of many-objective optimisation algorithms.

CCS Concepts: • **Software and its engineering** → *Software testing and debugging*; *Empirical software validation*;

Additional Key Words and Phrases: Software product line, test selection, test prioritisation, multi-objective optimisation

ACM Reference format:
Robert M. Hierons, Miqing Li, XiaoHui Liu, Jose Antonio Parejo, Sergio Segura, and Xin Yao. 2020. Many-Objective Test Suite Generation for Software Product Lines. *ACM Trans. Softw. Eng. Methodol.* 29, 1, Article 2 (January 2020), 46 pages.
https://doi.org/10.1145/3361146

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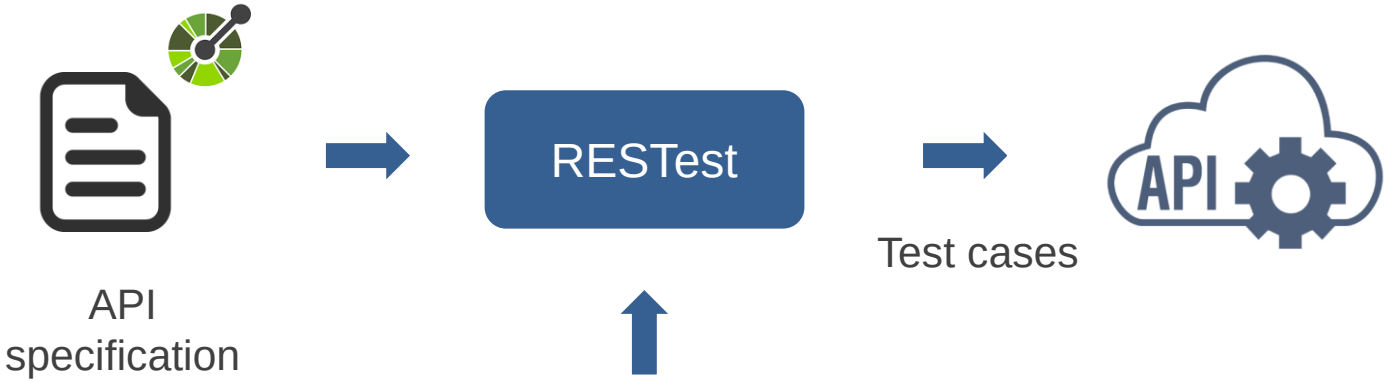
- Test case selection.
- Test case prioritization.
- 9 objectives:
  - Size
  - Cost
  - Dissimilarity
  - #changes
  - #faults
  - …

Search-Based Software Testing

Web APIs

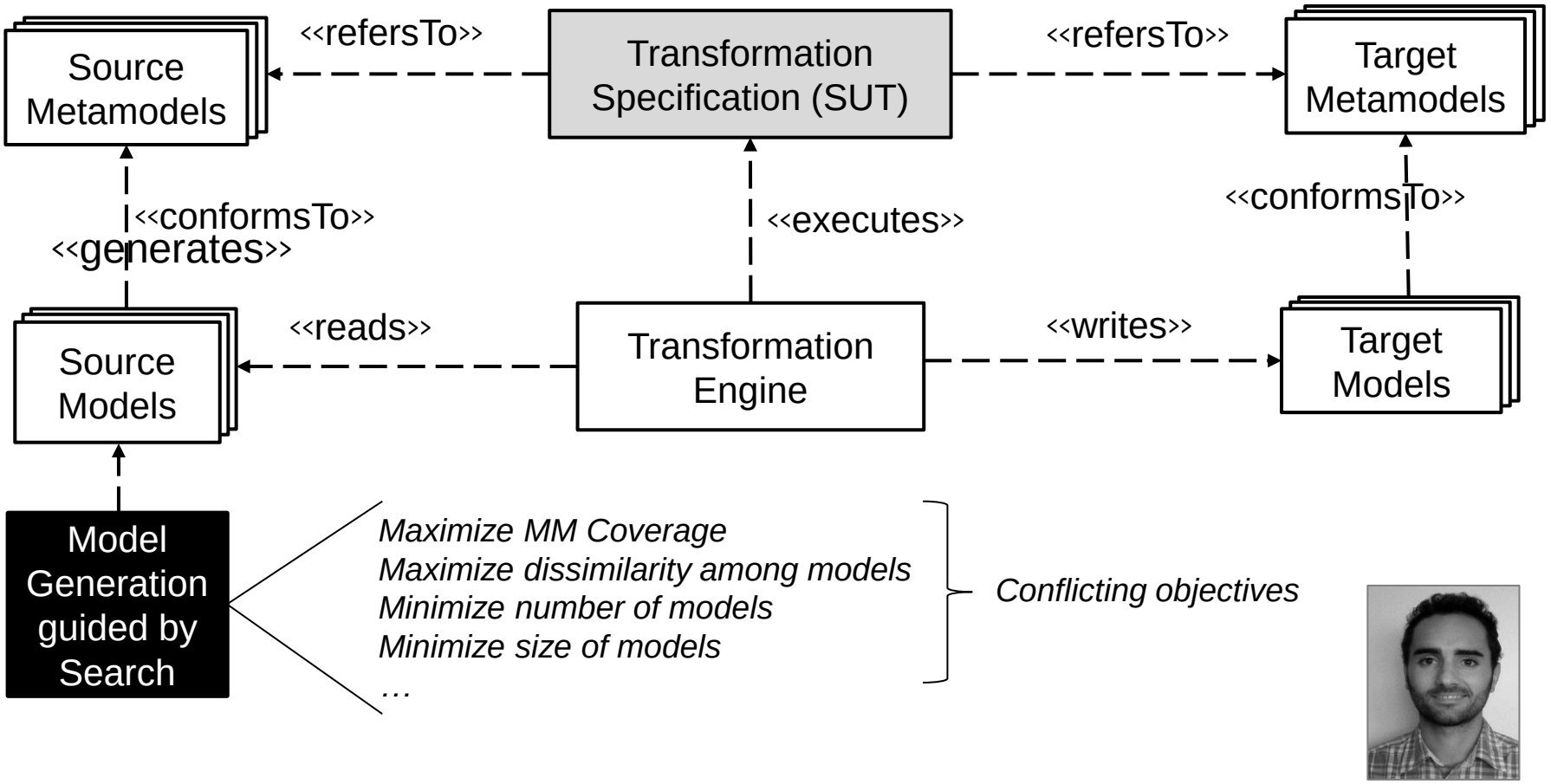
OPENAPI INITIATIVE



Search-Based Software Testing

Model Transformations

Search-based source model generation.



Search-Based Software Testing

GUI Test Case Repair

Search-based GUI test case repair in Android

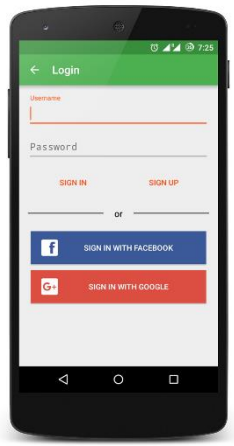
81 GUI tests cases

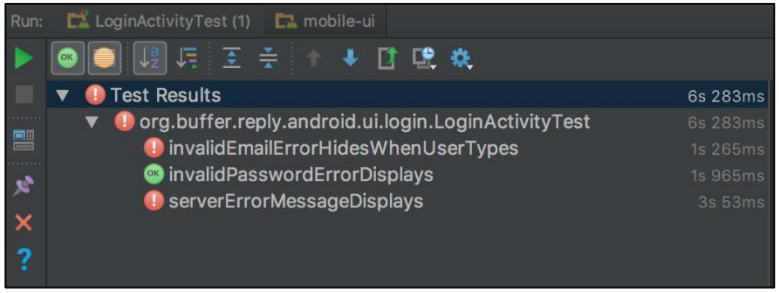
22 Android apps

4 Android versions

11 broken test cases

Most of them automatically repaired by our algorithm!





Search-Based QoS Management

Take advantage of:

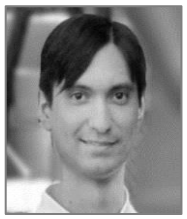
plans/SLA offered by the APIs

characteristics offered by cloud providers

to

Maximize Availabiliy, Reliability, Security, etc.

Minimize Cost, Response time, number of different providers.



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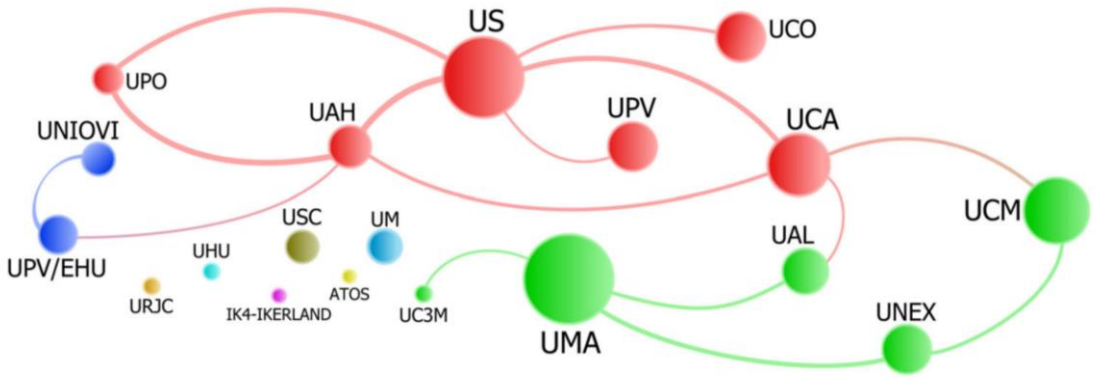

A. Ramírez, P. Delgado-Pérez, J. Ferrer, J.R. Romero, I. Medina-Bulo, F. Chicano. "A systematic literature review of the SBSE research community in Spain". Progress in Artificial Intelligence, vol. 9, pp. 113-128. 2020. Springer. ISSN: 2192-6360. DOI: 10.1007/s13748-020-00205-3

Thanks!

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