Model-based test-scripts generation for SPLs

Software Product Line Engineering (SPLE) or Software Product Families has brought several benefits to Bombardier Transportation (BT).
Within BT, each train is customised and its software system is highly-coupled to the underlying electrical system and hardware. This means that technical artefacts, e.g., test scripts, realising common features of the SPL need to account for the different configurations of the product line and can not be directly reused throughout the SPL. For instance, the Traction/Brake Control feature (TBC) is one of such common features and is responsible for transmitting the driver inputs to the brake and propulsion systems by operating on the train communication channels, which are called signals. Despite the TBC behaviour is the same for all the trains, the signals on which it operates are different due to the different train architectures.
Such an heterogeneity of signals represent a major challenge for the testing phases where different test scripts accounting for different signals need to be created (despite the TBC is a common feature of the Aventra SPL and its behaviour does not vary among the trains).
With our approach, we tackle the above challenge of creating test scripts steaming from common SPL features and accounting for products differences by defining a light-weight model-based approach. The approach uses metamodels, Domain-specific Languages (DSLs) and model transformations for the automatic generation of test scripts from abstract test case descriptions.
We use the BT Aventra Family for evaluating the applicability and efficacy of the proposed approach. In particular, we demonstrate the applicability of the proposed approach in industrial context and its efficiency in generating executable test scripts which are equivalent to those manually created using the opportunistic reuse of testing artefacts strategy.
First validations results of the approach suggest that the generated test scripts are fully equivalent to the manual ones and that the approach allows to save development effort, in relation to the number of artefacts, already for product lines containing more than 2 products and 3 features.

More details can be found at the following link:

https://mdh.diva-portal.org/smash/record.jsf?dswid=-3445&pid=diva2%3A1439002&c=1&searchType=UNDERGRADUATE&language=en&query=&af=%5B%5D&aq=%5B%5B%7B%22author%22%3A%5B%22Di+Silvestro%2C+Fabio%22%5D%7D%5D%5D&aq2=%5B%5B%5D%5D&aqe=%5B%5D&noOfRows=50&sortOrder=author_sort_asc&sortOrder2=title_sort_asc&onlyFullText=false&sf=allBT

*Campo obbligatorio

Industrial relevance

In "A method for evaluating rigor and industrial relevance of technology evaluations", the authors proposed a model for assessing the industrial relevance of a research. The model focus on the research methodology and assess the relevance of 4 aspects being: subjects, context, scale, and research method. For each of this aspect, a person gives a point if that aspect contributes to the relevance.

1. The "Subjects" aspect refers to the subjects used for the evaluation, i.e., students vs practitioners. Do you think the subjects for this research were industrially relevant? *

   Seleziona tutte le voci applicabili.

   - [ ] 0 (no)
   - [ ] 1 (yes)

2. Remarks (motivate your answer)

3. The "Context" aspect refers to the context in where the research and evaluation was carried, i.e., labs vs academic environment vs industry. Do you think the context for this research was industrially relevant? *

   Seleziona tutte le voci applicabili.

   - [ ] 0 (no)
   - [ ] 1 (yes)

4. Remarks (motivate your answer)

5. The "Scale" aspect refers to the significance of the used case study. Do you think the size and the significance of the use cases used are industrially relevant? *

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- [ ] 0 (no)
- [ ] 1 (yes)

6. Remarks (motivate your answer)

7. The "Research Method" aspect refers to the method used and whether this facilitate the understanding and the use of the research for practitioners. Do you think the method is significant for the industry? *

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- [ ] 0 (no)
- [ ] 1 (yes)

8. Remarks (motivate your answer)

9. How industrially relevant do you find the Model-based test-scripts generation for SPLs? *

Contrassegna solo un ovale.

	1	2	3	4	5	
Not relevant	◯	◯	◯	◯	◯	Higlhly relevant

10. Remarks