Modelling Program Verification Tools for Software Engineers

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Motivation

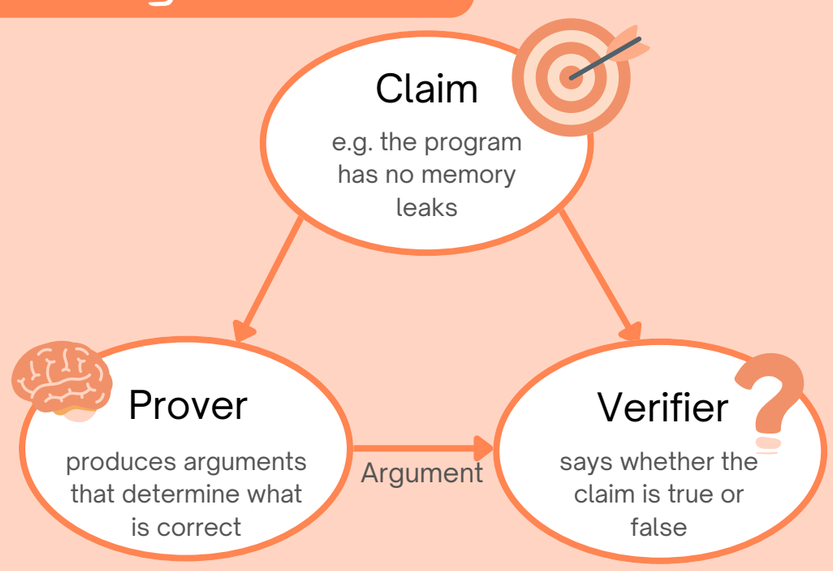
There are many program verification tools and techniques but it is **difficult to find and choose a suitable tool**

- Techniques are hard to understand
- Tools are often not production-ready
- Information sources may be unreliable and unavailable

Contribution

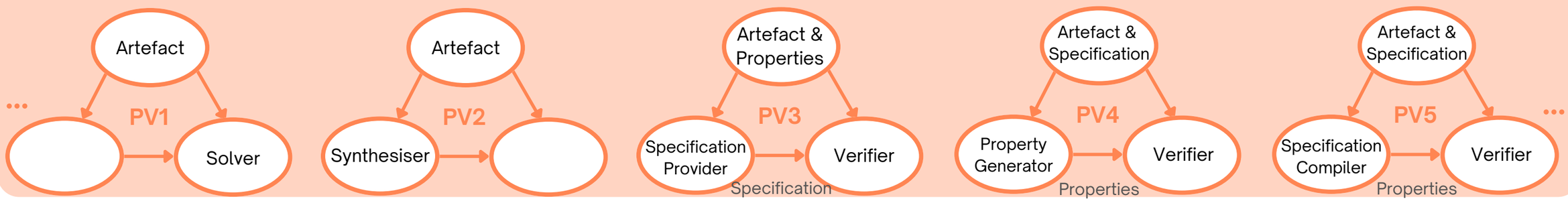
We present a **megamodel** [1] for program verification tools to make them more accessible to a broader audience.
We have also prepared a **data set** with concrete examples of program verification tools

Megamodel

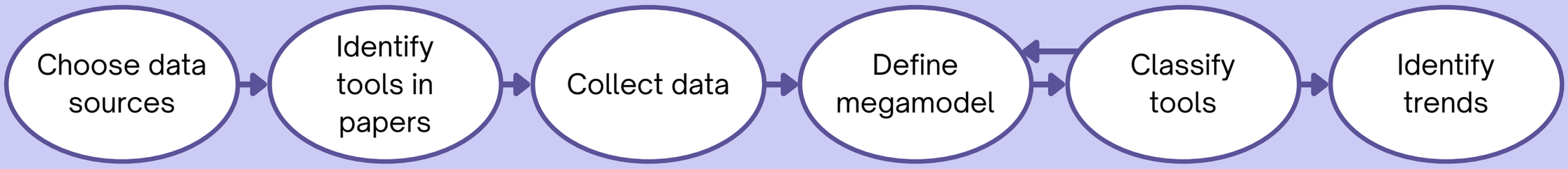


The model is based on the classic division of roles in a correctness proof as introduced by Goldwasser, Micali and Rackoff in 1985 [2].

Using this model, we have identified seven levels: **PV0 – PV6**. The higher levels tend to give more correctness guarantees, though typically at the cost of more user effort. For example, PV6 includes theorem provers, whereas PV1 may include a tool to check emptiness of automata.



Data set



- 460 papers from CAV and TACAS
- **420+ tools, frameworks and specification formats**
- Includes information such as domain, what input is needed, input format, output produced, internal details, relations to other tools, links to project pages, and more!

Available at
https://slebok.github.io/proverb

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[1] Sophie Lathouwers and Vadim Zaytsev. 2022. **Modelling Program Verification Tools for Software Engineers**. In ACM/IEEE 25th International Conference on Model Driven Engineering Languages and Systems (MODELS '22). https://doi.org/10.1145/3550355.3552426
[2] S Goldwasser, S Micali, and C Rackoff. 1985. **The knowledge complexity of interactive proof-systems**. In Proceedings of the seventeenth annual ACM symposium on Theory of computing (STOC '85). https://doi.org/10.1145/22145.22178