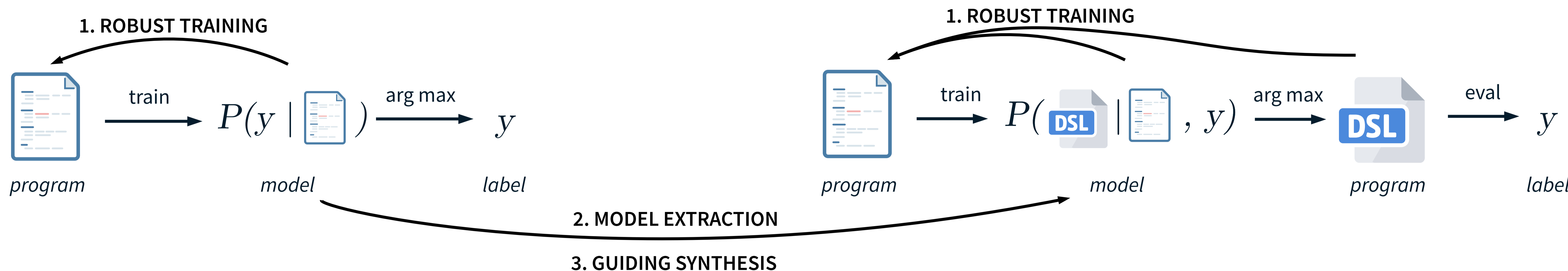


LEARNING OVER PROGRAMS

meets

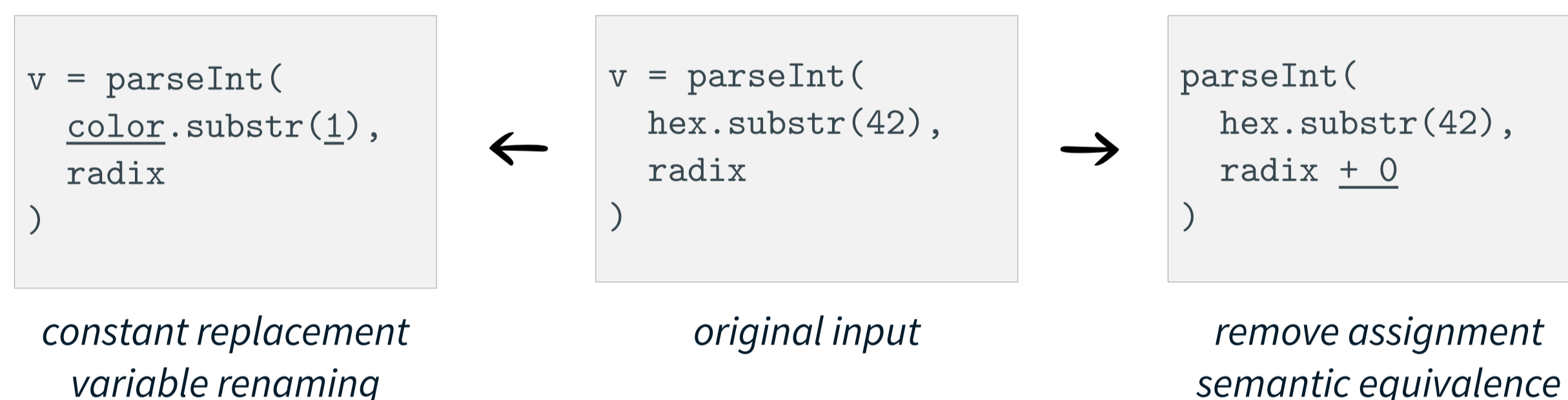
LEARNING PROGRAMS



1. ROBUST TRAINING

Learning a Static Analyzer from Data. Bielik, Raychev, Vechev. CAV'17
Adversarial Robustness for Code. Bielik, Vechev. ICML'20

Learn a model that is correct for all label preserving program transformations



$P(y | \text{program})$ $P(\text{DSL} | \text{program}, y)$

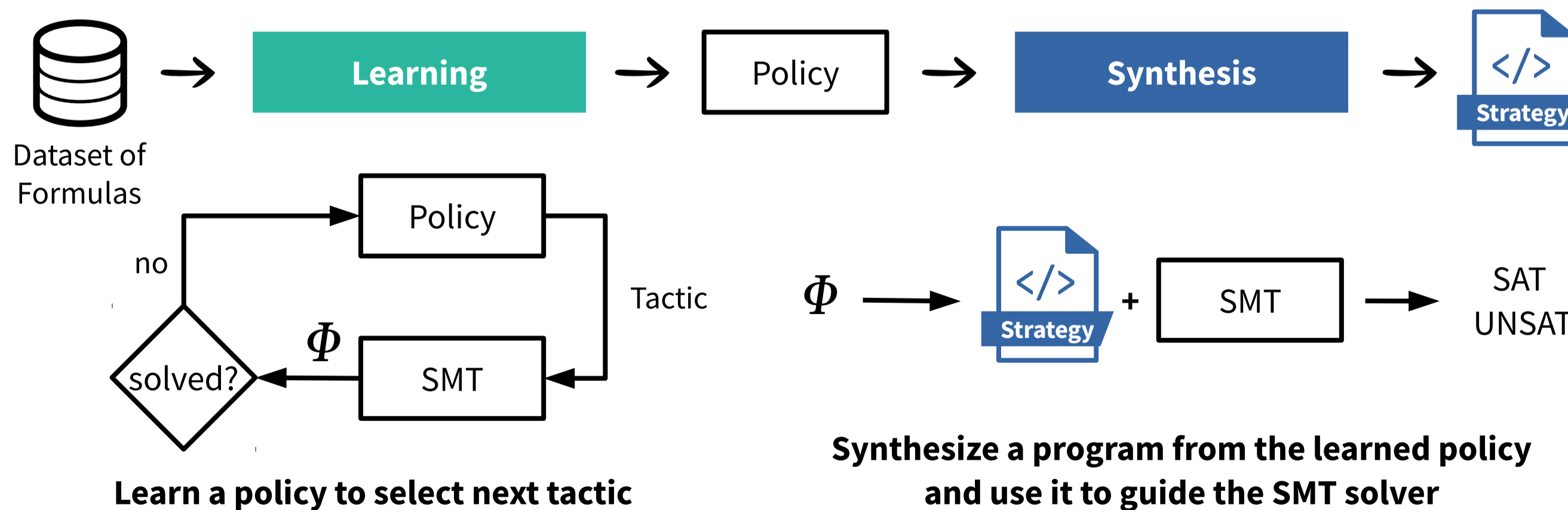
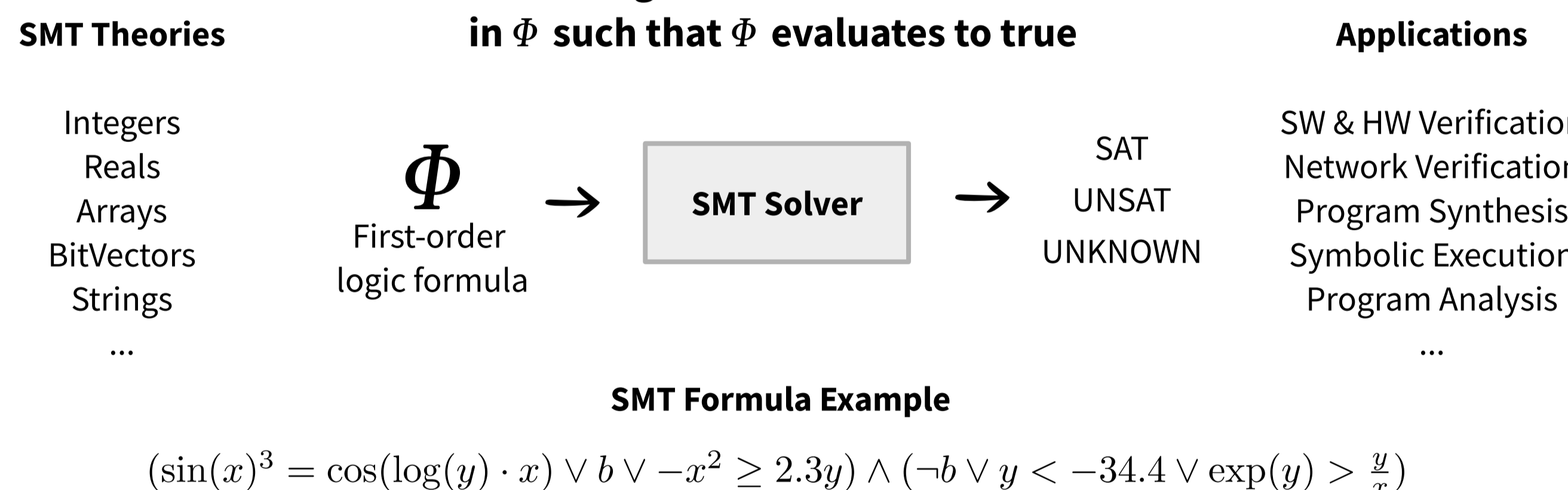
Property	Neural Networks	PHOG
Approximation	Abstain per sample	Abstain per region
Training	Adversarial	Adversarial (CEGIS)
Program Representation	Graph	Graph
Representation Refinement	Remove Edges	Extract Nodes
Compositionality	Sequential	Fixed-point

99.9% robustness and 99.9% accuracy on a subset of the dataset

2. MODEL EXTRACTION

Learning to Solve SMT Formulas. Balunovic, Bielik, Vechev. NeurIPS'18

Find an assignment to all free variables in Φ such that Φ evaluates to true

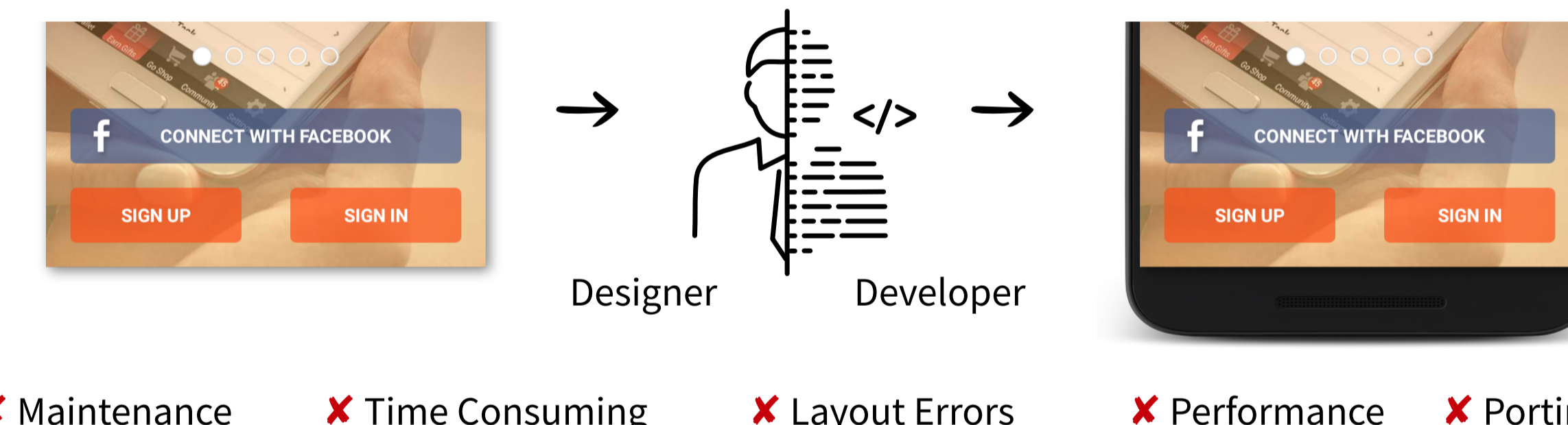


Up to 100x speed-up over state-of-the-art Z3 solver

3. GUIDING SYNTHESIS

Robust Relational Layout Synthesis from Examples for Android. OOPSLA'17
Guiding Program Synthesis by Learning to Generate Examples. ICLR'20

Synthesize relational layout from a specification such that it looks the same when rendered (and generalizes to other devices)



Infer UI

Layout Synthesis	Robustness Properties
User Feedback	List of Devices
Probabilistic Model	Robustness Model

Available on **GitHub** and **Google Play**.

Examples of layout errors: **Blank Space**, **Wrong Alignment/Size**, **Out of Screen**, **Overlaying Views**.

Discovered more than 100 layout errors in GitHub + PlayStore applications