Deep Learning-Driven Circuit Representation
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Motivation
Facilitate Utilization of Machine Learning in VLSI Computer Aided Design

- Hardware Security
- Verification and Test
- Synthesis

Fixed-size feature matrices filled with real numbers
Contains both functional and structural pieces of information from the circuit

Outputs desire circuit property, e.g., its functionality

Deep Learning-Driven Circuit Representation

- Feature Extraction
  - Sparse Mapping
  - Level-Dependent Decaying Sum
  - Existence Vectors
- Feature Selection
  - Select the most representative nodes

Circuits with distinct properties have different representations

An Application: Circuit Recognition
Five sets of benchmarks in six different classes: Division, Modulo, Adders, Subtractors, Multiplier circuits, and others.
Achieves a classification accuracy higher than 98%

http://sportlab.usc.edu