

An Open-Source Deep Reinforcement Learning Framework for Chip Placement

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Scalability and Generalization of Circuit Training for Chip Floorplanning

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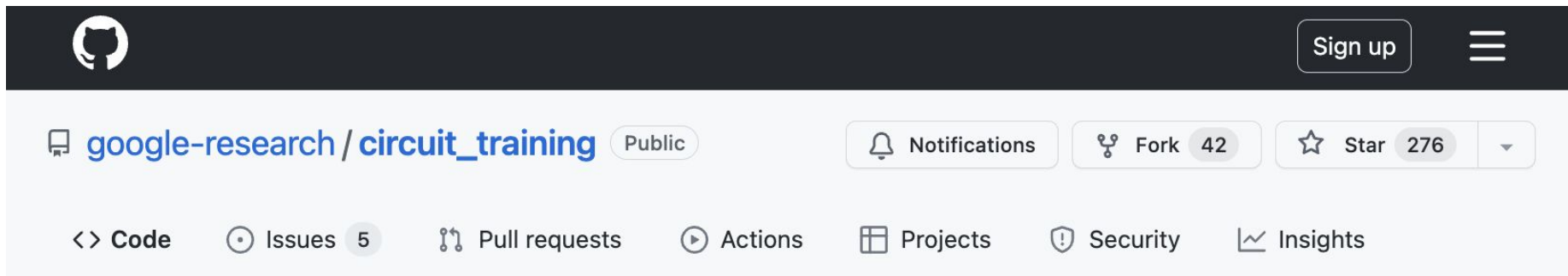
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Google Research

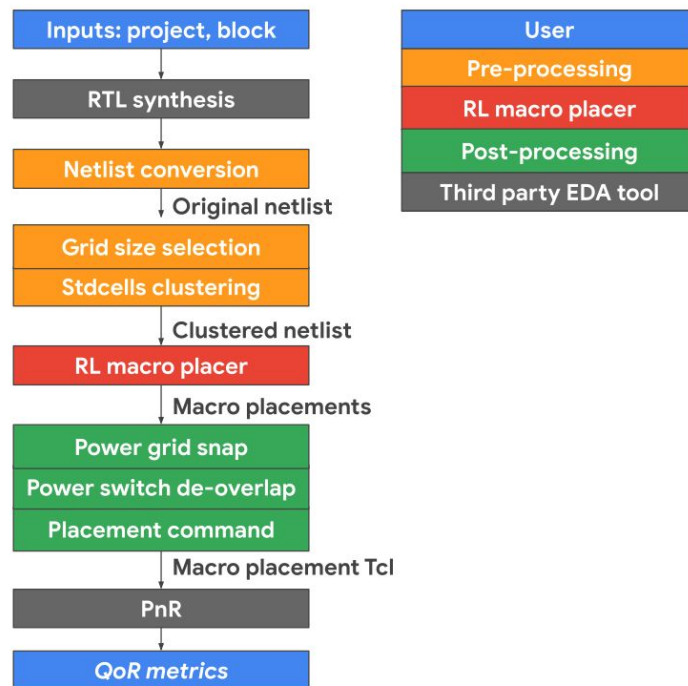
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Open-Source Release of Circuit Training

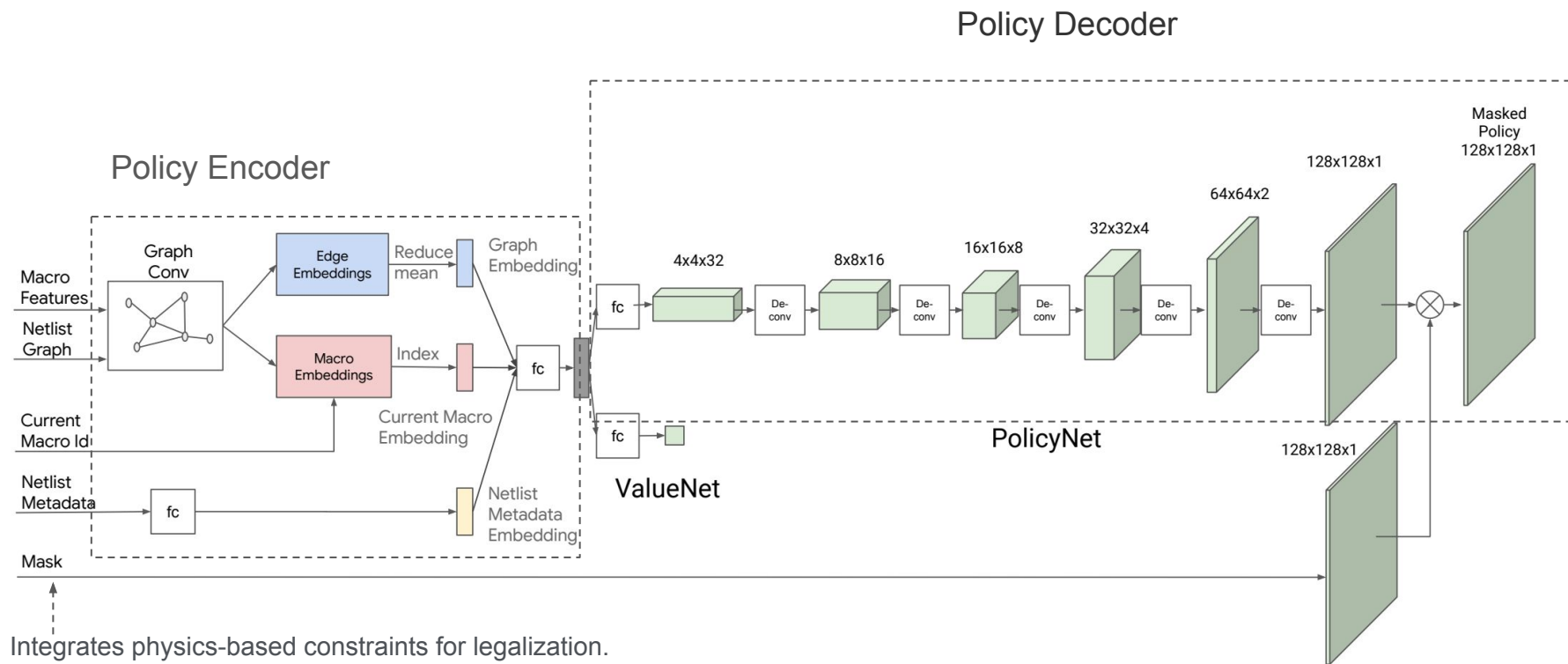
- [Circuit Training](#) is an open-source version of the deep reinforcement learning (RL) method published in [Nature](#).
- Collaboration with the tf-agents team (an RL infrastructure team at Google)
- Check it out at: https://github.com/google-research/circuit_training!



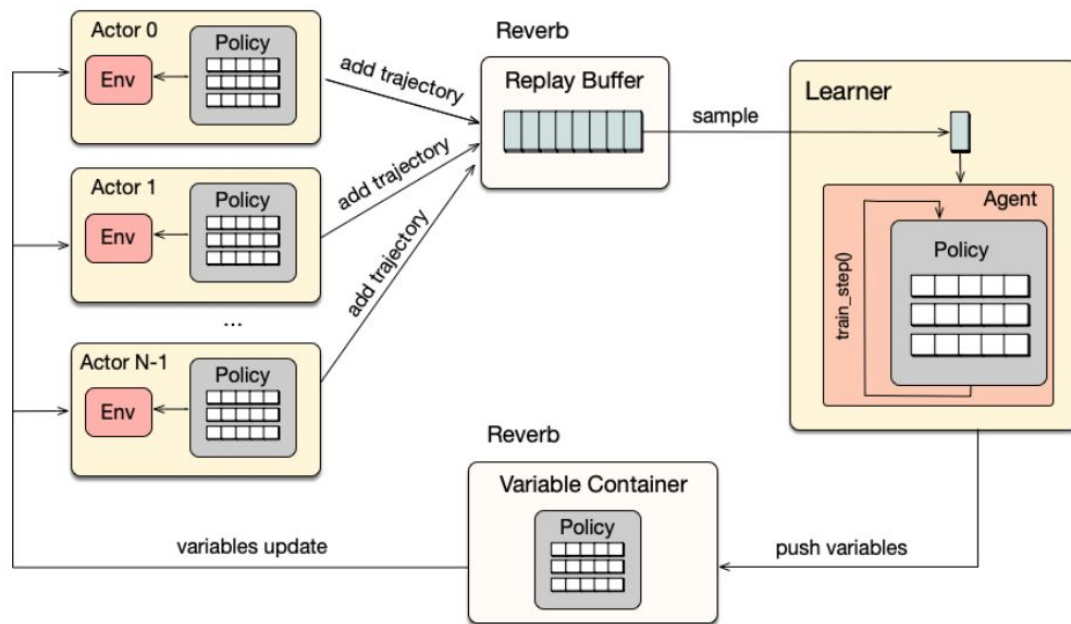
Circuit Training End-to-End Production Workflow



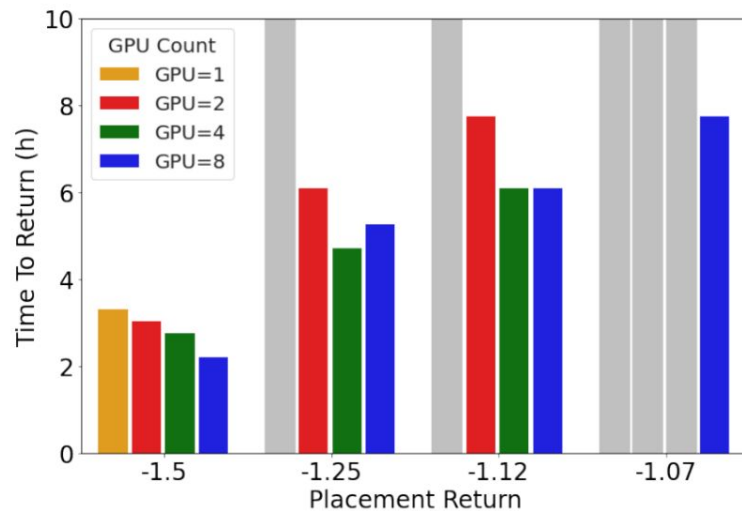
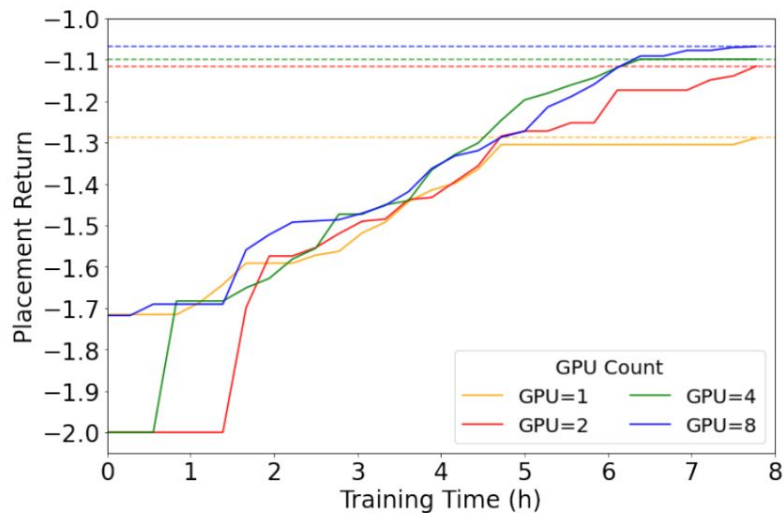
Circuit Training Architecture



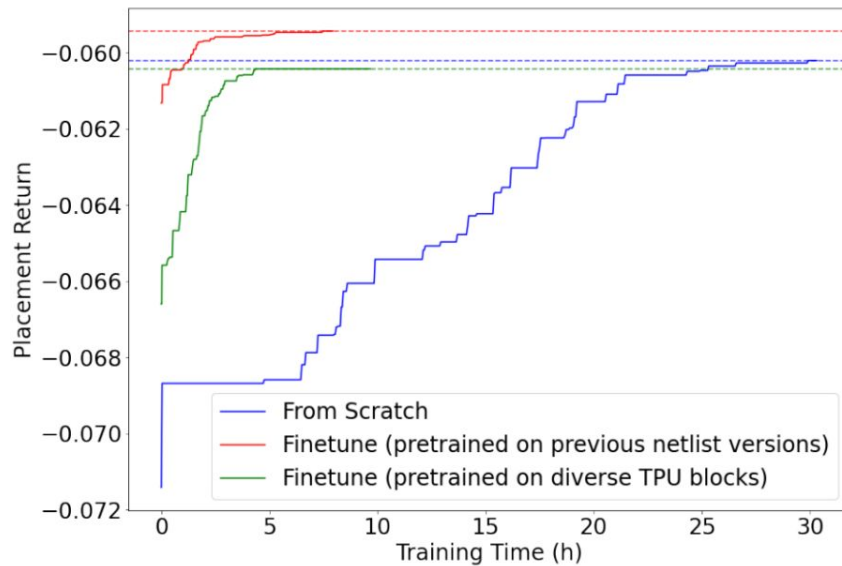
Actor Learner Distributed Data Collection and Training



Performance vs. Training Time and Number of Parallel Workers (GPUs)

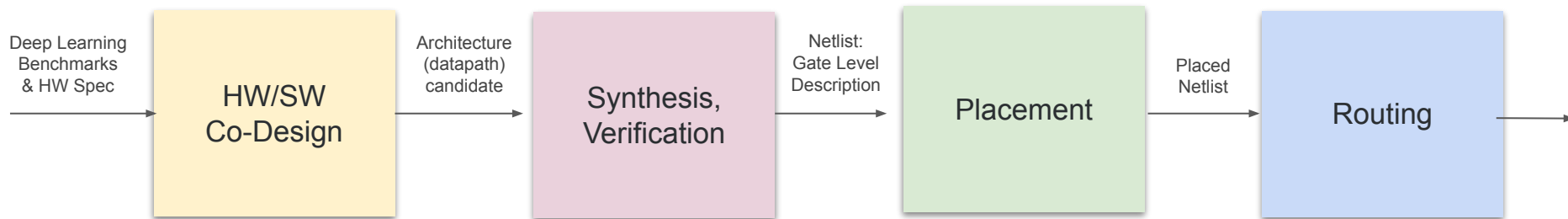


Effect of Pre-Training Data Relevance



Next Steps: Moving Beyond Chip Placement

- Top-Level Chip Floorplanning
- Block Shaping
- Macro Selection
- Pin Assignment
- Co-Optimization with Earlier Stages



Real-World Impact

- To our knowledge, the first deep RL method used in production of systems or hardware
- Used to design 2 generations of **TPUs** and **Pixel** phones, saving weeks of design time
- Projected to save thousands of engineering hours on every new chip
- Open-sourced:
github.com/google-research/circuit_training
- Published in [Nature](#)

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A graph placement methodology for fast chip design

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