



Neuroevolution

as scalable alternative in deep learning

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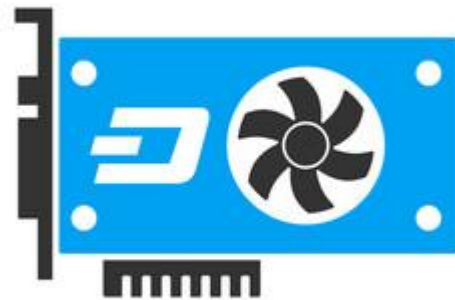


Deep learning

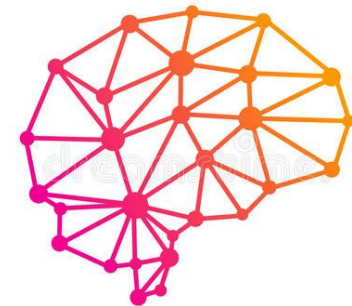
Big Data



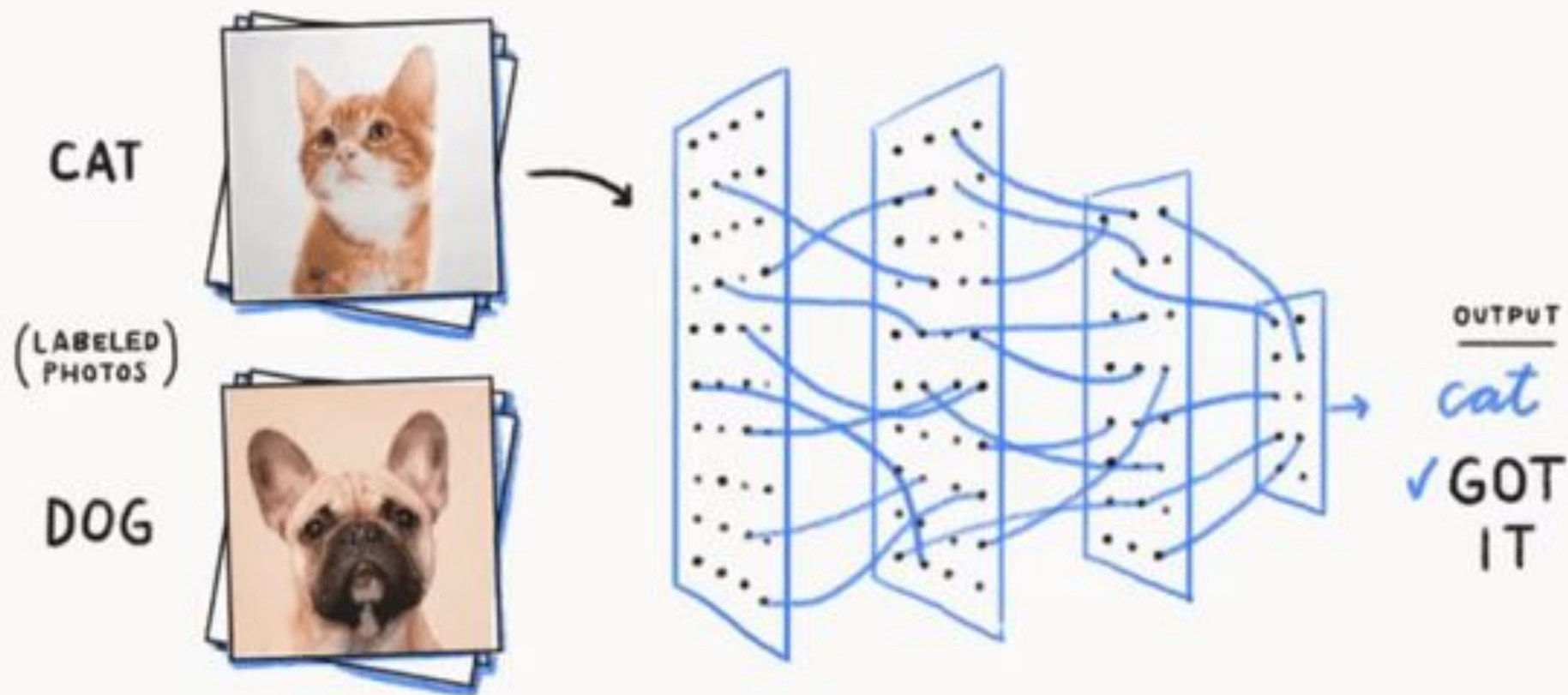
**Computational
Power**



**Deep Neural
Networks**



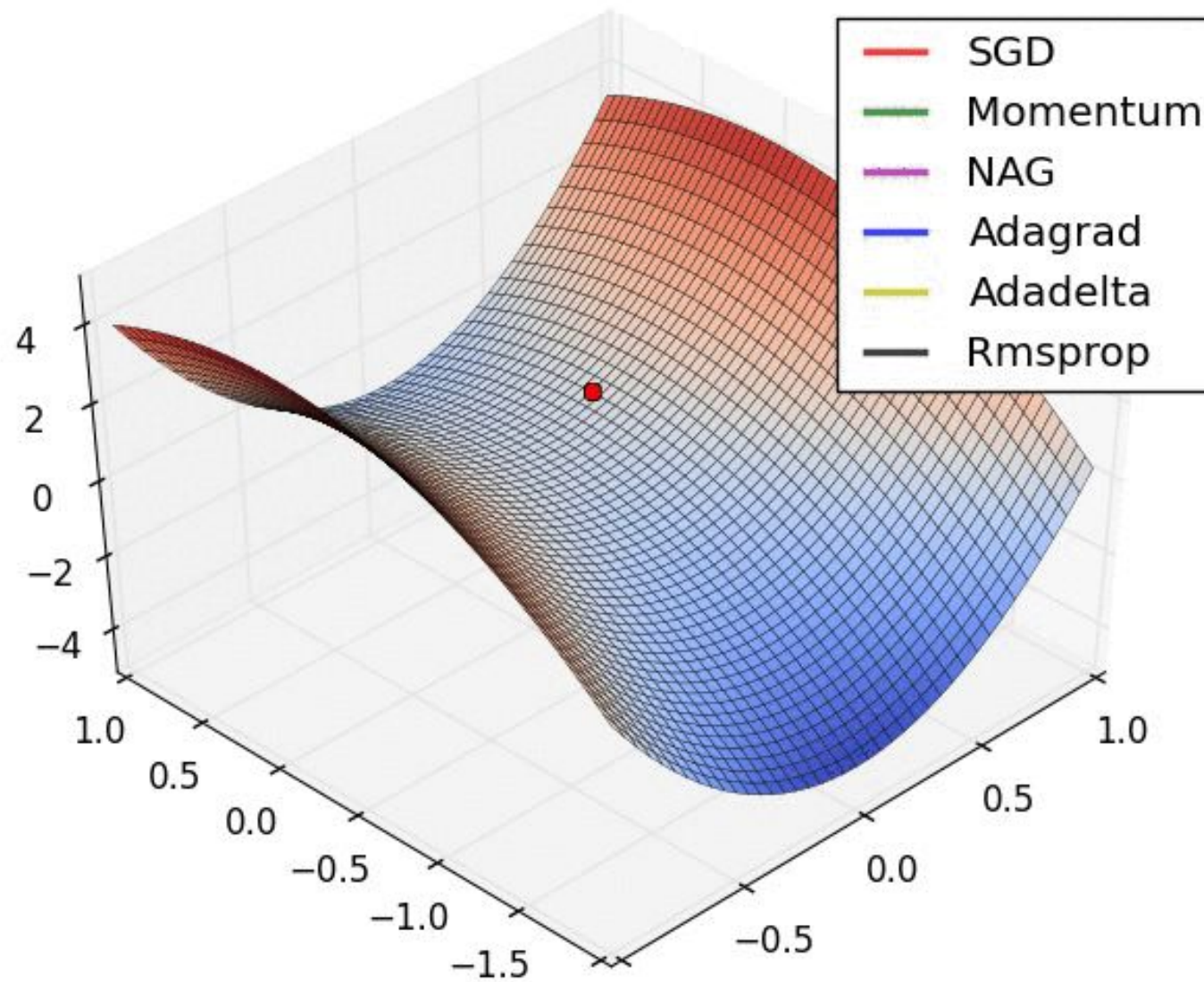
A Neural Network is a **function** that can learn



> Neuroevolution



Gradient Descent



Back Propagation



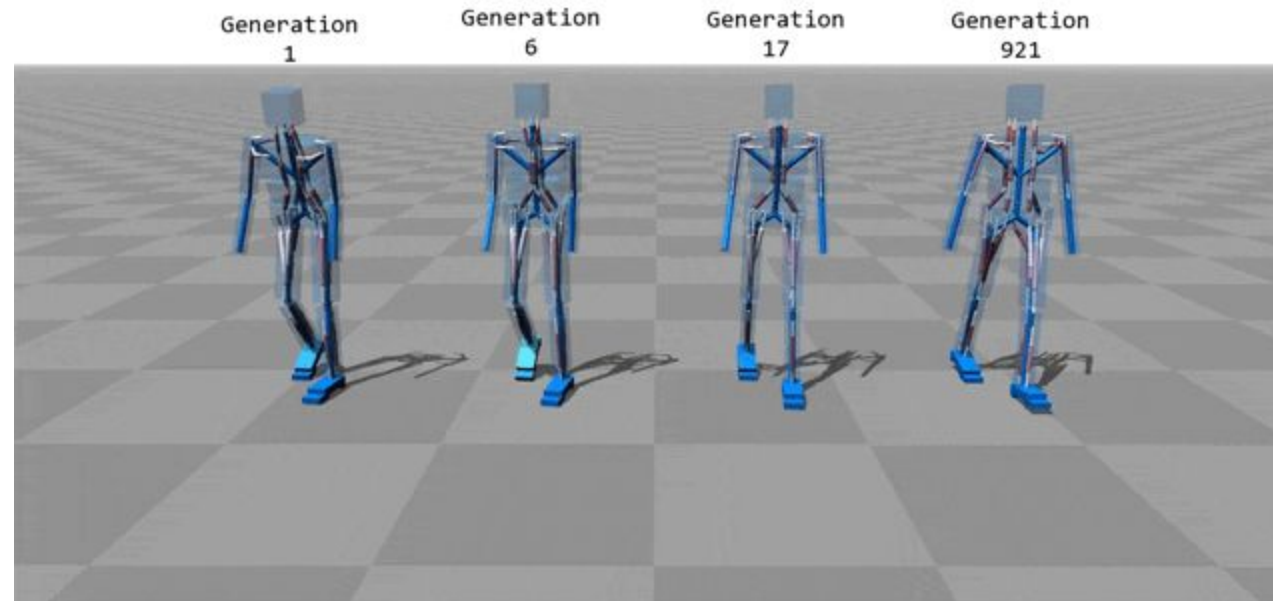
Interesting problems

Differentiable
problems

Evolutionary algorithms

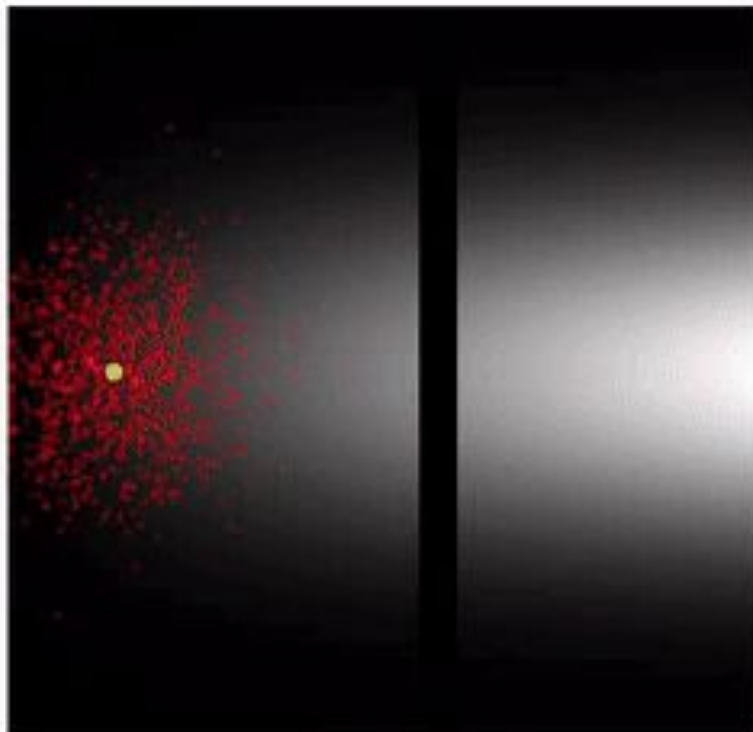


Evolutionary algorithms

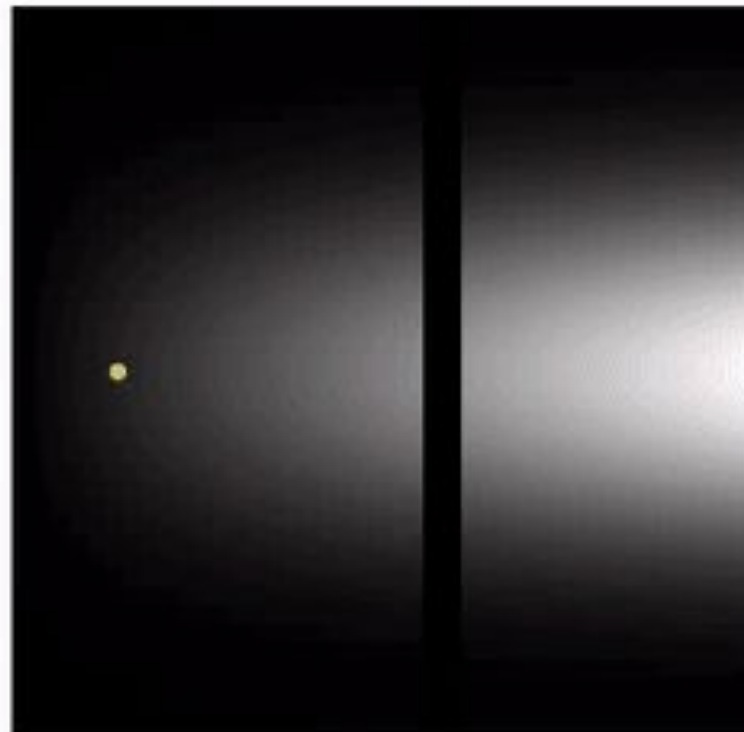


Evolutionary algorithms

ES

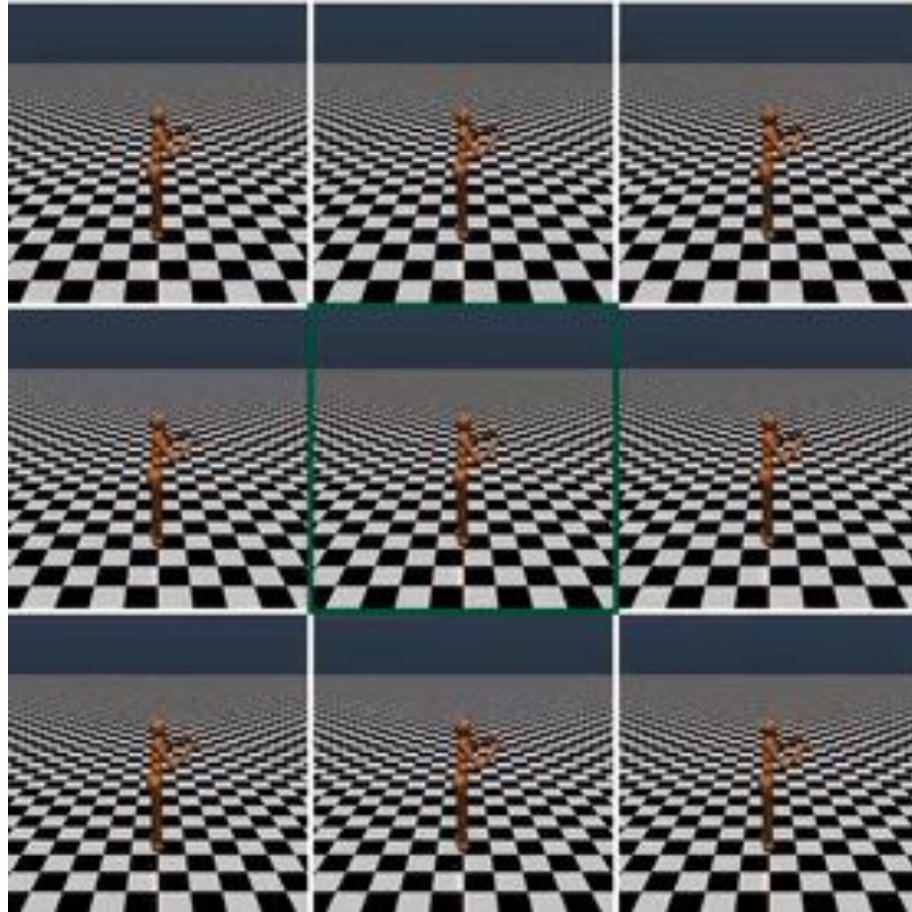


Finite Differences
(Gradient Descent)

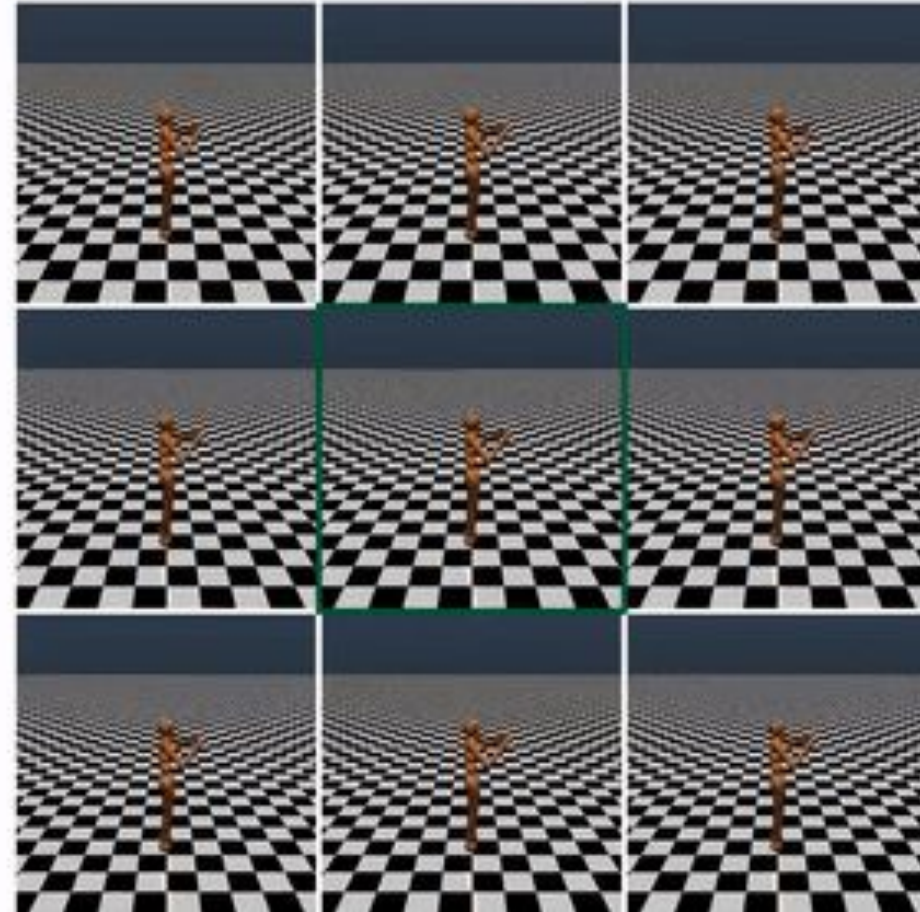


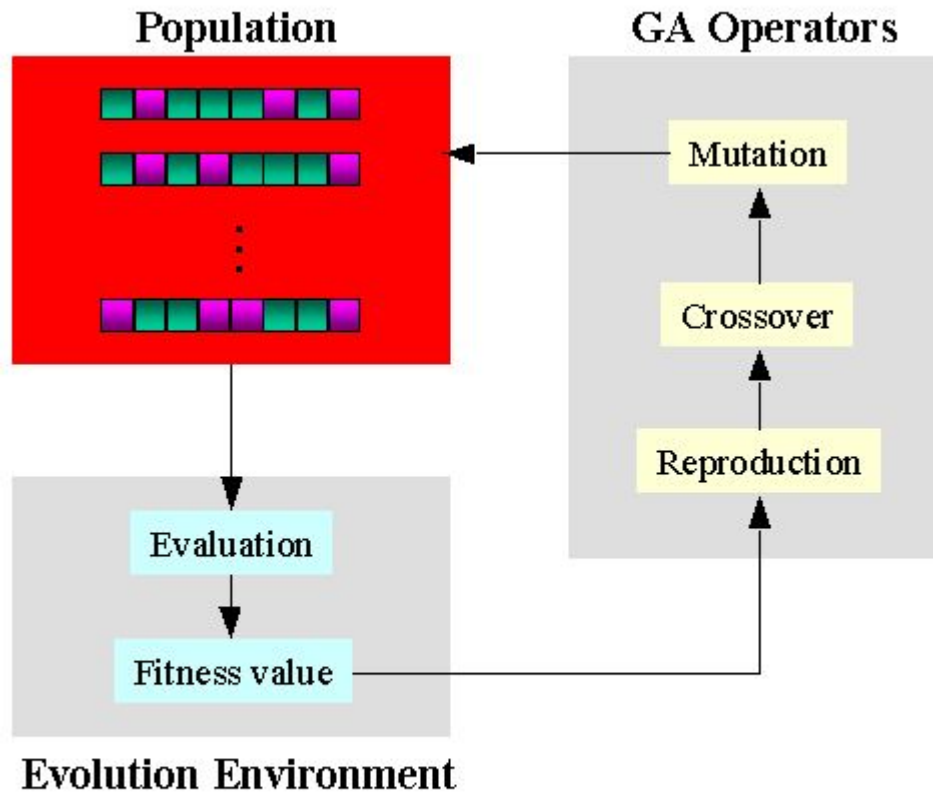
Evolutionary algorithms

ES
Fallen: 0

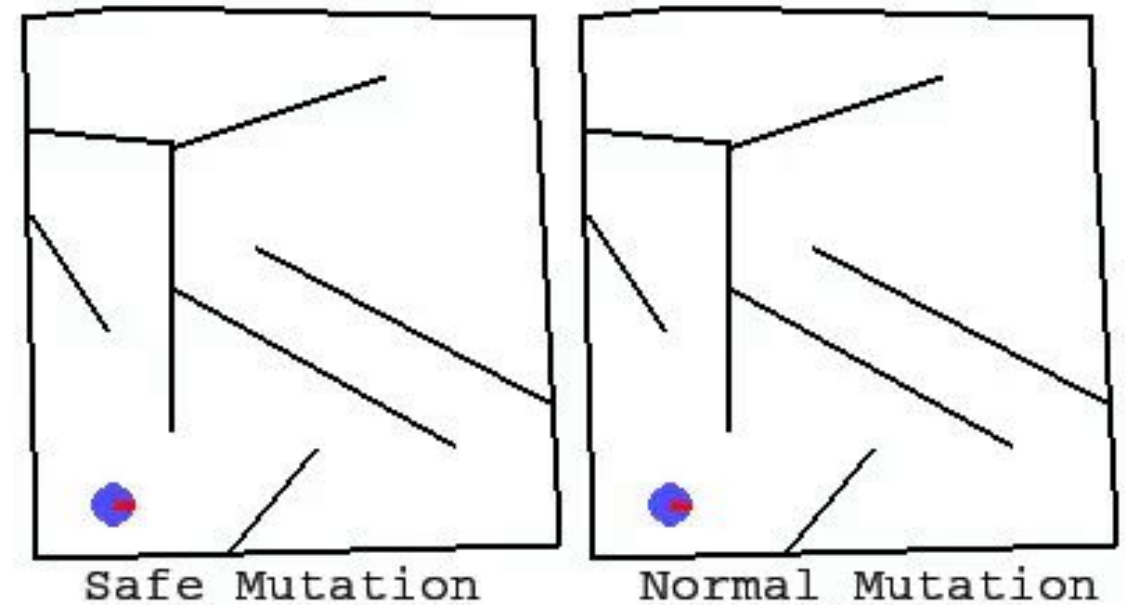


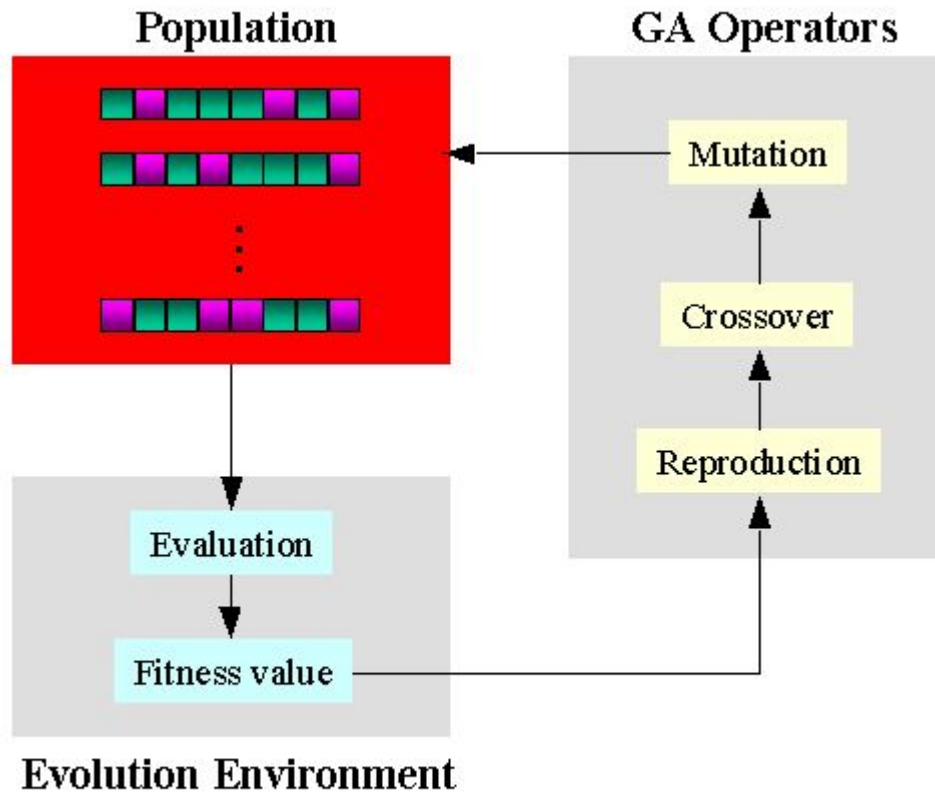
TRPO
Fallen: 0





Genetic Algorithm Evolution Flow

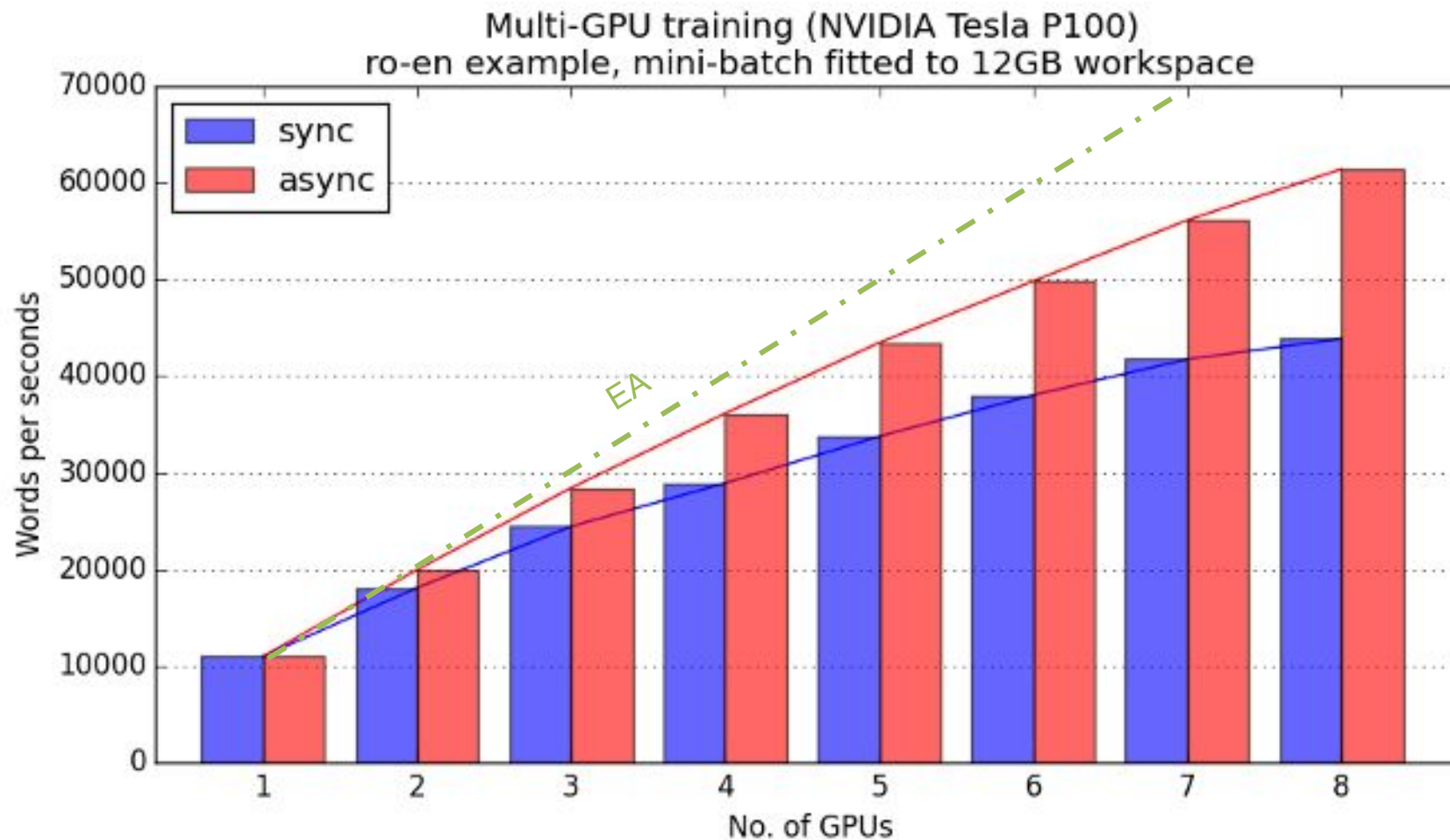




Genetic Algorithm Evolution Flow

BP





Neuroevolution

Pros and Cons

	GD	ES
Simple to implement	✓	✓
Differentiable Problems	✓	✓
Non Differentiable Problems	✗	✓
Scale well on parallelization	✗	✓

Thank you for your time!



machinalis
Machine Learning Solutions Delivery

- **Safe Mutations for Deep and Recurrent Neural Networks through Output Gradients.**
Joel Lehman, Jay Chen, Jeff Clune, and Kenneth O. Stanley
<https://arxiv.org/pdf/1712.06563.pdf>
- **Evolution Strategies as a Scalable Alternative to Reinforcement Learning.**
Tim Salimans, Jonathan Ho, Xi Chen, Szymon Sidor, Ilya Sutskever
<https://arxiv.org/abs/1703.03864>
- **Neural evolution strategies**
Wierstra et al.
<http://www.jmlr.org/papers/volume15/wierstra14a/wierstra14a.pdf>
- <https://en.wikipedia.org/wiki/Neuroevolution>
- https://en.wikipedia.org/wiki/Evolutionary_algorithm

