

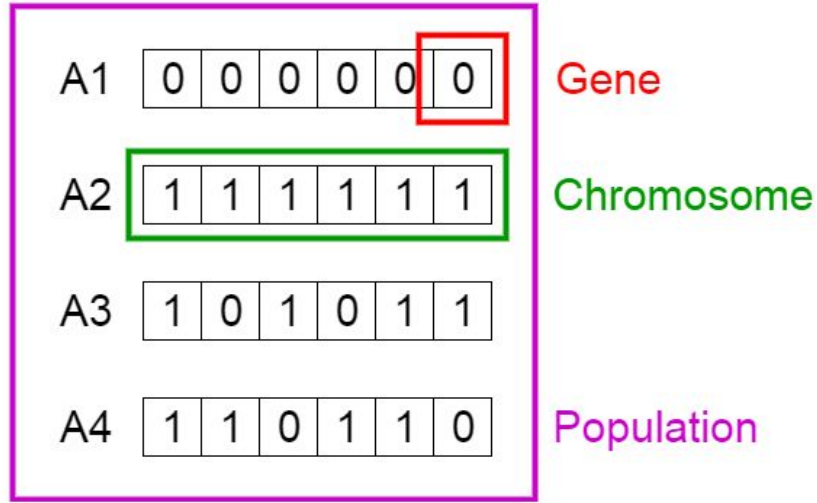
# A look at Genetic Algorithm Application

Dat O - Pledged - 12/5/2021

*In Mem. SP*

# What is a Genetic Algorithm?

1. Population
2. Fitness
3. Selection
4. Crossover
5. Mutation



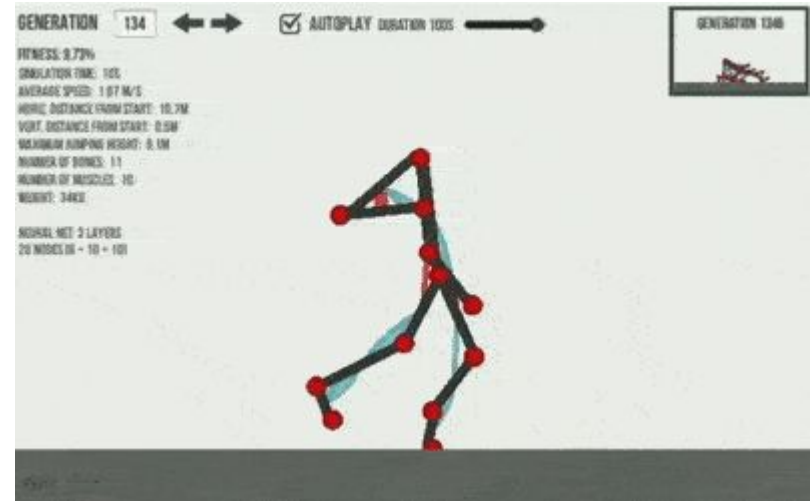
# Question: How is Genetic Algorithms utilized?

What's the big deal?

How did it help improve/solve a problem?

Is it necessary to implement in your program?

Does it actually work?



# Genetic Algorithm to create an Image using polygons

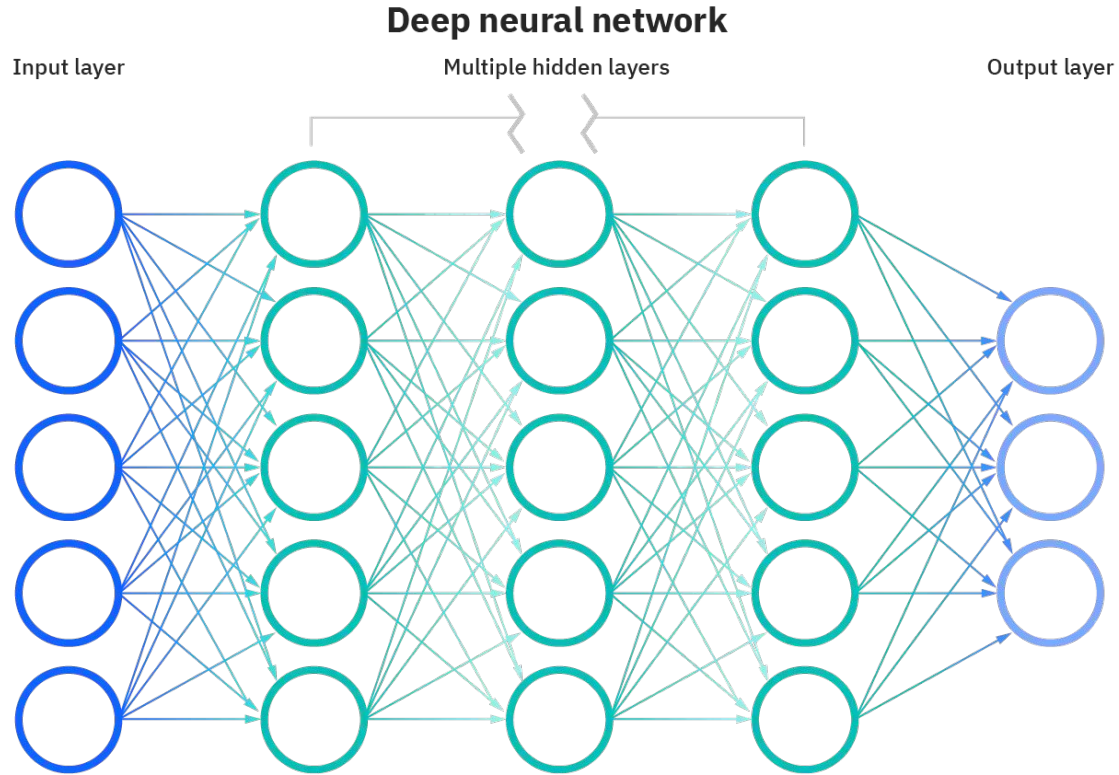
Roger Johansson: [Evolution of Mona Lisa](#)

1. Setup a random DNA string on an empty canvas
2. Copy the generated sequence and mutate it slightly
3. Use the new generation
4. Compare the canvas to the source image
5. Overwrite the current DNA with the new DNA
6. Repeat from 1

(Success rate shown on link)

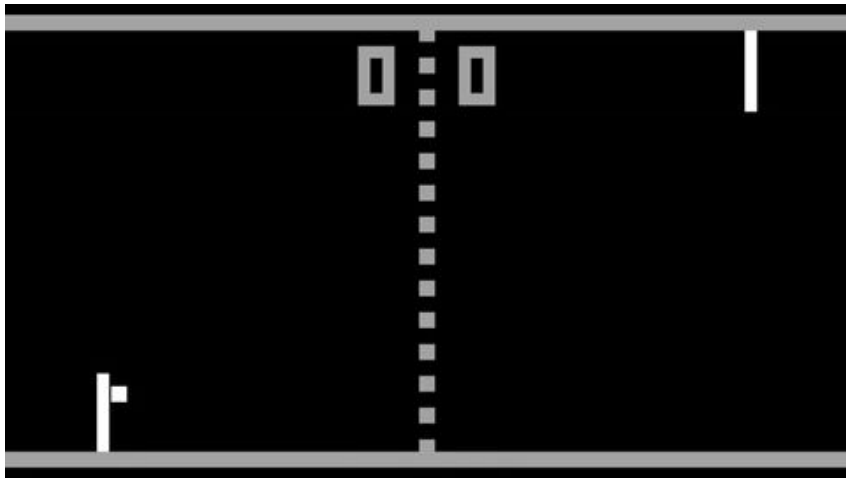


# Neural Networks





## Pong using AI (feat. Neural Networks)



Tristan Fogt: [PongEvolution](#) (Repository)

Had inputs in the neural network corresponding to the paddle, ball x & y axis, and speed

Had the movement and stop rate of the paddle to be the node outputs.

Had 100 paddles spawn and mutated off of the one that achieved the highest score

# Evolving creatures to race (simulation)

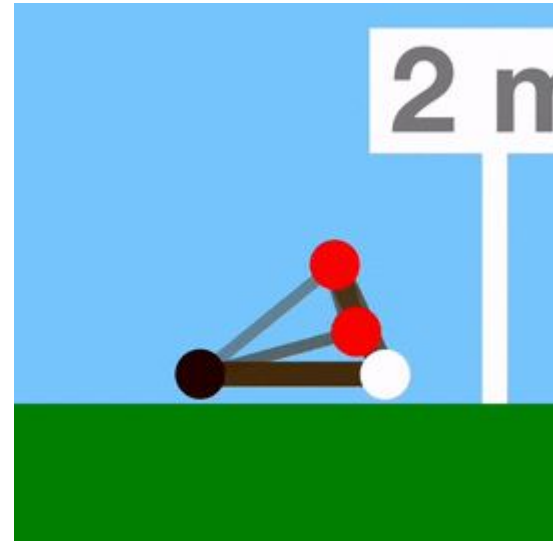
CaryKH: [Evolution Simulator](#)

Has multiple characteristics to each creature

Each one will benefit in some form, assisting them going farther across the field.

The lower half of the population will die off and new offspring will be reproduced (with randomness)

Continue to do so until the 15 second limit is maxed out.



Let's check back on the Mrs. Lisa...





## Results



**Polygon Reproduction:** The algorithm is constrained to only using sharp-edged polygons but does a good job deciphering which shape has the highest chance of resemblance to the original

**Pong with Neural Networks:** The neural network should work as intended to, and spawned a generation that would consistently score points, although it was overkill.

**Evolution Simulator:** Shows a great example of how a genetic algorithm should work and gives a great result that found an answer.

*Though genetic algorithms doesn't produce as much use in a big majority of programs and project today, they are still very useful at visualizing a scenario of starting at the bottom and slowly building up solely on experience and mutations.*



## Reflection: Looking Back

I had a very enjoyable experience researching these repositories and programmers ideas and their take on using a genetic algorithm

I learned about neural networks for the first time and how important of a role they play in the use of artificial intelligence

Took a dive into Javascript and the in's and out's of visual coding. Didn't complete a final product but took my first steps into participating building onto existing code instead of from scratch



## References

Fogt, T. (n.d.). *PongEvolution*. GitHub. Retrieved December 4, 2021, from <https://github.com/lts-Triggy>.

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Johansson, R. (n.d.). *Genetic Programming: Evolution of Mona Lisa*. Image evolution. Retrieved December 4, 2021, from <https://alteredqualia.com/visualization/evolve/>.

Mallawaarachchi, V. (2020, March 1). *Introduction to genetic algorithms - including example code*. Medium. Retrieved December 4, 2021, from <https://towardsdatascience.com/introduction-to-genetic-algorithms-including-example-code-e396e98d8bf3>.