Genetic Algorithms

CS 419/519

Demo 1: Mona Lisa

The power of randomization:

https://chriscummins.cc/s/genetics/

Demo 2: "Motorcycle"

Evolve a 2-d motorcycle to go as far as possible on a track

https://rednuht.org/genetic_cars_2/

Demo 3: Rockets

Evolve rockets to hit a target

http://www.blprnt.com/smartrockets/

Demo 4: Walkers

Evolve biped walkers

https://rednuht.org/genetic_walkers/

Demo 5: Mona Lisa (again)

Interesting take on evolving images

http://tanjacrijns.com/naturalcomputing/

Real-world Applications

The following appeared in results of a recent search:
- Simulation optimization using genetic algorithms with optimal computing budget allocation. SIMULATION, 2014.
- Optimal allocation of statistical tolerance indices by genetic algorithms. Artificial Life and Robotics, 2014.
- Optimal insurance risk allocation with steepest ascent and genetic algorithms. Journal of Risk Finance, 2013.
- Simultaneous allocation of capacitors and voltage regulators at distribution networks using genetic algorithms and optimal power flow. International Journal of Electrical Power and Energy Systems, 2012.
- Optimal allocation of solar PV systems in rural areas using genetic algorithms: a case study. International Journal of Sustainable Engineering, 2013.
- Fuzzy optimization of labour allocation by genetic algorithms. Engineering, Construction and Architechtural Management, 2003.

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Real-world Applications

The following appeared at GECCO 2019:
- Multiobjective shape design in a ventilation system with a preference-driven surrogate-assisted evolutionary algorithm.
- A novel hybrid scheme using genetic algorithms and deep learning for the reconstruction of Portuguese tile panels.
- Toward real-world vehicle placement optimization in round-trip carsharing.
- Evolving robust policies for community energy system management.
- Evolutionary approaches to dynamic earth observation satellites mission planning under uncertainty.
- Differential evolution based spatial filter optimization for brain-computer interface.
- Augmented evolutionary intelligence: Combining human and evolutionary design for water distribution network optimisation.

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