NEAT and HyperNEAT

Michal Pospěch & Daniel Crha

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Faculty of Mathematics and Physics, Charles University

Neuroevolution

Fixed Topology Evolution

- Searching the space of connection weights
- Topology is given, does not change during evolution

Evolving Topology

- Technical challenges:
  - good representation
  - not removing non-optimized network to early
  - minimisation of networks without need for a complexity function
- TWEANNs - Topology and Weight Evolving Artificial Neural Networks

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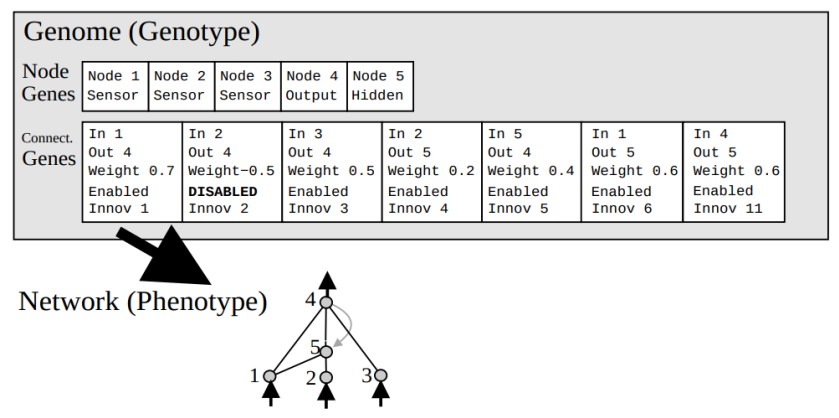
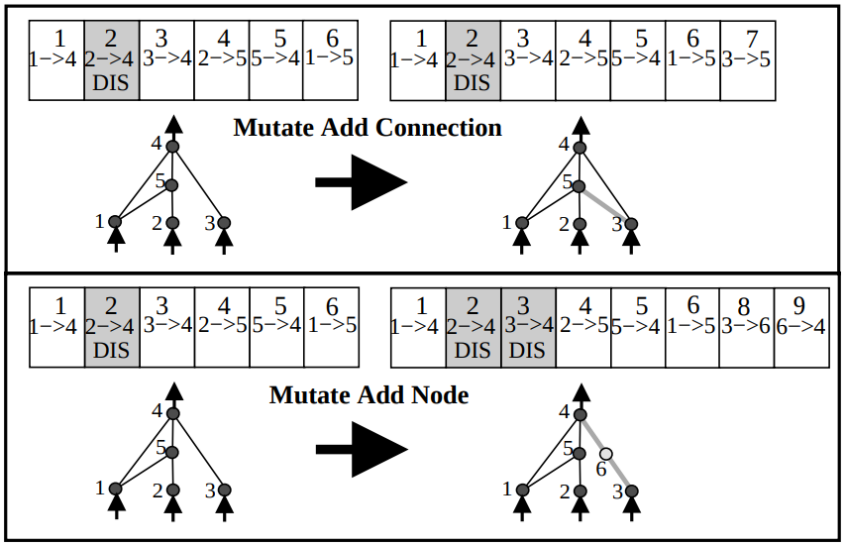
- NeuroEvolution of Augmenting Topologies
- Stanley and Miikkulainen, 2002
- solves all the issues aforementioned issues

Encoding and Mutation

- linear representations of network connectivity
  - 2 types of genes (nodes and connections)
  - innovation number
  - node
- 3 types of mutation
  - connection weight mutation
  - new node
  - new connection





Historical Markings and Crossover

- innovation number
  - new node via mutation →global innovation number++
  - used to line-up genomes during crossover
- mutation
  -

HyperNEAT

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