**NEAT Short:**

NEAT stands for Neurological Evolving Augmenting Topologies.

+ Uses Genetics and natural selection to gradually build the best neural network.

* **Creating class Temples for simulation**

**Concerns:**

**Required Simulation Functionality:**

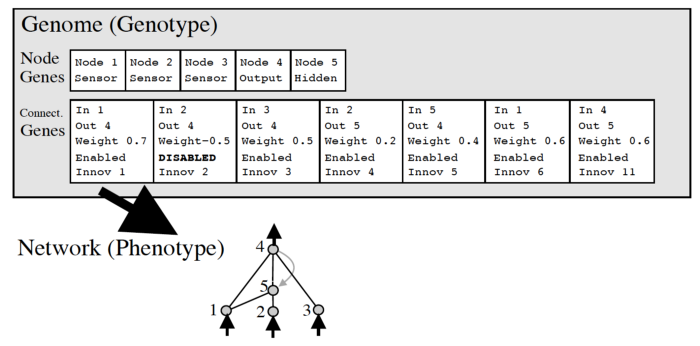
Items

**Genes**

Gene struct contains the Innovation number associated with the mutation.

* NodeGene\_t
  + Innovation Number
  + Node Number
  + Disabled Flag
* EdgeGene\_t
  + Innovation Number
  + In/Out Nodes
  + Disabled Flag

**Innovation Number**



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**Steps:**

1. Simulation/Selection
2. Crossover/Reproduction
3. Mutation

**Further Analysis:**

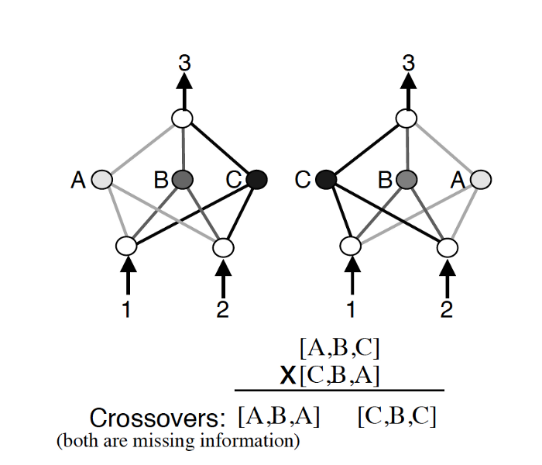
1. **Selection**

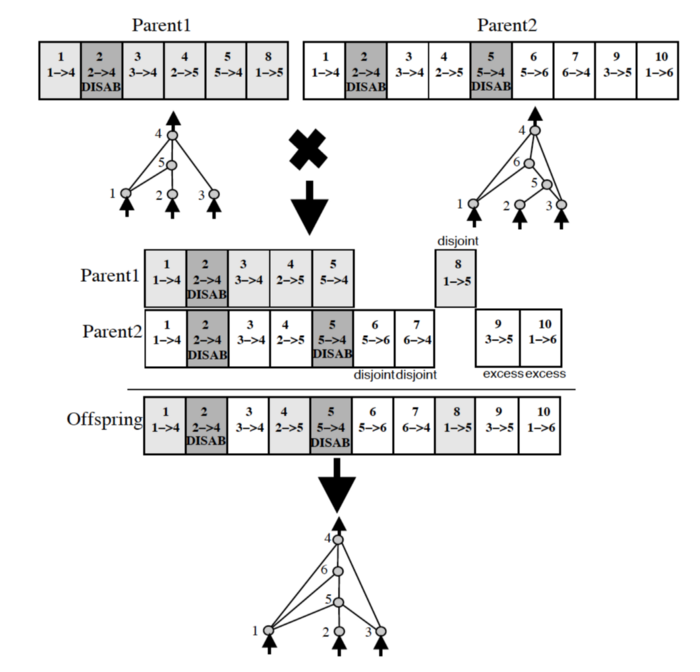
Select different Parents to propagate,

NEAT emphasizes having less evolved species within the environment to create new effective genes.

pseudo code:

1. **Crossover/Reproduction**



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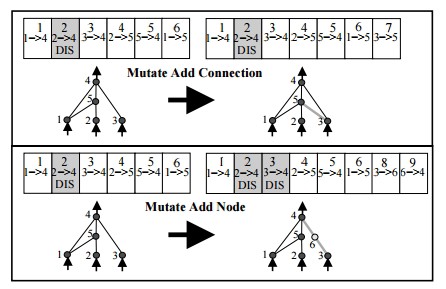
Crossover takes two parents and “Crosses” them where we use a Dominant/Recessive chance to pass on different genetics to children nodes. So, for example here is some pseudo code:

|  |
| --- |
| If (Gene in both parents):  Pick Random one Between them.  Else:  Child Gets Gene. |

1. **Mutation**

Chance to change a gene.

* Create/Remove NodeGene\_t:
  + Create: requires taking existing Edge and splitting in two.
  + Remove: Simply remove Node from list.
* Increase/Decrease weight in Gene:
  + Set Disabled flag to TRUE.



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Add new node steps:

1. If no edges exist, create one from input to output
2. Select an existing edge, and create node from

**Future Work:**

+Take NEAT and modify it for larger neural networks, so each ‘Node’ is a Block of neurons, each network is trained with back propagation.