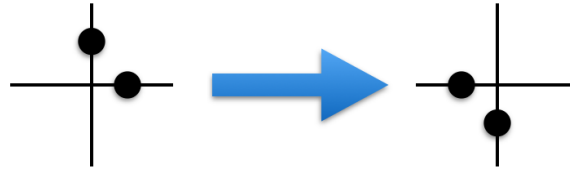


Tutorial 3 Tasks:

1. Edit the Monte Carlo code for the Ising gauge theory from Tutorial 1 (`gaugeTheory_mc.py`) to implement a “gauge update” for 4 spins around a star:



This move has no energy change, and so can be used to sample different configurations at low T .

2. Use this Monte Carlo code to generate data sets of configurations at $T \rightarrow 0$ and $T \rightarrow \text{infinity}$. Generate about 10,000 “images” for each of these cases.
3. Try to train yesterday’s FFNN to distinguish the low versus high T configurations. Does it work? What is the classification accuracy on a test subset?
4. Use the same data set to train the CNN using the code in the `/IsingGaugeTheory/` directory. (It should work this time!)

Notes and References:

- For the cross entropy cost function, see Equation 63 of <http://neuralnetworksanddeeplearning.com/chap3.html>.
- <https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxsc3ZydHV0b3JpYWxjdnByMTR8Z3g6Njg5MmZkZTM1MDhhZWNmZA>
- <http://www.deeplearningbook.org/contents/convnets.html>