Exercises for "Vertiefung Neuronale Netze"
SS 2018   Sheet 6
Due on: 4.5.2018

Task 6.1, ITM: In the directory /vol/ni/share/lehre/neuroII/itm[1] ,available on the linux machines, resides a simulation program for ITM and GNG. The program can be started by entering `./testgng` . Clicking `File -> Open` a number of different predefined configurations can be loaded. Ctrl-G en- or disables the (automatic) generation of input stimuli. Using the mouse, manual input stimuli can be presented. With `Edit -> Network Settings` (Ctrl-W) the learning parameters can be adjusted.

- Winner Adaptation: the winner node gets adapted (with learning rate $\varepsilon * \alpha$)

- Neighbors Adaptation: all neighbors are adapted

    - Global Adaptation: all nodes get adapted (SOM)
    - otherwise: only the direct neighbors are adapted (GNG,learning rate $\varepsilon * \sigma$)

- Metrics Adaptation: A global covariance matrix will be estimated and used within the mahalanobis distance.

- Input Threshold: an update step is only performed if the distance $(x - w)'C^{-1}(x - w)$ is bigger than the "deviation thresh"

- Edge-Update / Node-Update: Edge- and node update like in GNG

- Edge-Update / Node-Update + ITM Mode: Edge- and Node-Update like in ITM

- Expansion: (additional) shifting of the winner node in the direction of the centroid of its direct neighbors

1. test the influence of correlated stimuli on the SOM model (`fixedgrind.gng`).

2. Use ITM-parameters (`itmtemplate.gng`) to show the robustness against correlated stimuli

3. How does enabling/disabling the winner adaptation change the distribution of nodes? How does the result depend on the usage of statistical vs. correlated stimuli? For comparison, take a snapshot of the trained networks after 5.000, 10.000, >25.000 iterations.

4. Find a constellation in which the presentation of a stimulus (manual clicking) causes an edge to vanish.

5. How could you navigate with a topological map in a city like Brussels, which has a lot of one way streets?

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[1] Alternatively you can use /vol/ni/share/lehre/neuroII/www.demogng.de/js/demogng.html for some tasks as well.