Tutorial 4 – Comparison CMAC with FFNN

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- Training Samples:

  One of the biggest difference is the required number of samples for the training in order to get a good response. So, for example, the FFNN had a really good behavior just with 12 samples whereas the CMAC needed 1000 samples to achieve a comparable response. The reason for this huge number of samples relies on the local generalization of the CMAC vs the global generalization of the FFNN.

  The CMAC requires a lot of training samples compared with the FFNN.

- Learning Time:

  Using the FFNN the learning time depends strongly on the desired MSE error, and the number of samples. In the tutorial 3, for instance, we considered an error about 0.00003 and 30 samples, and we the required time of the NN was more than 15 minutes. On the other hand, the CMAC took aproximately a minute to reach the same error with 1000 samples !!!

  The CMAC is really fast with respect to the FFNN.

- Generalization:

  The CMAC is based on local generalization, therefore it is necessary take a huge number of samples trying to cover every position. The FFNN is based on global generalization, points that were not trained are interpolated with good results.

  CMAC local generalization FFNN global generalization

- Implementation:

  The FFNN needs normalized training sets whereas the CMAC works directly with the raw data.

  The learning rate in the CMAC must be smaller than 0.5 (for our specific task) otherwise the CMAC could not converge