# Kohonen Map Project Report

Unsupervised and Reinforcement Learning in Neural Networks

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17 novembre 2012

## 1 Learning rate and convergence

## 2 Assignment method

In this step, we need a method to automatically assign the propre digit to each prototype that we found by executing the Kohonen map algorithm. An obvious idea is to look at the labels of the trainning data points that are close to the prototype, then decide the its label accroding to the majority in this surrounding. In fact, this task has a similarity with the $k$ nearest neighbor classification algorithm, which assigns a label to a data sample based on the majority of its $k$ neighbors. So we decided to use the kNN method.

Before we apply this method directly to the problem, however, we need to determine the parameter, $k$, of this algorithm. Intuitively, this parameter depends on our trainning data, which covers the hand writing samples of the four chosen digits. So we do firstly a cross validation on kNN models with distinct $k$ values (ranging from 3 to 300), which results in $k$ equals 5.

Once the paramter is fixed, the application of kNN to the problem is fairly straightforward.

## 3 Comparing the results

## 4 Conclusion