

Markov Chains as Skeleton Structures of Neural Networks in the Japanese Phonetic Alphabet for Optical Character Recognition

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1 ABSTRACT

In this paper, we attempt to improve existing kana (alphabet) and suji no (numeral) recognition using a multi-layered feed forward neural network using pre-existing Markov Chains to refine weights on neural network graphs in order to cancel the effect of gaussian noise.

The network receives 400 base-5 values as input vectors, and requires 7 neurons in the output layer to identify the characters. As opposed to the conventional method of initializing the CRS matrix with binary numerals, we use base-5 to order to minimize noise up to a considerable degree. This makes the algorithm less efficient, however, the total time taken in actual execution for small pieces of text remains approximately the same. This makes segmentation and feature extraction considerably simpler.

For classification, the errors are handled using

$$\frac{\delta E}{\delta W_{ij}} = \eta \sum_k (y_{i_1})^2 - (y_{i_2})^2$$

where the parents of ij are the coordinates of the pixels of the characters. This is especially useful for detecting the handukaten, and the various nuances of the closely packed Japanese alphabet.

The existing network has been succesful in learning roku (6) and tsu(pronounced su) without fail.