



# Intelligent Handwriting Recognition System for Tifinagh Alphabets Using Learning Vector Quantization Neural Network

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## ABSTRACT

The Tifinagh alphabet has undoubtedly been used by Berber speakers in North Africa and the Canary Islands since the 3rd century BC. second hand. Until the 3rd century A. In the present paper, two neural networks are used to recognize the Tifinagh alphabet which is used for writing Amazigh language. In this paper the alphabet image is reshaped to be suitable as input for networks, wherefore, image processing resizing technique is used. The proposed method is based on the use of neural network, the learning vector quantization neural network to classify the alphabets. In the proposed system, alphabet's image is represented by binary numbers that are used as input, then they are fed to the neural networks. Neural network followed by learning vector quantization neural network, the recognition rate for learning vector quantization neural network LVQNN was 93%. The result shows that the learning vector quantization neural network LVQNN has good accuracy in the training and testing phrase.

Keywords: Handwriting Tifinagh alphabet, learning vector quantization NN (LVQNN), Image Resizing. ....

## 1. Introduction

In computer vision, still the analysts are working to discover arrangements for penmanship acknowledgment problems. There are a few dialects around the world which have been accomplished by analysts, such as English and Arabic dialects. In this paper we watch the Tifinagh letter set acknowledgment. The Tifinagh letter set is utilized for composing the hair stylist dialect, this dialect is talked in north Africa uncommonly in morocco, Algeria, little portion of Libya, Mauritania, Niger, Burkina Faso and in Egypt in Siwa Desert spring, hair stylist dialect is talked by three letter set which is Arabic, Latin and Tifinagh letter set, within the early of the 21th century the hair stylist dialect ended up a national dialect in Algeria, after that in 2011 the hairstylist dialect got to be an official dialect of Morocco. These days most of nation which talk with hair stylist dialect are utilized Tifinagh letter set, the Tifinagh letter set has about 57 letter set. Within the later a long time there was a few inquires about for Tifinagh letter.

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## 2. Methodology

In this paper, an intelligent handwriting Tifinagh alphabet recognition system is developed. The proposed system consists of two main phases which are the processing phase and the recognition phase, Every alphabets' image will have four samples as we see in figure [2] these images will change in binary which are the input for neural network, after resizing every image will be matrix of (20\*20) which will feed into neural network.

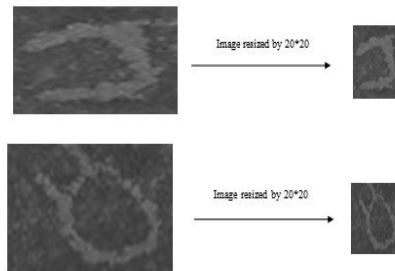


Fig.2: image resized

## 3. Learning Vector Quantization NN

Learning Vector Quantization LVQ, distinctive from Vector quantization VQ and Kohonen Self-Organizing Maps KSOM, essentially may be a competitive arrange which employments administered learning. We may characterize it as a prepare of classifying the designs where each field unit speaks to a course. it employments Because administered learning, the arrange will be given a set off preparing designs with known classification together with an beginning conveyance of the yield lesson. After completing the preparing prepare, LVQ will classify an input vector by relegating it to the same course as that of the yield unit.

### 3.1 LVQNN Architecture

Taking after figure appears the design of LVQ which is very comparative to the engineering of KSOM. As able to see, there are “n” number of input units and “m” number of yield units. The layers are completely interconnected with having weights on them.

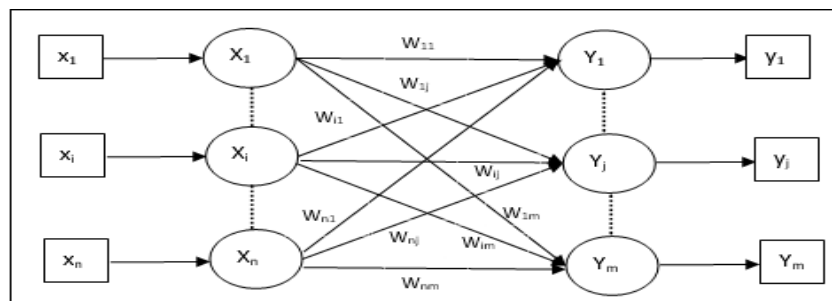
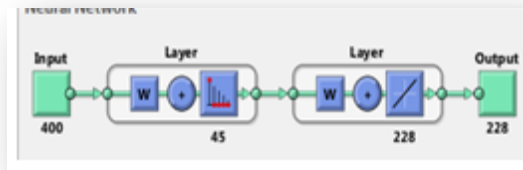


Fig.3: LVQNN Architecture

- $\mathbf{x}$  = training vector  $(x_1, \dots, x_i, \dots, x_n)$
- $\mathbf{T}$  = class for training vector  $\mathbf{x}$
- $\mathbf{w}_j$  = weight vector for  $j^{\text{th}}$  output unit
- $\mathbf{C}_j$  = class associated with the  $j^{\text{th}}$  output uni

$$D(j) = \sum_{i=1}^n \sum_{j=1}^m (x_i - w_{ij})^2$$



**Table 1:** LVQNN Parameters

Parameters	Number
Input neurons	400
Hidden layer	1
Hidden neurons	45
Learning rate	0.27
Error	0.001
Momentum rate	0.05

#### 4. Result

LVQNN was trained and tested, the result show that the LVQNN has good efficiency. The recognition rate is determine by (number of recognize/ total image). The total images are 57.

**Table 2:** LVQNN Result

NN	Recognition rate	Accuracy
LVQNN	53/57= 0.93	93%

#### 5. Conclusion

A proposed an intelligent handwriting Tifinagh alphabet recognition system was developed , Tifinagh alphabet is used to write the Amazgy language, in this system image resizing technique was used to resize the alphabet image, , Learning Vector Quantization neural network was used for recognize the alphabet, , 228 alphabets image samples were used for training and 57 for testing , the result show that the LVQNN has good accuracy which was 93% in testing phrase.

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**Reference**

- N. Larios, H. Deng, W. Zhang, M. Sarpola, J. Yuen, R. Paasch, A. Moldenke, D. A. Lytle, S. R. Correa, E. N. Mortensen, L. G. Shapiro, and T. G. Dietterich, "Automated insect identification through concatenated histograms of local appearance features: feature vector generation and region detection for deformable objects," *Machine Vision and Applications*, Springer, vol. 19, issue. 2, pp. 105-123, 2008
- R. G. Mundada and V. V. Gohokar, "Detection and classification of pests in greenhouse using image processing," *IOSR Journal of Electronics and Communication Engineering*, vol. 5, pp. 57-63, 2013.
- Resource Manual on Integrated Production and Pest Management (IPPM) in Rice, World Education (INGO) Philippines, Inc., 2005, ch. 6, pp. 113-115.
- Sampling insect pests, their damage and beneficial organisms Philippine rice self-sufficiency plan (PRSSP). [Online]. Available: [http://pinoyrkb.com/main/resources/publications-and-figures/rice-science-for-decisionmakers/doc\\_download/517-sampling-insect-pests](http://pinoyrkb.com/main/resources/publications-and-figures/rice-science-for-decisionmakers/doc_download/517-sampling-insect-pests)
- F. A. Carino, P. E. Kenmore, and V. A. Dyck, "A FARMCOP suction sampler for hoppers and predators in flooded rice fields," *The International Rice Research Newsletter*, vol. 4, ch. 5, pp. 21-22, 1979.
- Segmentation and Automatic Identification of Pests on Plants using Image Processing" Third International Conference Computing Communication & Networking Technologies (ICCCNT), 26-28 July 2012.
- Vincent Martin and Sabine Moisan "Early Pest Detection in Greenhouses" International Conference on Pattern Recognition, December 2008.
- Patil J.K. and Raj Kumar "feature extraction of diseased leaf images" *Journal of Signal and Image Processing* ISSN: 0976-8882 & E-ISSN: 0976-8890, Volume 3, Issue 1, 2012, pp.-60-63.
- Thiago L. G. Souza, Eduardo S. Mapa, Kayran dos Santos, and David Menotti "Application of complex networks for automatic classification of damaging agents in soyabean leaflets" 18th IEEE International Conference on 2011 pp:1065 – 1068.
- WG. Baxt, 1995. "Application of artificial neural networks to clinical medicine" *Lancet*. vol. 346 (8983), pp. 1135-1138.
- Arpita Mittal, Sanjay Kumar Dubey (2012). Analysis of Rheumatoid Arthritis through Image Processing, *IJCSI International Journal of Computer Science Issues*, Vol. 9, Issue 6, No 2.
- Y. Kim, "Contrast enhancement using brightness preserving bi-histogram equalization," *IEEE Trans. Consum. Electron.* vol. 43, no. 1, pp. 1-8, Feb. 1997.
- Y. Wan, Q. Chen, and B. M. Zhang, "Image enhancement based on equal area dualistic sub-image histogram equalization method," *IEEE Trans. Consum. Electron.* vol. 45, no. 1, pp. 68-75, Feb. 1999.