

The Research of Applying Neural Network to Polygonal Approximation

張崑麒、鍾翼能

E-mail: 9510706@mail.dyu.edu.tw

ABSTRACT

In this thesis, we applied the Competitive Hopfield Neural Network (CHNN) to polygonal approximation and 2-D image contour recognition. At first, we searched the feature points, the position of feature points where are included high curvature and corner on the contour. We used polygonal approximation to describe the image contour. There have two patterns we set, one is model pattern another is test pattern. The CHNN was employed to perform feature matching. In the application of this method, we can apply it to radar track smoothing, stock market analysis and polygonal approximation.

Keywords : Competitive Hopfield Neural Network ; polygonal approximation ; radar track smoothing

Table of Contents

封面內頁 簽名頁 授權書	iv 英文摘要	iii 中文摘要
.	vi 目錄	v 謹謝
. . . . .	. . . . .	vii 圖目錄
. . . . .	. . . . .	ix 第一章 緒論 1.1前言
. . . . .	. . . . .	1 1.2理論應用
. . . . .	. . . . .	1 1.3研究動機
. . . . .	. . . . .	2 1.4論文架構
. . . . .	. . . . .	3 第二章 類神經網路理論 2.1前言
. . . . .	. . . . .	4 2.2類神經網路簡介
. . . . .	. . . . .	7 2.3神經元介紹
. . . . .	. . . . .	9 2.4類神經網路的分類
. . . . .	. . . . .	11 第三章 Hopfield類神經網路 3.1理論基礎
. . . . .	. . . . .	14 3.2 Hopfield模型
. . . . .	. . . . .	15 3.3 Lyapunov函數
. . . . .	. . . . .	18 3.4類神經網路設計
. . . . .	. . . . .	19 第四章 競爭型Hopfield類神經網路 4.1前言
. . . . .	. . . . .	25 4.2類神經網路模型
. . . . .	. . . . .	29 5.2應用CHNN之曲線近似模擬
. . . . .	. . . . .	33 參考文獻
. . . . .	. . . . .	35
. . . . .	. . . . .	前言
. . . . .	. . . . .	與建議
. . . . .	. . . . .	圖目錄 圖2.1人工神經元模型
. . . . .	. . . . .	6 圖3.1 Hopfield模型
. . . . .	. . . . .	15 圖3.2 Hopfield網路
. . . . .	. . . . .	17 圖3.3人工神經元模型
. . . . .	. . . . .	20 圖3.4循環網路
. . . . .	. . . . .	23 圖5.1目標軌道曲線原圖 (取樣100點)
. . . . .	. . . . .	30 圖5.2目標軌道曲線近似圖 (取樣50點)
. . . . .	. . . . .	30 圖5.3曲線近似圖 (取樣22點)
. . . . .	. . . . .	31 圖5.4目標軌道曲線
. . . . .	. . . . .	31 圖5.5軌道近似曲線 (取樣50點)
. . . . .	. . . . .	32 圖5.6軌道近似曲線 (取樣22點)
. . . . .	. . . . .	32

REFERENCES

- [1] S. Haykin, " Neural Networks: a comprehensive foundation 2nd edition. " Prentice Hall, 1999, pp.664-727.
- [2] N. M. Nasrabadi, W. Li, " Object Recognition by a Hopfield Neural Network. " IEEE Trans. SMC, Vol.21, No.6, 1911, pp.1523-1535.
- [3] P. N. Suganthan, E. K. Teoh, D. P. Mital, " Programming Hopfield Network for Object Recognition. " in Proc. Of SMC Conf., 3, 1993, pp.114-119.
- [4] P. N. Suganthan, E. K. Teoh, D. P. Mital, " Homomorphic ARG Matching by Hopfield Network. " in Proc. IEEE Int. Conf. Industrial Electronics, Vol.1, 1995, pp.161-165.
- [5] M. N. Fu, H. Yan, " A Shape Classifier based on Hopfield-Amari Network. " in Proc. IEEE Int. Conf. Neural Network, Vol.1, 1996, pp.558-593.
- [6] W. J. Li, T. Lee, " Hopfield Neural Network for Affine Invariant Matching. " IEEE Trans. Neural Networks, Vol.12, No.6, 2001, pp.1400-1410.
- [7] W. J. Li, T. Lee, " Object recognition and articulated object learning by accumulative Hopfield matching. " Pattern Recognition, 35, 2002, pp.1933-1948.
- [8] D. L. Lee, " Pattern Sequence Recognition Using a Time Vary Hopfield Network. " IEEE Trans. Neural Networks, Vol.13, No.2, 2002,

pp.330-342.

- [9] 葉怡成, “類神經網路模式應用與實作.” 儒林圖書有限公司, 2002.
- [10] 張嘉鍇, “在低解析度六角格子影像上之輪廓辨識.” 國立中山大學機械工程研究所碩士論文, 2000.
- [11] 李祐魁, “利用次像素在低解析度六角格子上作輪廓辨識.” 國立中山大學機械工程研究所碩士論文, 2000.
- [12] 黃國源, “類神經網路與圓型辨識.” 維科出版社, 2000.
- [13] 蕭富介, “類神經網路應用於瓦特I型六連桿組耦點曲線之合成.” 國立中山大學機械工程研究所碩士論文, 2002.
- [14] M. Cooper, “Visual occlusion and the interpretation of ambiguous.” ELLIS HORWOOD, 1992.
- [15] M. Egmont-Peterson, D. de Ridder, H. Handels, “Image processing with neural networks-s review.” Pattern Recognition, 35, 2002, pp. 2279-2301.
- [16] J. S. Lee, C. H. Chen, Y. N. Sun, G. S. Tseng, “Occluded objects recognition using multiscale features and Hopfield neural network.” Pattern Recognition, Vol. 30, No. 1, 1997, pp. 113-122.
- [17] 王進德, 蕭大全, “類神經網路與模糊控制理論入門.” 全華科技圖書股份有限公司, 1994.
- [18] 林昇甫, 洪成安, “神經網路入門與圖樣辨識(修訂第二版).” 全華科技圖書股份有限公司, 2002.
- [19] M. N. Fu, H. Yan, K. Huang, “A curve band function based method to characterize contour shapes.” Pattern Recognition, Vol. 31, No. 10, 1997, pp. 1661-1671.
- [20] J. H. Kim, S.H. Yoon, C. W. Lee, K. H. Sohn, “A robust solution for object recognition by mean field annealing techniques.” Pattern Recognition, 34, 2001, pp. 885-902.
- [21] Y. Uchiyama, M. Haseyama, H. Kitajima, “Hopfield neural networks for edge detection.” ISCAS 2001. Vol. 3, 2001, pp. 608-611.
- [22] Rosenfield, E. Johnston, “Angle detection on digital curves.” IEEE Trans. Compute. Vol. C-22, 1973, pp. 875-878.