

استخدام الشبكات العصبية لأغراض التمييز

Neural Networks as a Discriminant Purposes

الخلاصة

Neural Networks

Abstract

Discriminant between groups is one of the common procedures because of its ability to analyze many practical phenomena, and there are several methods can be used for this purpose, such as linear and quadratic discriminant functions. recently, neural networks is used as a tool to distinguish between groups.

In this paper the simulation is used to compare neural networks and classical method for classify observations to group that is belong to, in case of some variables that don't follow the normal distribution. we use the proportion of number of misclassification observations to the all observations as a criterion of comparison.

المقدمة

Neural Networks

		Training	Learning	
		((Weights	
Pitts	McCulloch	Neurons	[3]	1943
		1986	[5]	Williams Hinton و Rumelhart و
1990			[6]	Singleton و Surkan
		[7]	Kulikowski Weiss	1991
		[2]	Smaget Krose	1996
		[1]	Moro و Jose	1997

هدف البحث

[4] (Linear Discriminant Function)

-:

-1

$$\bar{X}_{(1)} = \sum_{j=1}^{n_1} X_j / n_1$$

$$\bar{X}_{(2)} = \sum_{j=1}^{n_2} X_j / n_2$$

$$d_i = \bar{X}_{(1)} - \bar{X}_{(2)} \quad d_i$$

-2

$$s_{ii} = \sum X_j^2 - (\sum \bar{X}_i)^2 / n$$

$$s_{ij} = \sum X_i \cdot X_j - (\sum X_i)(\sum X_j) / n$$

-3

$$V_{ii} = \frac{S_{ii(1)} + S_{ii(2)}}{n_1 + n_2 - 2}$$

$$V_{ij} = \frac{S_{ij(1)} + S_{ij(2)}}{n_1 + n_2 - 2}$$

-4

$$y = \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \dots + \alpha_r x_r$$

$\alpha_1, \alpha_2, \alpha_3, \dots, \alpha_r$

Between-

Within – Group

Group variation

Variation

. λ

$$\lambda = \frac{\text{between – group. variation}}{\text{within – group. variation}}$$

.

$\lambda \quad \alpha_1, \alpha_2, \alpha_3, \dots, \alpha_r$

[4] Cutoff point

-5

()

$$z = \frac{\bar{Y}_1 + \bar{Y}_2}{2}$$

∴

$$\bar{y}_1 = \bar{x}(1) \cdot S^{-1}(\bar{x}(1) - \bar{x}(2))$$

$$\bar{y}_2 = \bar{x}(2) \cdot S^{-1}(\bar{x}(1) - \bar{x}(2))$$

[4] Classification Rule قاعدة التصنيف

:

$$y \geq Z$$

x

$$y < Z$$

x

[4] The Probability of Misclassification خطأ التصنيف

()

$$P_{12} = \Phi(-1/2D)$$

$$D^2 = (\bar{X}_{(1)} - \bar{X}_{(2)})' * S^{-1} (\bar{X}_{(1)} - \bar{X}_{(2)})$$

P₁₂

الشبكات العصبية الاصطناعية ANN [2][5]

ANN

Brain

Connection Systems

Adaptive system_

Parallel Distributed Systems

Neurons

. ANN

ANN

ANN

الشبكات العصبية كأساس للتصنيف [2]:

ANN

Activation function

Step function

threshold function

$$f(s) = \begin{cases} 0 & \text{if } s < 0 \\ 1 & \text{if } s \geq 0 \end{cases} \dots\dots\dots (1)$$

Sigmoid

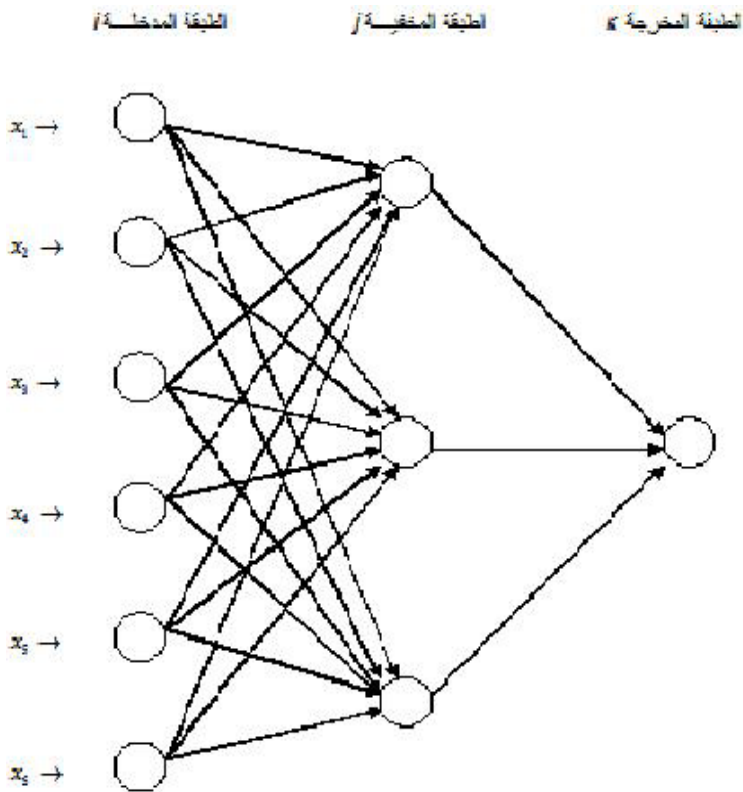
$$f(s) = \frac{1}{1 + e^{-s}} \quad \dots\dots\dots (2)$$

θ (Bias)

s

$$s = \sum_{i=1}^6 w_i x_i + \theta \quad \dots\dots\dots (3)$$

$(x_1, x_2, x_3, x_4, x_5, x_6)$



(1)

1 0

s

0

1

التدريب أو التعليم Training or Learning [2][5][6]

((Perception))

:

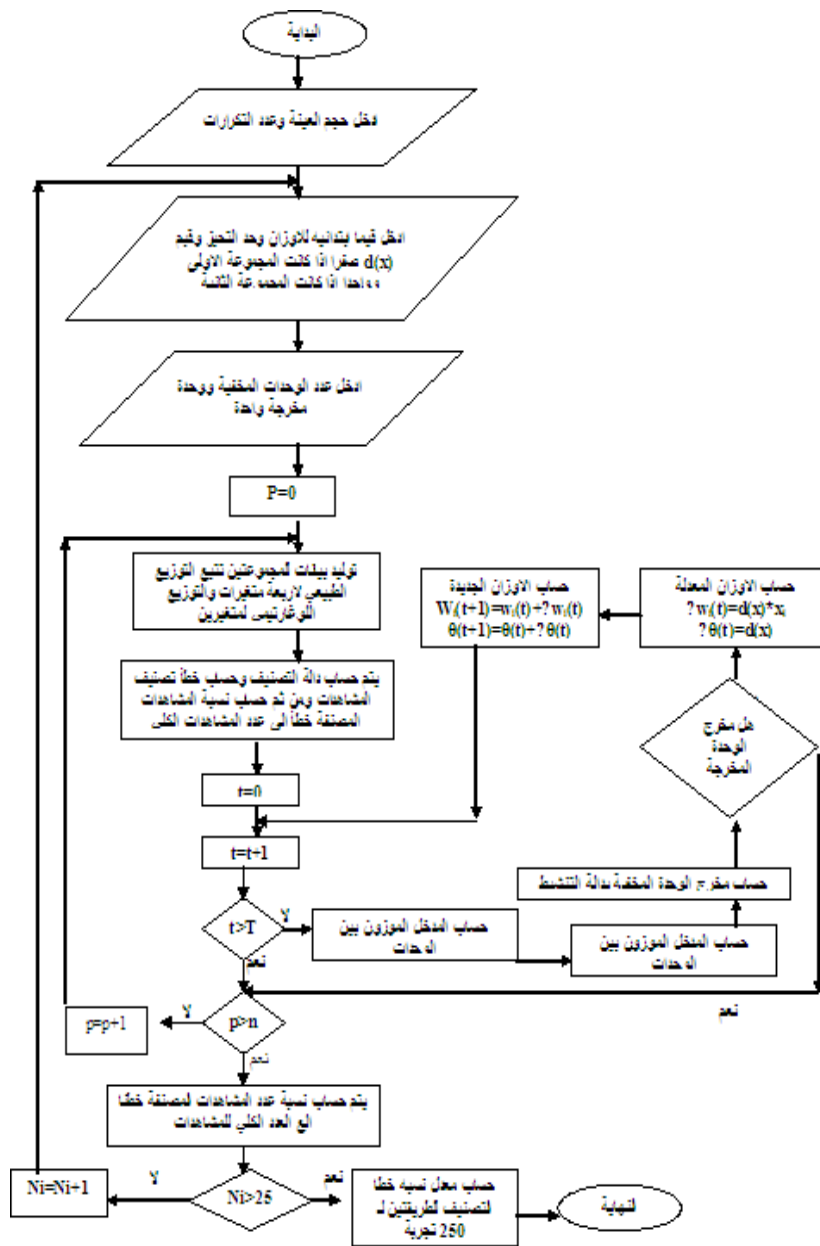
$$\left. \begin{aligned} w_i(t+1) &= w_i(t) + \Delta w_i(t) \\ \theta(t+1) &= \theta(t) + \Delta \theta(t) \end{aligned} \right\} \dots\dots\dots (4)$$

(())	$\Delta \theta(t)$	$\Delta w_i(t)$	x	$d(x)$	$d(x)$
:	Perception				.1
			x		.2
			$y = f(x) \neq d(x)$.3
			:		
	$\Delta w_i = d(x)x_i$,	$\Delta \theta = d(x)$		
			$y = f(x) = d(x)$		
			$\Delta \theta = 0$		
			(2)		.4

Matlab

تجربة المحاكاة

	:	.1
$(n=20,40,80,100,150)$	n	.2
$(x_1, x_2, x_3, x_4, x_5, x_6)$	(0)	
(1)		
	.	
	3,4,5,6	.3
	.	
		.4
	.	
	50	.5
	.	
		.6
(4)	"	
	250	.7



(2)

تحليل النتائج

(1)

4

(1)

<i>n</i>	<i>LDS</i>	<i>NN</i>			
		<i>node=3</i>	<i>node=4</i>	<i>node=5</i>	<i>node=6</i>
20	0.184	0.161	0.161	0.162	0.161
40	0.182	0.158	0.158	0.155	0.154
80	0.182	0.159	0.155	0.156	0.153
100	0.171	0.140	0.139	0.143	0.143
150	0.172	0.141	0.140	0.144	0.144

الاستنتاجات

.1

.2

. 4 3

.3

المصادر

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