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چکیده

(PLF)

PLF

(FFNN)

PLF

واژه‌های کلیدی:

مقدمه

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مروری بر مراجع

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(AI)

(ANNs)

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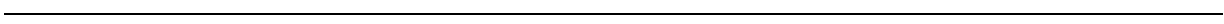
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FFNN SOM

تحليل داده‌ها

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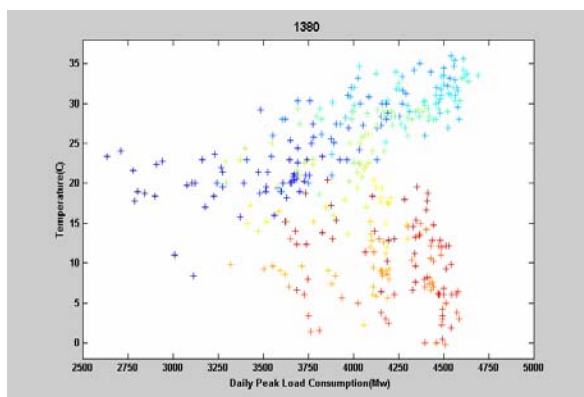
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تأثیر عوامل آب و هوایی بر الگوی مصرف بار

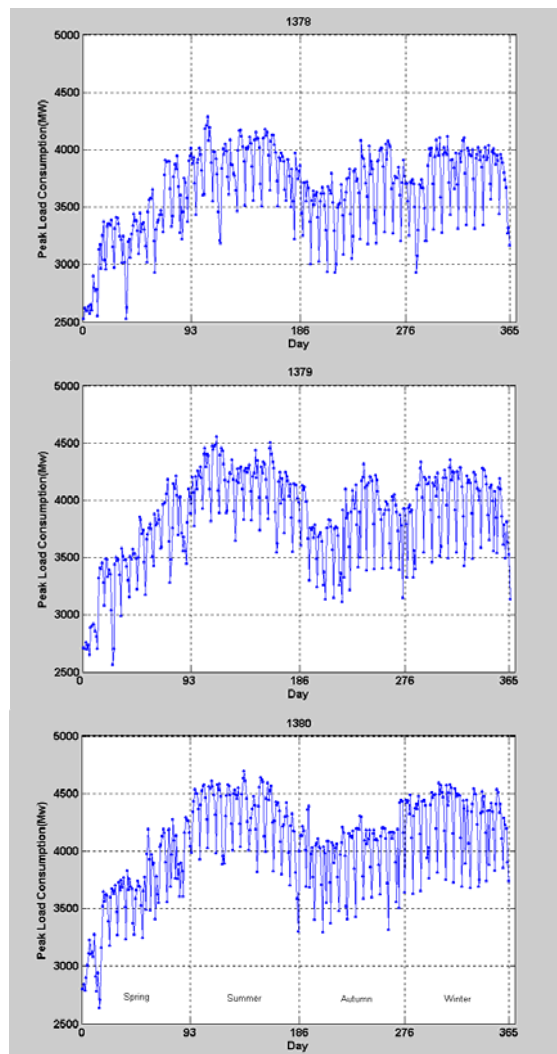
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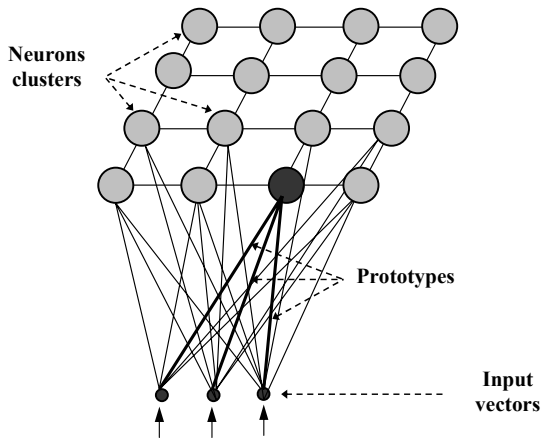


شکل ۲: رابطه بین پیک بار روزانه و دمای هوا در سال ۱۳۸۰.



شکل ۱: سری زمانی پیک بار الکتریکی روزانه..

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شکل ۳: نقشه خودسازمانده.

خوشه‌بندی با شبکه نقشه خودسازمانده

$$m_i = [m_{i1}, \dots, m_{id}]$$

SOM

i

d

[-] [-]

(SOM)

SOM

SOM

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الگوریتم SOM

SOM

SOM

$$m_i \in R^n$$

$$x \in R^n$$

Q

$$i=1, \dots, C \quad Q_i$$

x

x

b

(BMU)

()

$$\|x - m_b\| = \min\{\|x - m_i\|\} \quad (1)$$

BMU

$$: \quad (2) \quad i$$

$$m_i(t+1) = m_i(t) + \alpha(t)h_{bi}(t)(x(t) - m_i(t)), \quad (3)$$

(4)

$$(5) \quad t$$

SOM

$$0 < \alpha(t) < 1$$

$$\frac{1}{C} \sum_{j=1}^C \max_{l \neq j} \left\{ \frac{S_c(Q_j) + S_c(Q_l)}{d_{ce}(Q_j, Q_l)} \right\} \quad (6)$$

$$(7)$$

$$(8)$$

$$(9)$$

$$h_{bi}(t)$$

$$S_c(Q_j)$$

$$b \quad i$$

[10]

$$d_{ce}(Q_j, Q_l)$$

$$(11)$$

نحوه خوشه‌بندی و نرمالسازی داده‌های ورودی

$$h_{bi}(t) = \exp\left(-\frac{\|r_i - r_b\|^2}{2\sigma^2(t)}\right), \quad (12)$$

$$i \quad b$$

$$r_b \in R^2 \quad r_i \in R^2$$

$$\sigma(t)$$

SOM

$$\sqrt{N}$$

$$N$$

SOM

[11]

$$: \quad (13)$$

$$E = \sum_{i=1}^N \sum_{j=1}^C h_{bi} \|x_i - m_j\|^2 \quad (14)$$

$$h_{bi}(t)$$

$$x_i$$

BMU

$$b$$

$$j$$

$$)$$

SOM (15)

$$(16)$$

$$: \quad (17)$$

$$y_{new} = \frac{y_{old} - mean}{std}, \quad (18)$$

$$y_{new}$$

$$y_{old}$$

$$std \quad mean$$

-

الگوهای آرایه‌ای شبکه و نرم فاصله
SOM

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$$\sqrt{N}$$

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خروجی خوشه‌بندی

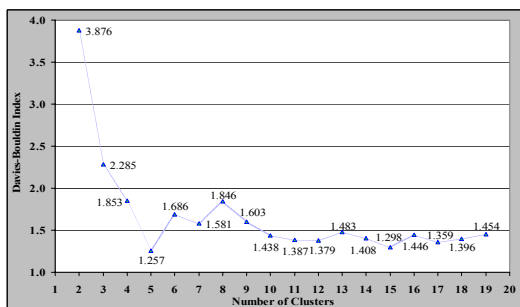
SOM

آموزش SOM

SOM

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شکل ۴: مقادیر شاخص دیویس-بولدین برای برخی از آرایه‌ها در

سال ۱۳۸۰.

پیش‌بینی با شبکه عصبی پیشخوراند

FFNN (FFNN)

$$a^2 = f^2(W^2 f^1(W^1 p + b^1) + b^2) \quad ()$$

W^1 W^2

p

f^1 f^2

b^1 b^2

داده‌های ورودی

پیش‌پردازش داده‌ها

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الگوریتمهای آموزش شبکه

(OSS)				(KMO)	۲۱	-	-	%
	(BFGS)	-	-					
(RP)		(LM)	-	PCA				[]
	[]							

- الگوریتم پس انتشار خطای ارتجاعی

تعداد لایه‌ها، نرون‌ها و توابع تبدیل

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- الگوریتم برویدن-فلچر-گلدفارب-شانو(BFGS)

- الگوریتم لونبرگ-مارکوارت

$$X_{k+1} = X_k - A_k^{-1} \cdot g_k$$

()

$$H = J^T * J$$

$$g = J^T * e$$

e

»

« () »

$$X_{k+1} = X_k - [J^T \cdot J + \mu I]^{-1} \cdot J^T \cdot e$$

()

μ

BFGS

$$\mu \quad n \quad n^2 * n^2$$

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- الگوریتم شبه نیوتنی تقاطع یک مرحله‌ای

OSS

RP

LM

BFGS

« »

(MAPE)

MAPE

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(

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MAPE (

جدول ۳: مقایسه نتایج بدست آمده از سه مدل پیش بینی.

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(MSE)

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SOM

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MAPE

MAPE

$$MAPE = \frac{1}{M} \sum_{i=1}^M \frac{|actual(i) - forecast(i)|}{actual(i)} * 100\% \quad ()$$

$actual(i)$ M

i $forecast(i)$ i

نتایج پیش بینی

OSS, BFGS, LM, RP

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واژه‌های انگلیسی به ترتیب استفاده در متن

- 1 - Artificial Intelligence
 - 2 - Artificial Neural Networks
 - 3 - Self-Organizing Map
 - 4 - Feed forward
 - 5 - Quasi-Newton
 - 6 - Gray
 - 7 - Steepest Descent
 - 8 - Levenberg-Marquardt
 - 9 - Broyden-Fletcher-Goldfarb-Shanno
 - 10 - One Step Secant
 - 11 - Deterministic Annealing
 - 12 - Map Units
 - 13 - Best Matching Unit
 - 14 - Neighborhood Kernel
 - 15 - Davies-Bouldin Index
 - 16 - Spherical Clusters
 - 17 - Random Order Incremental Training
 - 18 - Lag
 - 19 - Principal Component Analysis
 - 20 - Rotated Component Matrix
 - 21 - Kaiser-Meyer-Olkin Measure of Sampling Adequacy
 - 22 - Mean Absolute Percentage Error
 - 23 - Mean of Square Error
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