

// : // :

(BOD)
(BOD)

(DO)

Archive of SID

(BOD)

(Little, and

Williams, 1975)

(ANFIS)¹

(Jang, 1993)

(1975) Yih, and Davidson
(1998) Mulligan and Brown

Van Griensven,

(2002)

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(Jang and Gulley,

.1995)

(DO)

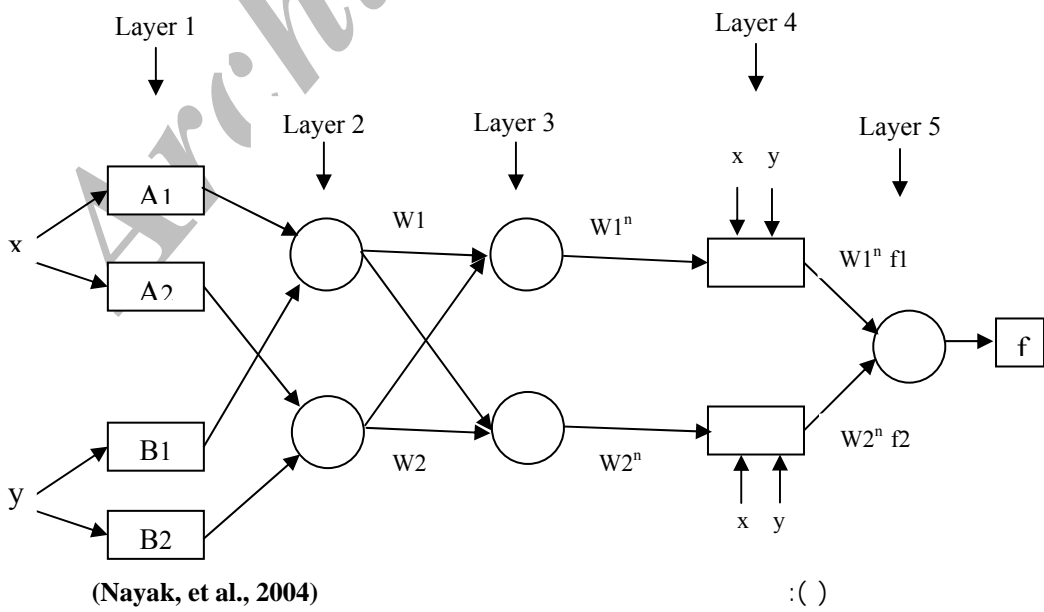
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(Chang and

.Chang, 2001)

()

:(Nayak, et al., 2004)



()

(RMSE) (R²)

(NMSE)

(MAPE)

:

$$R^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})(\hat{x}_i - \bar{\hat{x}})}{\left(\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (\hat{x}_i - \bar{\hat{x}})^2 \right)^{\frac{1}{2}}} \quad (1)$$

$$RMSE = \left[\frac{1}{n} \sum_{i=1}^n (x_i - \hat{x}_i)^2 \right]^{\frac{1}{2}} \quad (2)$$

$$NMSE = \frac{\sum_{i=1}^n (x_i - \hat{x}_i)^2}{\sum_{i=1}^n (x_i - \bar{x})^2} \quad (3)$$

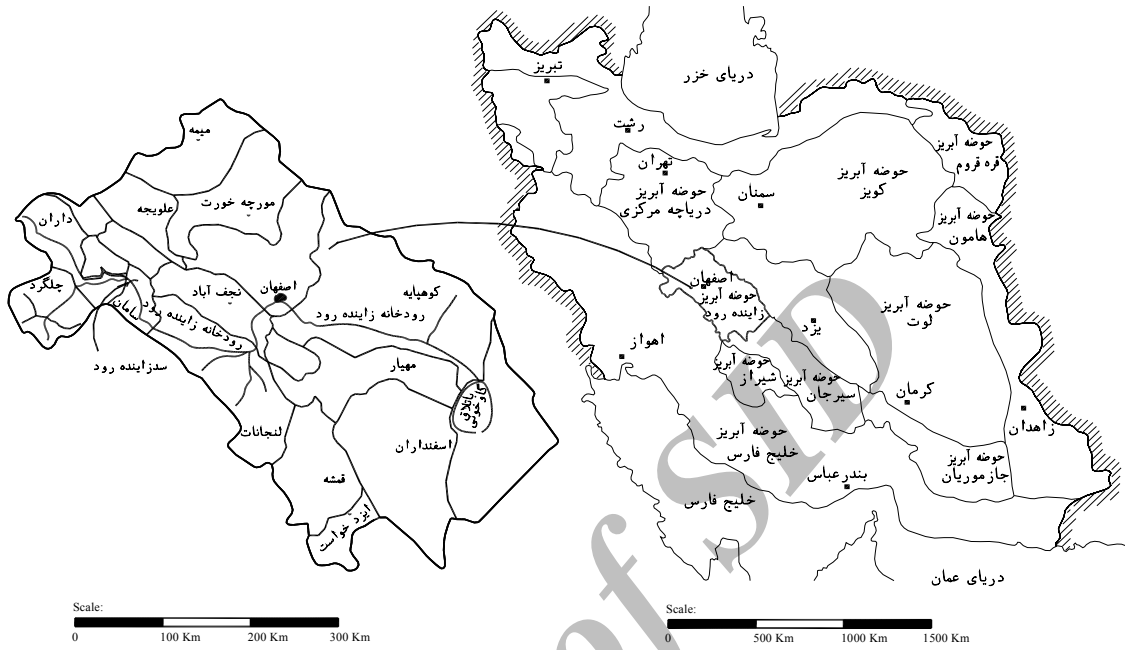
$$MAPE = \frac{1}{n} \sum_{i=1}^n \frac{|x_i - \hat{x}_i|}{x_i} \quad (4)$$

n \hat{x}_i x_i
x% (TS_x)

$$TS_x = \frac{Y_x}{n} \times 100 \quad (5)$$

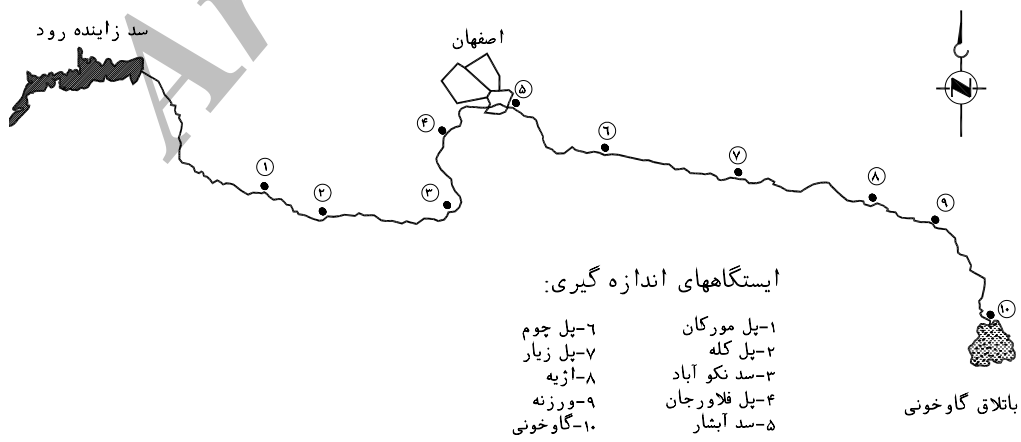
Y_x
n x% (APE)
x%

()



() :

()



() :

DO BOD : ()

(mg/l)	(mg/l)	(mg/l)	(mg/l)	
/	/	/	/	BOD
/	/	/	/	DO

BOD

(MATLAB 7.4)

()

ANFIS

BOD

()

NF3 NF2 NF1

:

BOD

(T)

(Q)

BOD

(V)

(d)

ANFIS

BOD

:

DO

(T)

(Q)

(NF1)

DO

(V)

(W)

(d)

BOD

BOD

()

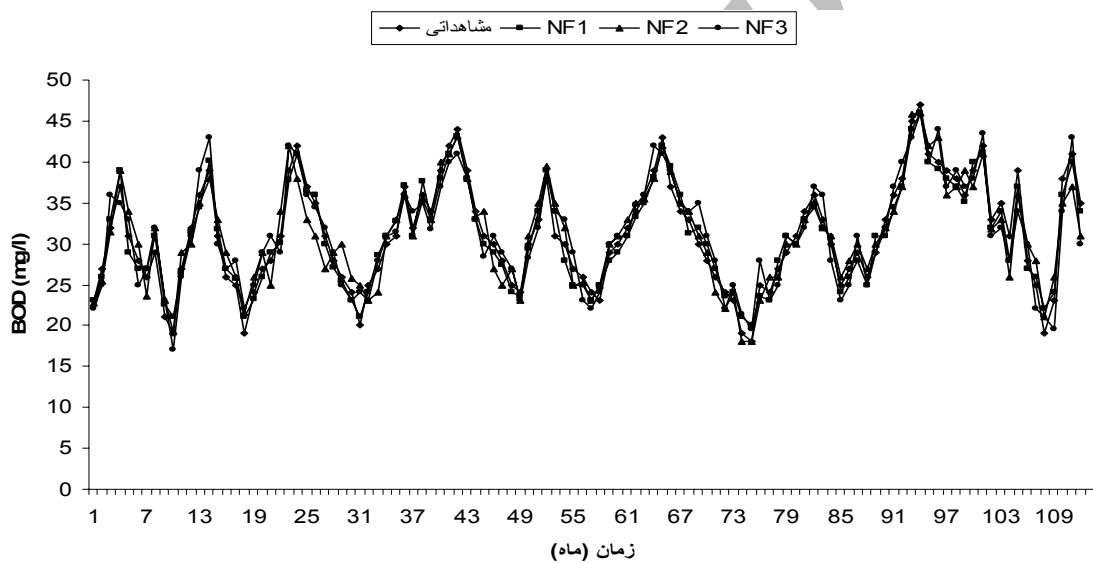
(TSx)

()

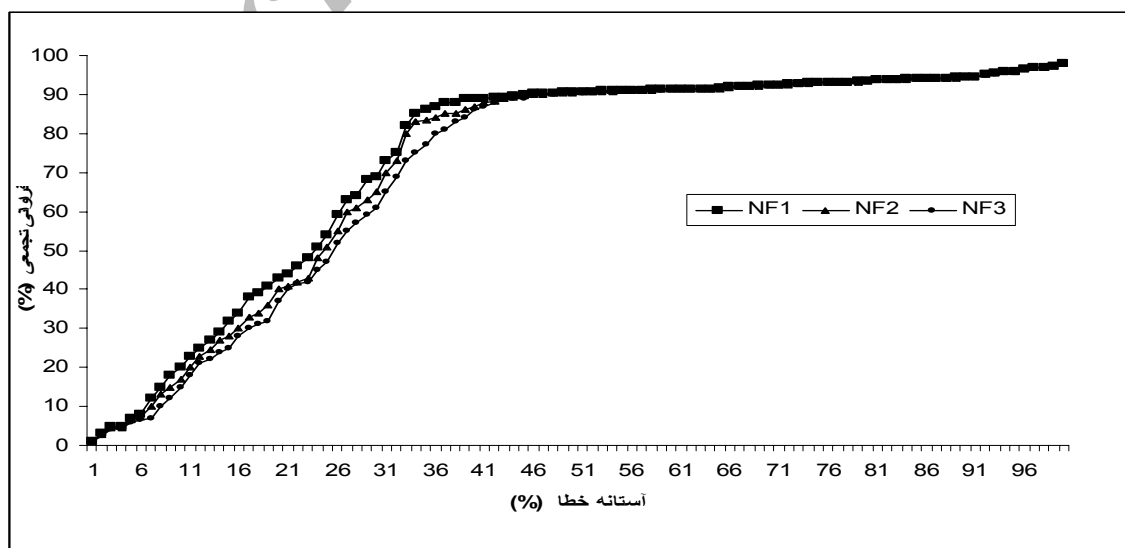
DO BOD

NF1

BOD		ANFIS		RMSE		R ²			
MAPE		NMSE							
/	/	/	/	/	/	/	/	BOD ₁ , BOD ₂ , T, Q	NF1
/	/	/	/	/	/	/	/	d, V, BOD ₁ , BOD ₂ , T, Q	NF2
/	/	/	/	/	/	/	/	d, V, T, Q	NF3



(NF3, NF2, NF1) BOD : ()



(NF3, NF2, NF1) : ()

NF6 NF5 NF4

()

ANFIS

()

DO

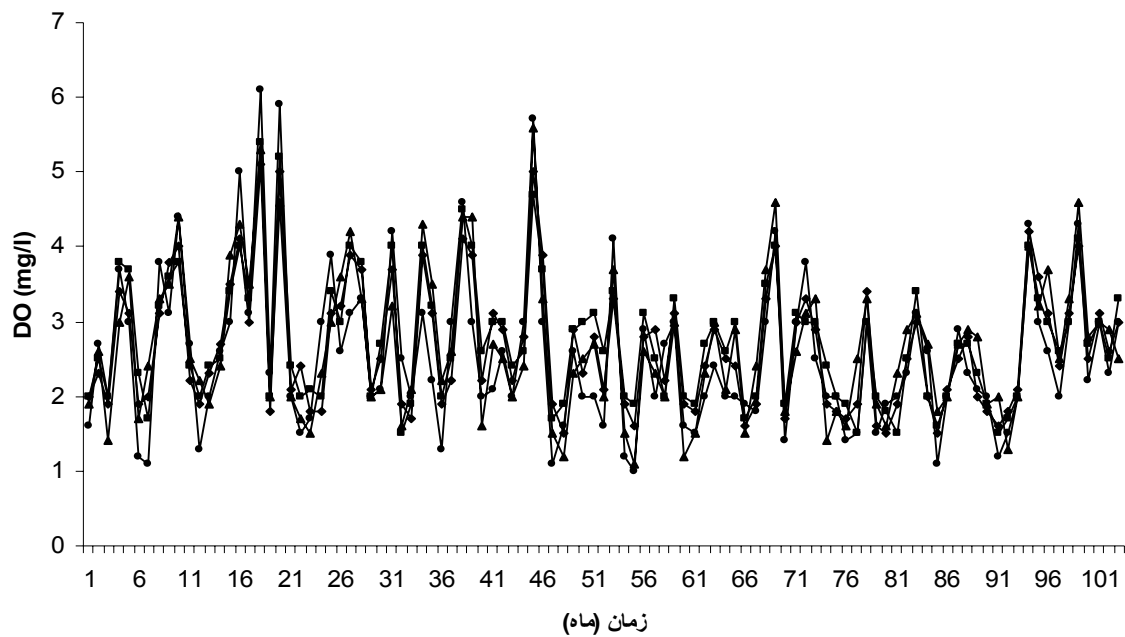
DO

ANFIS

:()

MAPE		NMSE		RMSE		R ²			
/	/	/	/	/	/	/	/	DO ₋₁ , W, T, d, V	NF4
/	/	/	/	/	/	/	/	d, DO ₋₁ , DO ₋₂ , T, Q	NF5
/	/	/	/	/	/	/	/	d, W, DO ₋₁ , Q	NF6

—●— مشاهداتی —■— NF4 —▲— NF5 —●— NF6



(NF4, NF5, NF6)

DO

:()

()

DO

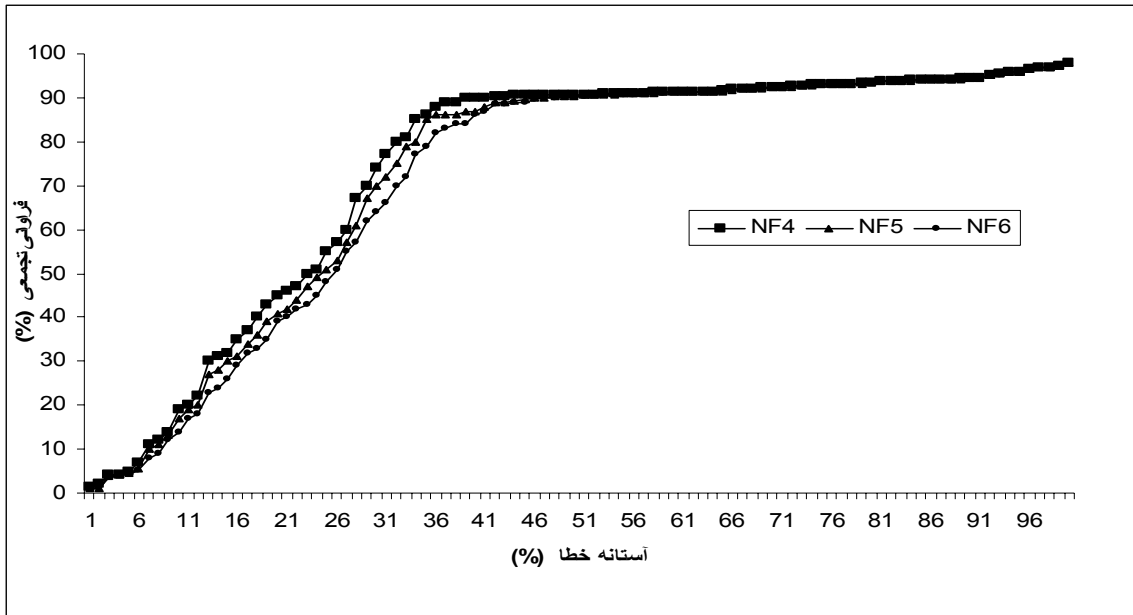
(TSx)

ANFIS

()

(NF4)

NF4



(NF6, NF5, NF4)

: ()

Archive

(TDS)

(COD)

/
/

/
DO

BOD

/

(DO

BOD

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یادداشت

1-Adaptive Neuro Fuzzy Inference System
(ANFIS)

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