



چهارمین کنفرانس هیدرولیک ایران
دانشکده مهندسی دانشگاه شیراز
۲۹ مهرماه لغایت ۱ آبانماه ۱۳۸۲



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(training data)

(RCEW)

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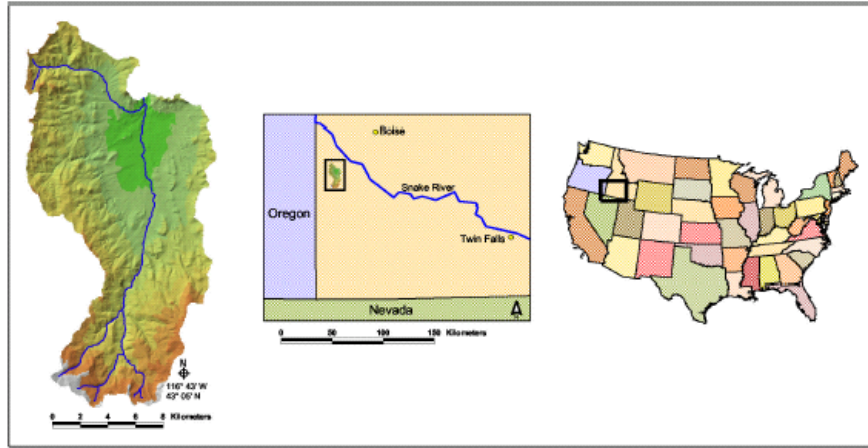
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(Boise)

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۲۲۴۱



(RCEW)

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(۲۰۰۰, Hanson)

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۵۵ ۱۵

(۲۰۰۰, Marks)

$$.۱۵۶۶ \text{ m}^3/\text{s}$$

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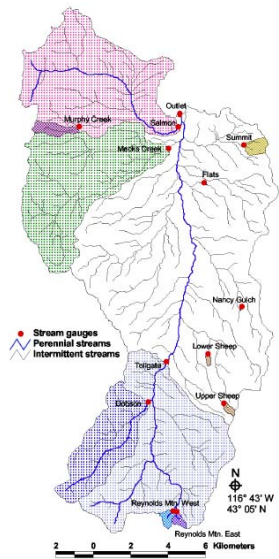
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۱۹۶۳

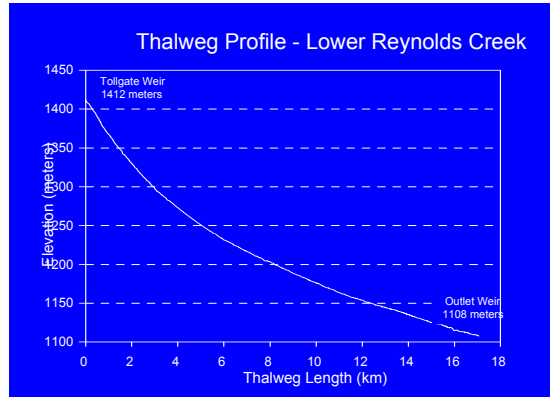
۲a

(۲۰۰۰,

Pearson)



(a)
(b)



(b)

(a)

0.82/14

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(2)

5457

2b

MIKE11

MIKE11

1982

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(Multi- layer perceptron) MLP

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MLP

(

(Back propagation rule)

(over training)

(۱۰)

(cross-validation)



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(training data)

(cross- validation)

(testing data)

1. 1

16 11

3. 17

(cross-validation)

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(cross-validation)

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MLP

:

$$E_p = X_{obs} - X_{est}$$

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X_{obs}

E_p

X_{est}

(MIKE11)

(MIKE11)

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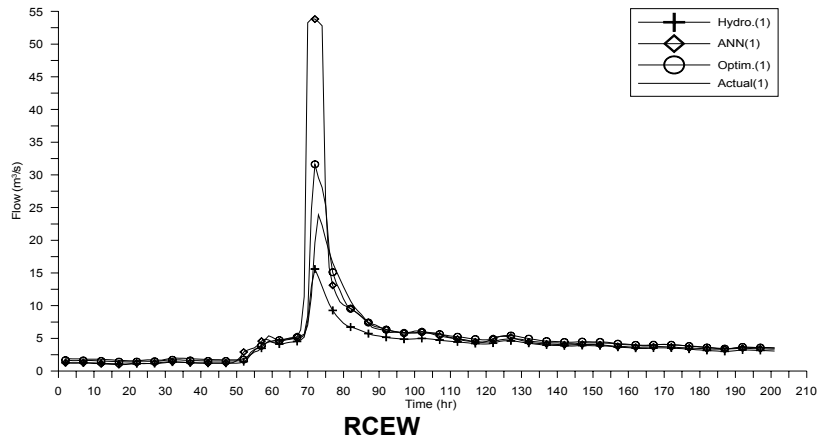
, Hydro(2) Hydro(1)

3

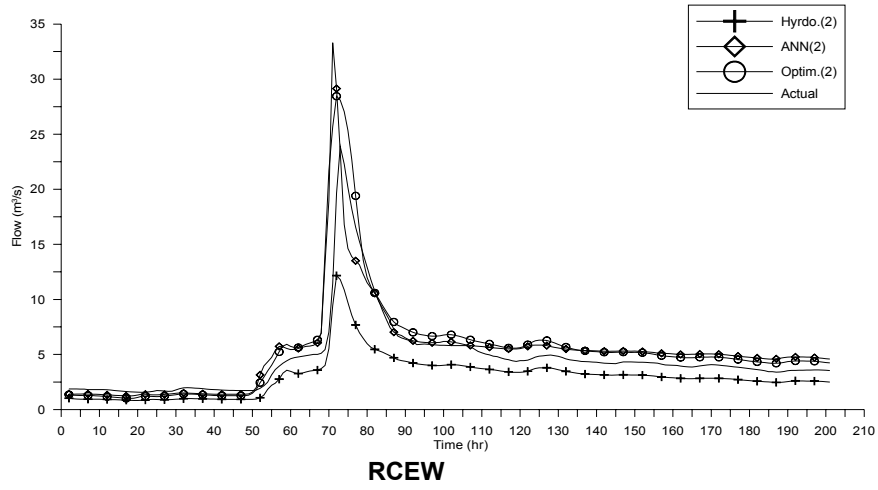
(

Optim(2).

Optim(1)



-3



- 4

(RMSE)

(R²) coefficient of efficiency

$$R^2 = 1 - \frac{\sum_p (x_{obs} - x_{pre})^2}{\sum_p (x_{pre} - \bar{x}_{obs})^2}$$

:

$$rmse = \sqrt{\frac{\sum (x_{obs} - x_{pre})^2}{n}}$$

n

X_{est}

X_{obs}

: X_{obs}

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(1982 16 11

...

(RMSE)

(R²)

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	ANN	MIKE		ANN	MIKE	
./18725	./18.35	./2375	./9153	./5432	./9435	R ²
./98.6	1/.113	1/3242	./7158	2/1143	./9364	RMSE

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RMSE R²

2

(RMSE)

(R²)

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((
0/7883		0/8035	0/5432	R ²
1/3269		1/0813	2/8143	RMSE

...

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MIKE11

MLP

()
) ۰/۶۴۳۵ R² ()
۰/۹۱۵۳ ()
) ۰/۷۱۵۸ ۰/۹۳۶۴ RMSE
۰/۲۳۷۵ R² ()
۰/۹۸۰۶ ۱/۳۲۴۲ RMSE ۰/۸۷۲۵

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