1 Results

1.1 Main Results

model	R2	MSE	hidden sizes	total hs	epochs
Tanh2HiddenLayer	93.4 ± 4.1	0.06	[8, 4]	12	30
Relu1HiddenLayer	92.1 ± 3.0	0.07	[15, 5]	20	30
Tanh1HiddenLayer	90.0 ± 6.4	0.09	[8, 4]	12	30
Relu1HiddenLayer	88.5 ± 6.7	0.1	[8, 4]	12	30
GRNN	87.7 ± 5.2	0.11	[8, 4]	12	30
Relu2HiddenLayer	86.5 ± 0.7	0.12	[15, 5]	20	30
GRNN	86.5 ± 3.8	0.12	[15, 5]	20	30
	85.7 ± 9.2	0.13	[15, 10, 3]	28	30
Relu1HiddenLayer	83.6 ± 7.4	0.14	[15, 10, 3]	28	30
Relu2HiddenLayer	82.6 ± 1.4	0.15	[15, 10, 3]	28	30
Tanh2HiddenLayer	80.2 ± 14.8	0.17	[15, 5]	20	30
Tanh1HiddenLayer	79.3 ± 0.8	0.18	[15, 5]	20	30
Relu2HiddenLayer	75.7 ± 17.8	0.21	[8, 4]	12	30
FFNN	71.5 ± 1.5	0.25	[15, 5]	20	30
Tanh1HiddenLayer	70.3 ± 20.0	0.26	[15, 10, 3]	28	30
FFNN	65.3 ± 0.7	0.3	[8, 4]	12	30
	57.9 ± 7.0	0.37	[15, 10, 3]	28	30
Linear1HiddenLayer	57.2 ± 8.9	0.37	[15, 5]	20	30
Linear2HiddenLayer	52.9 ± 1.6	0.41	[15, 5]	20	30
	51.6 ± 0.5	0.42	[8, 4]	12	30
Linear1HiddenLayer	50.6 ± 6.4	0.43	[8, 4]	12	30
Tanh2HiddenLayer	49.2 ± 32.6	0.44	[15, 10, 3]	28	30
Linear2HiddenLayer	49.0 ± 4.2	0.45	[15, 10, 3]	28	30
Linear1HiddenLayer	39.0 ± 7.4	0.53	[15, 10, 3]	28	30
RBFN	20.4 ± 0.7	0.7	[15, 5]	20	30
	10.2 ± 1.5	0.79	[8, 4]	12	30
	5.0 ± 0.7	0.83	[15, 10, 3]	28	30

Table 1: Results of different models

1.2 Backward Feature Selection

features	R2
flow_rate1, conc_nano1, Kfluid1, heat_flux1, X_D1, flow_rate2, conc_nano2, Kfluid2, heat_flux2, X_D2	82.69
conc_nano1, Kfluid1, heat_flux1, X_D1, flow_rate2, conc_nano2, Kfluid2, heat_flux2, X_D2	62.45
flow_rate1, Kfluid1, heat_flux1, X_D1, flow_rate2, conc_nano2, Kfluid2, heat_flux2, X_D2	81.63
flow_rate1, conc_nano1, heat_flux1, X_D1, flow_rate2, conc_nano2, Kfluid2, heat_flux2, X_D2	73.64
flow_rate1, conc_nano1, Kfluid1, X_D1, flow_rate2, conc_nano2, Kfluid2, heat_flux2, X_D2	72.94
flow_rate1, conc_nano1, Kfluid1, heat_flux1, flow_rate2, conc_nano2, Kfluid2, heat_flux2, X_D2	67.45
flow_rate1, conc_nano1, Kfluid1, heat_flux1, X_D1, conc_nano2, Kfluid2, heat_flux2, X_D2	68.03
flow_rate1, conc_nano1, Kfluid1, heat_flux1, X_D1, flow_rate2, Kfluid2, heat_flux2, X_D2	76.57
flow_rate1, conc_nano1, Kfluid1, heat_flux1, X_D1, flow_rate2, conc_nano2, heat_flux2, X_D2	38.28
flow_rate1, conc_nano1, Kfluid1, heat_flux1, X_D1, flow_rate2, conc_nano2, Kfluid2, X_D2	69.39
flow_rate1, conc_nano1, Kfluid1, heat_flux1, X_D1, flow_rate2, conc_nano2, Kfluid2, heat_flux2	81.61

Table 2: Results of Backward Feature Elimination

1.3 Forward Feature Selection

1.4 Weight Analysis

1.5 Jackknife Sensitivity Analysis

features	R2
X_D1	14.85
flow_rate2	27.69
conc_nano2	11.15
Kfluid2	62.66
heat_flux2	-4.92
flow_rate1, Kfluid2	75.33
conc_nano1, Kfluid2	64.49
Kfluid1, Kfluid2	67.9
heat_flux1, Kfluid2	74.3
X_D1, Kfluid2	67.3
flow_rate2, Kfluid2	9.94
conc_nano2, Kfluid2	87.59
heat_flux2, Kfluid2	56.8
X_D2, Kfluid2	67.59
flow_rate1, Kfluid2, conc_nano2	60.42
conc_nano1, Kfluid2, conc_nano2	78.36
Kfluid1, Kfluid2, conc_nano2	79.88
heat_flux1, Kfluid2, conc_nano2	90.37
X_D1, Kfluid2, conc_nano2	84.51
flow_rate2, Kfluid2, conc_nano2	65.14
heat_flux2, Kfluid2, conc_nano2	57.1
X_D2, Kfluid2, conc_nano2	54.6
flow_rate1, Kfluid2, conc_nano2, heat_flux1	62.62
conc_nano1, Kfluid2, conc_nano2, heat_flux1	92.87
Kfluid1, Kfluid2, conc_nano2, heat_flux1	80.94
X_D1, Kfluid2, conc_nano2, heat_flux1	87.63
flow_rate2, Kfluid2, conc_nano2, heat_flux1	82.76
heat_flux2, Kfluid2, conc_nano2, heat_flux1	55.75
X_D2, Kfluid2, conc_nano2, heat_flux1	75.43
flow_rate1, Kfluid2, conc_nano2, heat_flux1, conc_nano1	49.56
Kfluid1, Kfluid2, conc_nano2, heat_flux1, conc_nano1	93.06
X_D1, Kfluid2, conc_nano2, heat_flux1, conc_nano1	87.49
flow_rate2, Kfluid2, conc_nano2, heat_flux1, conc_nano1	69.35
heat_flux2, Kfluid2, conc_nano2, heat_flux1, conc_nano1	65.5
X_D2, Kfluid2, conc_nano2, heat_flux1, conc_nano1	64.18
flow_rate1, Kfluid2, conc_nano2, heat_flux1, conc_nano1, Kfluid1	84.19
X_D1, Kfluid2, conc_nano2, heat_flux1, conc_nano1, Kfluid1	87.54
flow_rate2, Kfluid2, conc_nano2, heat_flux1, conc_nano1, Kfluid1	76.61
heat_flux2, Kfluid2, conc_nano2, heat_flux1, conc_nano1, Kfluid1	71.81
X_D2, Kfluid2, conc_nano2, heat_flux1, conc_nano1, Kfluid1	77.34

Table 3: Results of Forward Feature Selection for different features

Feature	Weight Importance
X_D2	0.681455
X_D1	0.617036
heat_flux2	0.613336
heat_flux1	0.612263
Kfluid2	0.512448
conc_nano2	0.490265
flow_rate1	0.426227
Kfluid1	0.419663
conc_nano1	0.390698

Table 4: Results of Weight Analysis

Feature	Sensitivity	Variance
Kfluid2	4.82179	401.356
heat_flux2	3.89074	224.65
X_D1	-1.47476	501.868
X_D2	-1.64904	234.985
Kfluid1	-7.38787	462.004
flow_rate1	-11.5723	420.514
flow_rate2	-17.386	165.634
conc_nano1	-19.2583	623.708
conc_nano2	-23.7143	34.6234
heat_flux1	-25.1771	106.623

Table 5: Results of Jackknife Sensitivity Analysis