

# 1 Results

## 1.1 Main Results

model	R2	MSE	hidden sizes	total hs	epochs
Tanh2HiddenLayer	89.1 $\pm$ 2.4	0.1	[8, 4]	12	100
	88.4 $\pm$ 4.2	0.1	[8, 4]	12	200
	87.1 $\pm$ 3.6	0.11	[8, 4]	12	50
	69.2 $\pm$ 19.3	0.27	[8, 4]	12	20
	65.9 $\pm$ 39.4	0.3	[15, 5]	20	100
	63.6 $\pm$ 40.1	0.32	[15, 5]	20	200
	58.2 $\pm$ 45.4	0.37	[15, 5]	20	50
Linear2HiddenLayer	57.6 $\pm$ 11.9	0.37	[15, 5]	20	20
Tanh2HiddenLayer	57.2 $\pm$ 25.4	0.37	[15, 5]	20	20
Tanh1HiddenLayer	57.0 $\pm$ 8.3	0.38	[10]	10	20
Linear2HiddenLayer	54.0 $\pm$ 1.1	0.4	[15, 5]	20	200
	53.9 $\pm$ 1.1	0.4	[15, 5]	20	100
	53.4 $\pm$ 2.1	0.41	[15, 5]	20	50
	52.7 $\pm$ 4.4	0.41	[8, 4]	12	50
	51.7 $\pm$ 4.6	0.42	[8, 4]	12	100
	51.7 $\pm$ 4.7	0.42	[8, 4]	12	200
	49.8 $\pm$ 11.3	0.44	[8, 4]	12	20
Tanh1HiddenLayer	35.6 $\pm$ 35.6	0.56	[10]	10	100
	34.2 $\pm$ 40.9	0.58	[10]	10	50
	33.8 $\pm$ 37.8	0.58	[10]	10	200

Table 1: Results of different models

## 1.2 Backward Feature Selection

features
SG Coating, Temp Alk Sol, NaOH Wt%, Dip Time Alk (min), pH Sol, Hydro Time (h), Dip Time Sol (s), Clay Conc, Cure Time (min), Cure Temp
Temp Alk Sol, NaOH Wt%, Dip Time Alk (min), pH Sol, Hydro Time (h), Dip Time Sol (s), Clay Conc, Cure Time (min), Cure Temp
SG Coating, NaOH Wt%, Dip Time Alk (min), pH Sol, Hydro Time (h), Dip Time Sol (s), Clay Conc, Cure Time (min), Cure Temp
SG Coating, Temp Alk Sol, Dip Time Alk (min), pH Sol, Hydro Time (h), Dip Time Sol (s), Clay Conc, Cure Time (min), Cure Temp
SG Coating, Temp Alk Sol, NaOH Wt%, pH Sol, Hydro Time (h), Dip Time Sol (s), Clay Conc, Cure Time (min), Cure Temp
SG Coating, Temp Alk Sol, NaOH Wt%, Dip Time Alk (min), Hydro Time (h), Dip Time Sol (s), Clay Conc, Cure Time (min), Cure Temp
SG Coating, Temp Alk Sol, NaOH Wt%, Dip Time Alk (min), pH Sol, Dip Time Sol (s), Clay Conc, Cure Time (min), Cure Temp
SG Coating, Temp Alk Sol, NaOH Wt%, Dip Time Alk (min), pH Sol, Hydro Time (h), Clay Conc, Cure Time (min), Cure Temp
SG Coating, Temp Alk Sol, NaOH Wt%, Dip Time Alk (min), pH Sol, Hydro Time (h), Dip Time Sol (s), Cure Time (min), Cure Temp
SG Coating, Temp Alk Sol, NaOH Wt%, Dip Time Alk (min), pH Sol, Hydro Time (h), Dip Time Sol (s), Clay Conc, Cure Temp
SG Coating, Temp Alk Sol, NaOH Wt%, Dip Time Alk (min), pH Sol, Hydro Time (h), Dip Time Sol (s), Clay Conc, Cure Time (min), Cure Temp

Table 2: Results of Backward Feature Elimination

features	R2
pH Sol	14.56
Hydro Time (h)	26.4
Dip Time Sol (s)	11.24
Clay Conc	64.24
Cure Time (min)	0.1
SG Coating, Clay Conc	64.93
Temp Alk Sol, Clay Conc	64.93
NaOH Wt%, Clay Conc	64.93
Dip Time Alk (min), Clay Conc	79.07
pH Sol, Clay Conc	62.87
Hydro Time (h), Clay Conc	-15.61
Dip Time Sol (s), Clay Conc	80.99
Cure Time (min), Clay Conc	74.1
Cure Temp, Clay Conc	66.68
SG Coating, Clay Conc, Dip Time Sol (s)	81.03
Temp Alk Sol, Clay Conc, Dip Time Sol (s)	81.03
NaOH Wt%, Clay Conc, Dip Time Sol (s)	81.03
Dip Time Alk (min), Clay Conc, Dip Time Sol (s)	93.94
pH Sol, Clay Conc, Dip Time Sol (s)	83.22
Hydro Time (h), Clay Conc, Dip Time Sol (s)	56.92
Cure Time (min), Clay Conc, Dip Time Sol (s)	60.09
Cure Temp, Clay Conc, Dip Time Sol (s)	60.67
SG Coating, Clay Conc, Dip Time Sol (s), Dip Time Alk (min)	85.55
Temp Alk Sol, Clay Conc, Dip Time Sol (s), Dip Time Alk (min)	85.55
NaOH Wt%, Clay Conc, Dip Time Sol (s), Dip Time Alk (min)	85.55
pH Sol, Clay Conc, Dip Time Sol (s), Dip Time Alk (min)	77.04
Hydro Time (h), Clay Conc, Dip Time Sol (s), Dip Time Alk (min)	75.85
Cure Time (min), Clay Conc, Dip Time Sol (s), Dip Time Alk (min)	71.81
Cure Temp, Clay Conc, Dip Time Sol (s), Dip Time Alk (min)	63.33

Table 3: Results of Forward Feature Selection for different features

Feature	Weight Importance
Cure Time (min)	0.590329
Cure Temp	0.516585
Clay Conc	0.482741
Hydro Time (h)	0.468115
SG Coating	0.4411
Dip Time Alk (min)	0.411237
Temp Alk Sol	0.368222
NaOH Wt%	0.343663
Dip Time Sol (s)	0.297781
pH Sol	0.294155

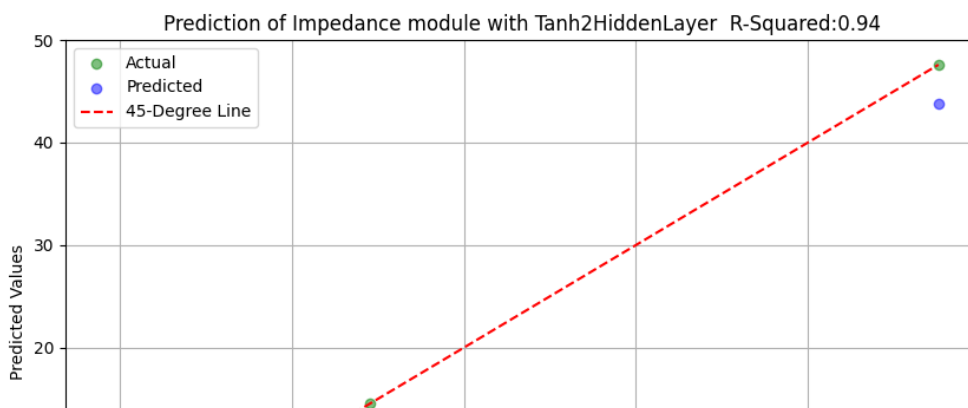
Table 4: Results of Weight Analysis

### 1.3 Forward Feature Selection

### 1.4 Weight Analysis

### 1.5 Jackknife Sensitivity Analysis

### 1.6 Predictions Plots



Feature	Sensitivity	Variance
Clay Conc	53.5718	0
Cure Temp	-1.89957	2.01948e-28
Cure Time (min)	-6.29477	2.01948e-28
Dip Time Sol (s)	-9.4163	2.01948e-28
SG Coating	-12.1679	2.01948e-28
Temp Alk Sol	-12.1679	2.01948e-28
NaOH Wt%	-12.1679	2.01948e-28
pH Sol	-13.4318	0
Dip Time Alk (min)	-14.7658	2.01948e-28
Hydro Time (h)	-14.9093	0

Table 5: Results of Jackknife Sensitivity Analysis

## 1.7 Performance Plots

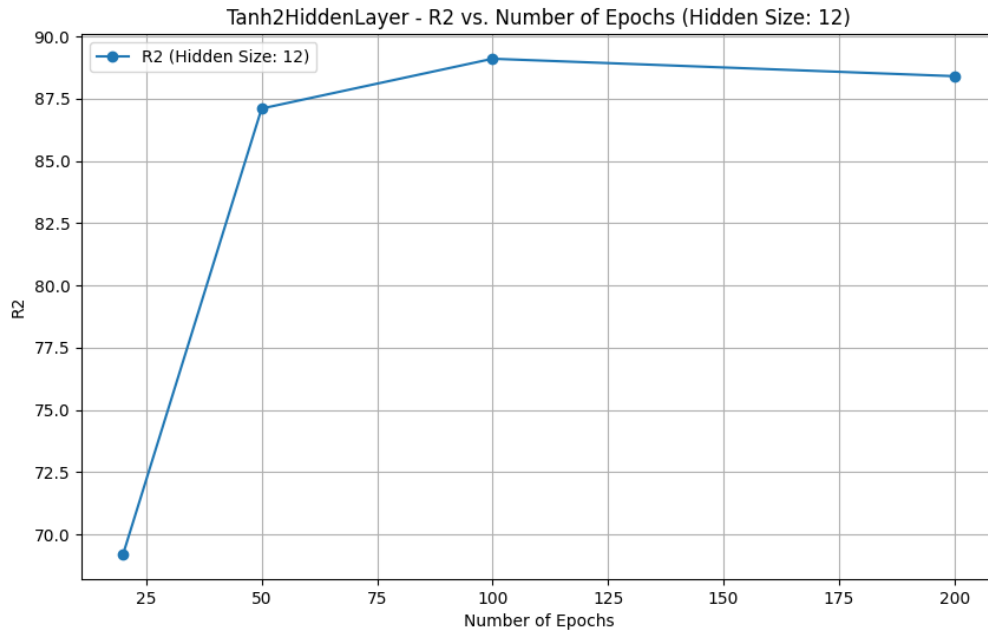


Figure 2: Tanh2HiddenLayer - R2 vs. Number of Epochs (Hidden Size: 12)

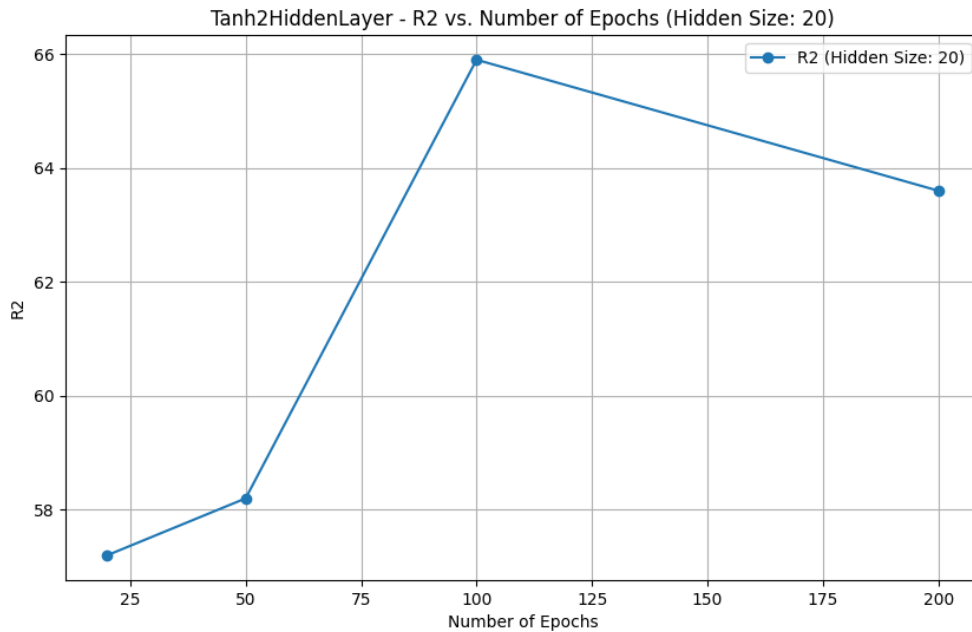


Figure 3: Tanh2HiddenLayer - R2 vs. Number of Epochs (Hidden Size: 20)

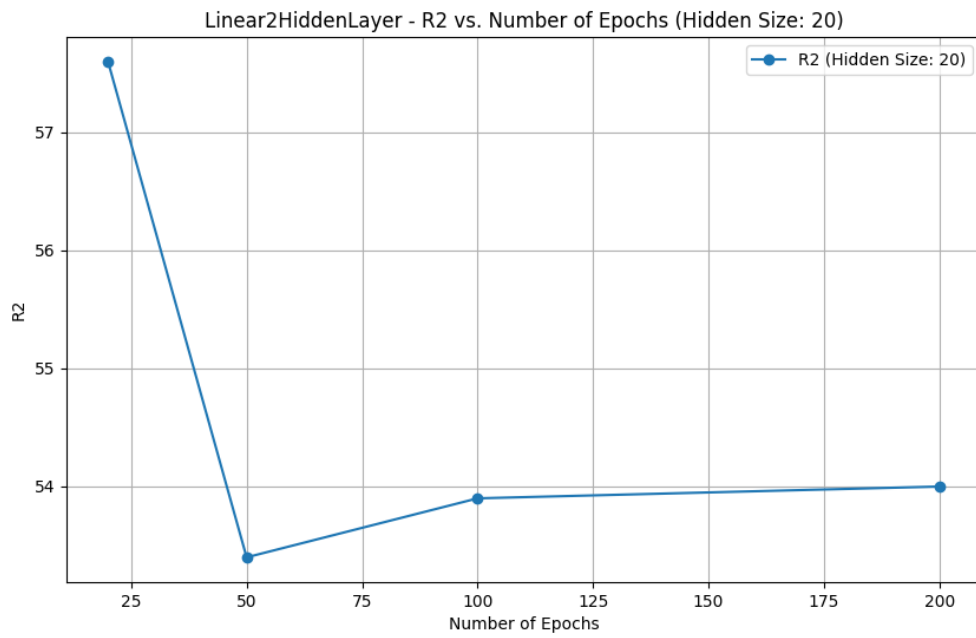


Figure 4: Linear2HiddenLayer - R2 vs. Number of Epochs (Hidden Size: 20)

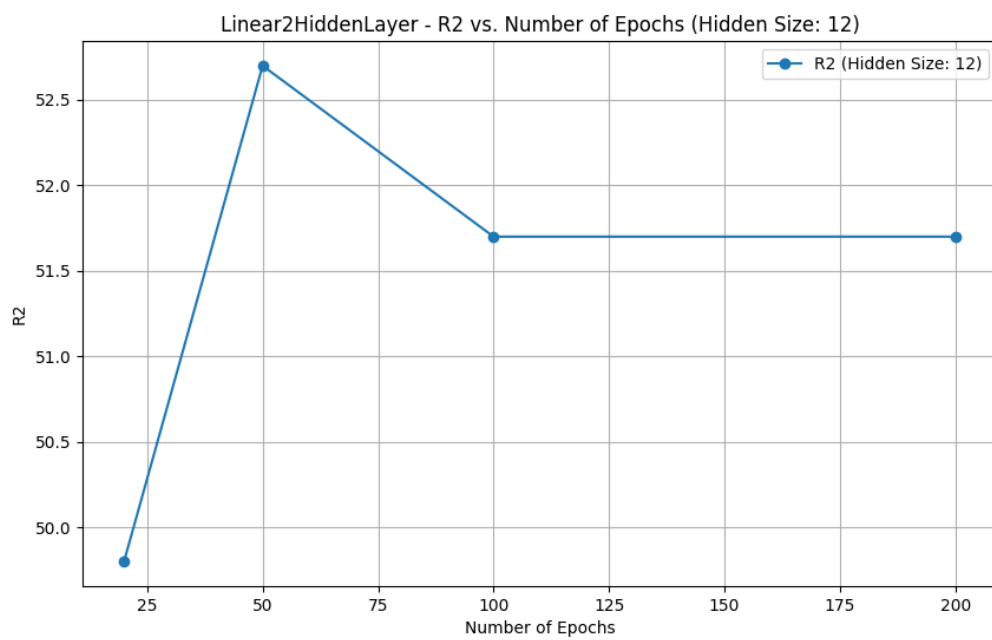


Figure 5: Linear2HiddenLayer - R2 vs. Number of Epochs (Hidden Size: 12)

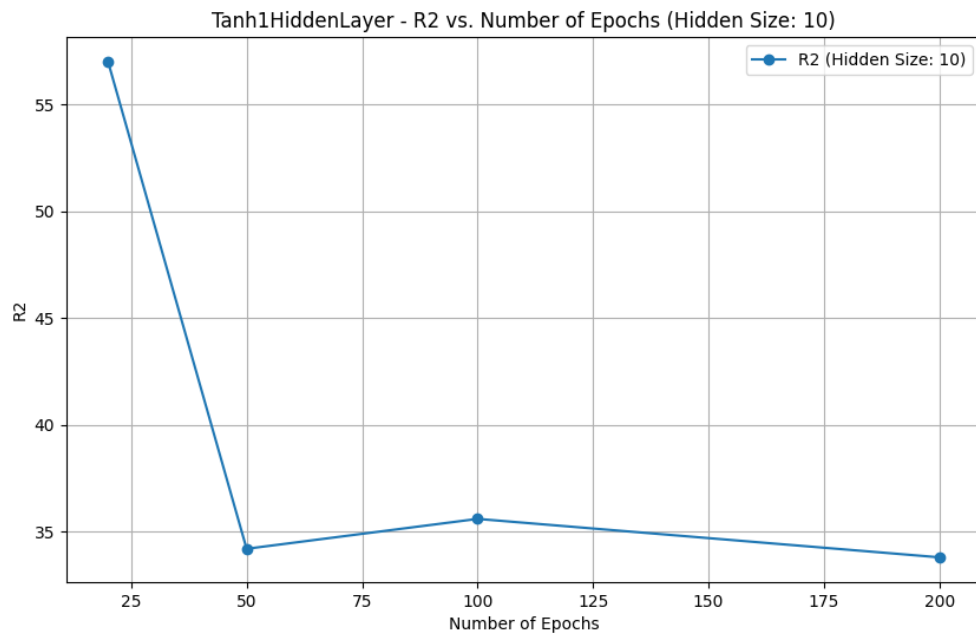


Figure 6: Tanh1HiddenLayer - R2 vs. Number of Epochs (Hidden Size: 10)