Inputs:

X0: Algae

X1: Balanus

X2: Chthamalus\_dalli

X3: Mytilus\_trossulus

X4: Nucella\_canaliculata

X5: Nucella Ostrina

X6: Semibalanus

X7: Temperature

X8: Day

Output:

Mytilus Growth Rate

est\_gp = SymbolicRegressor(population\_size=1000,

generations=2000, stopping\_criteria=50,

p\_crossover=0.8, p\_subtree\_mutation=0.05, function\_set=function\_set,

p\_hoist\_mutation=0.01,

p\_point\_mutation=0.1,

max\_samples=0.90, verbose=1,

parsimony\_coefficient=.1, random\_state=0)

R2: 0.8727831060044196

Length: 91

Fitness: 48.5878

add(add(add(div(add(add(inv(X6), X0), inv(X6)), inv(div(div(sub(X6, 0.436), X0), inv(add(mul(X6, X6), X2))))), add(inv(inv(mul(sub(mul(inv(X3), add(inv(X6), X0)), add(X0, X0)), mul(inv(X3), neg(X2))))), X0)), X0), inv(inv(mul(sub(inv(inv(mul(sub(sub(X6, 0.436), mul(mul(div(add(inv(X6), X0), inv(add(mul(X6, X6), X2))), neg(X2)), mul(inv(X3), neg(X2)))), mul(inv(X3), neg(X2))))), neg(mul(X8, X5))), mul(inv(X3), neg(X2))))))

(2\*X0\*\*2\*X3\*\*3\*X6 + X0\*X2\*X3\*(2\*X0\*X3\*X6 - X0\*X6 - 1) - X0\*X2\*(X2\*(X2\*\*2\*(X2 + X6\*\*2)\*(X0\*X6 + 1) + X3\*X6\*(0.436 - X6)) + X3\*\*2\*X5\*X6\*X8) + X3\*\*3\*(X2 + X6\*\*2)\*(X6 - 0.436)\*(X0\*X6 + 2))/(X0\*X3\*\*3\*X6)

Slightly increase parsimony

est\_gp = SymbolicRegressor(population\_size=1000,

generations=2000, stopping\_criteria=45,

p\_crossover=0.8, p\_subtree\_mutation=0.05, function\_set=function\_set,

p\_hoist\_mutation=0.01,

p\_point\_mutation=0.1,

max\_samples=0.90, verbose=1,

parsimony\_coefficient=.5, random\_state=0)

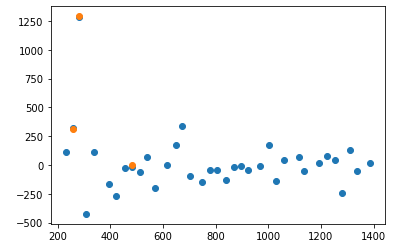
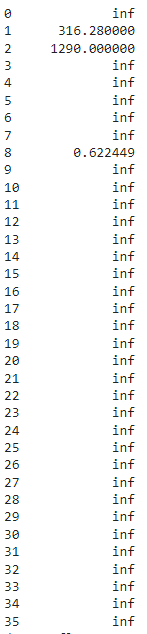
Length: 11

Fitness: 76.5957

R2: 0.7129607465069205

div(div(add(X8, div(add(X8, X2), X0)), X6), X6)

(X8 + (X2 + X8)/X0)/X6\*\*2



Ran again

est\_gp = SymbolicRegressor(population\_size=1000,

generations=2000, stopping\_criteria=45,

p\_crossover=0.8, p\_subtree\_mutation=0.05, function\_set=function\_set,

p\_hoist\_mutation=0.01,

p\_point\_mutation=0.1,

max\_samples=0.90, verbose=1,

parsimony\_coefficient=.5, random\_state=0)

Length: 27

Fitness: 56

R2: 0.4732650394662339

add(add(div(X8, X6), inv(mul(inv(X3), neg(add(X6, add(X6, X8)))))), add(add(add(inv(mul(inv(X3), neg(X0))), X0), X0), X0))

3\*X0 - X3/(2\*X6 + X8) + X8/X6 - X3/X0

Outliers removed

est\_gp = SymbolicRegressor(population\_size=1000,

generations=6000, stopping\_criteria=50,

p\_crossover=0.8, p\_subtree\_mutation=0.05, function\_set=function\_set,

p\_hoist\_mutation=0.01,

p\_point\_mutation=0.1,

max\_samples=0.90, verbose=1,

parsimony\_coefficient=.5, random\_state=0)

Length: 28

Fitness: 49.8824

**R2: 0.5091517479118436**

add(add(div(inv(mul(inv(X3), X6)), X6), inv(mul(inv(X3), neg(add(X6, add(X6, X8)))))), add(X0, add(X0, inv(div(X0, neg(X3))))))

2\*X0 - X3/(2\*X6 + X8) + X3/X6\*\*2 - X3/X0

est\_gp = SymbolicRegressor(population\_size=1000,

generations=10000, stopping\_criteria=45,

p\_crossover=0.8, p\_subtree\_mutation=0.05, function\_set=function\_set,

p\_hoist\_mutation=0.01,

p\_point\_mutation=0.1,

max\_samples=0.90, verbose=1,

parsimony\_coefficient=.3, random\_state=0)

R2: 0.7155240048180089

Length: 54

Fitness: 44.89

X0 - X1/(X5\*X8) + X3 + 1/(X0 + 1/X5 - 0.676\*X5/X3) - 0.676\*X5/X3\*\*2 - X3/X0

Higher Parsimony

est\_gp = SymbolicRegressor(population\_size=1000,

generations=10000, stopping\_criteria=45,

p\_crossover=0.8, p\_subtree\_mutation=0.05, function\_set=function\_set,

p\_hoist\_mutation=0.01,

p\_point\_mutation=0.1,

max\_samples=0.90, verbose=1,

parsimony\_coefficient=.4, random\_state=0)

add(add(add(mul(inv(X3), mul(inv(X3), mul(0.730, neg(X5)))), div(inv(sub(div(-0.104, X8), neg(inv(X3)))), X6)), inv(mul(inv(X3), neg(X0)))), mul(sub(div(-0.104, X8), neg(div(-0.104, X5))), X3))

Length: 39

Fitness: 44.791

R2: 0.5652005977657717

-X3\*(0.104/X8 + 0.104/X5) - 1/(X6\*(0.104/X8 - 1/X3)) - 0.73\*X5/X3\*\*2 - X3/X0

Inputs:

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X5: Nucella Ostrina

X6: Semibalanus

X7: Temperature

X8: Day

LOGGED

#Symbolic Regression Parameters

est\_gp = SymbolicRegressor(population\_size=1000,

generations=10000, stopping\_criteria=.0079,

p\_crossover=0.8, p\_subtree\_mutation=0.05, function\_set=function\_set,

p\_hoist\_mutation=0.01,

p\_point\_mutation=0.1,

max\_samples=0.90, verbose=1,

parsimony\_coefficient=.00001, random\_state=0)

div(div(X0, X3), add(sub(div(X0, add(sub(-0.435, div(inv(-0.435), X0)), X7)), div(add(div(add(div(add(sub(X0, div(inv(-0.435), X0)), X7), X8), X7), X8), X7), X6)), X7))

Fitness: 0.00788131

Length: 35

R2: 0.6067522964328422

div(div(X0, X3), add(sub(div(X0, add(sub(-0.435, div(inv(-0.435), X0)), X7)), div(add(div(add(div(add(sub(X0, div(inv(-0.435), X0)), X7), X8), X7), X8), X7), X6)), X7))

X0/(X3\*(X0/(X7 - 0.435 + 2.29885057471264/X0) + X7 - (X7 + (X7 + (X0 + X7 + 2.29885057471264/X0)/X8)/X8)/X6))

X0/X3 - 1/X8)/(X7 + 2.29885057471264 + X7/(X6\*(X0/(X1\*\*2\*X3) - 0.964)))

X0: Algae

X1: Balanus

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X3: Mytilus\_trossulus

X4: Nucella\_canaliculata

X5: Nucella Ostrina

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X7: Temperature

X8: Day