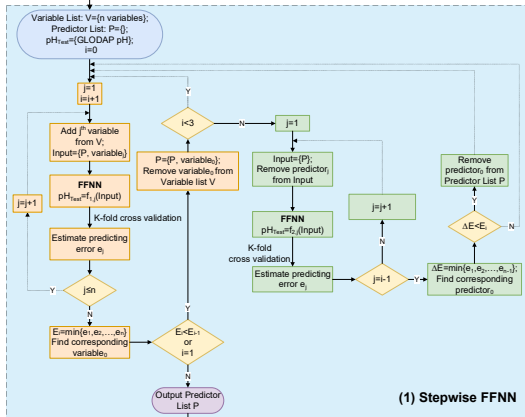**GLODAP pH measurements in mixed layer**

Collected Environmental Variables

GLODAP pH measurements in intermediate layer

Remove remote sensing products

Variable List: V={n variables};
Predictor List: P={};
pH_{Real}={GLODAP pH};
i=0

(1) Stepwise FFNN

j=1
i=i+1

Add j^{th} variable from V;
Input={P, variable_j}

i<3

N → j=1

j=j+1

FFNN
$pH_{Real}=f_{i,j}(Input)$

P={P, variable_0};
Remove variable_0 from Variable list V

Input={P};
Remove predictor_j from Input

Remove predictor_0 from Predictor List P

K-fold cross validation

FFNN
$pH_{Real}=f_{2,j}(Input)$

j=j+1

$\Delta E < E$

Estimate predicting error e_j

K-fold cross validation

j=j-1

$\Delta E = min\{e_1, e_2, ..., e_{n-1}\}$;
Find corresponding predictor_0

j≤n

Estimate predicting error e_j

N → Y

E=min{$e_1, e_2, ..., e_n$};
Find corresponding variable_0

$E < E_{i-1}$
or
i=1

N

Output Predictor List P

pH Predictors

(2) FFNN
$pH=f_1(Predictor1, Predictor2,...)$

Predicted pH in mixed layer
(0 m – mixed layer depth)

(1) Stepwise FFNN

pH Predictors

(2) FFNN
$pH=f_2(Predictor1, Predictor2,...)$

Predicted pH in intermediate layer
(mixed layer depth – 2000 m)

**pH product
(0-2000 m)**