



# Integrated machine learning and optimization in Python

Master of Science Research Project

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Muyi Song Department of Chemical Engineering

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### 5.1 Algorithm

**Table** Pseudo Code of Algorithm

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```

Initialize starting point by setting each dimension as  $(lb + ub)/2$ ;
Initialize radius  $r = 1.0$  and size of sampling points  $num$ ;
initialize a blank list to store optimal values;
while(the actual value  $\approx$  predicted value obtained by Baron)
    shuffle the order of dimensions;
    for index  $i_1$  to  $i_k$   $k = 1, \dots, n$ 
        while(termination is satisfied)
            Sampling along single direction within range  $[x_{i_k} - r, x_{i_k} + r]$ 
            Call Alamopy to get the surrogate model based on sampling data points;
            Call Baron to get the optimal point of surrogate model;
            if the optimal point is accurate:
                decrease  $r$ ; increase  $num$ ;
            else:
                increase  $r$ ; decrease  $num$ ;
        update  $x_{i_k}$  with new optimal point; append optimal value to solution list;

```

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### 5.2 Sampling methods

## 6 Results and Discssion