

Adaptive Sampling Section

Refinement Section

Start
Select the number of sampling points (N), and apply a sampling plan (stratification, space filling LHS, etc.) for the optimization domain.

Specify refinement (tol1) and termination (tol2) tolerances. The latter must be at least one order of magnitude larger than the estimated noise of function

Start the iterations count ($k = 1$ and $\text{funEvals} = 1$)

Sample the function based on the sampling plan defined earlier, and build the surrogate model. If $k > 1$, $(x^*)_{k-1}$ must be included in the sampled points

If $k = 1$ and $j = 1$, validate the model through cross-validation to make sure it is accurate enough.

Optional step (if $k = 1$ and $j = 1$)
If there are feasible points in the sampled points, use the best feasible point as initial estimate of the minimization problem to help convergence. If there aren't feasible points, try a new initial sample.

$j = 1$
Minimize the response surface model $\text{RSM}(x)$ subject to the constraints $G(x)$. These can be metamodels on their own, based on their evaluation difficulty.
The optimal solution is $(x_j)_k$.

Sample the point $(x_j)_k$ to get $g((x_j)_k)$ and $y((x_j)_k)$.
 $\text{funEvals} = \text{funEvals} + 1$

Update the surrogate model. In case of kriging, do not optimize the hyperparameters.

Starting from $(x_j)_k$ minimize the $\text{RSM}(x)$ to get $(x_{j+1})_k$

$| (x_j)_k - (x_{j+1})_k | \leq \text{tol1}?$

Yes

No

$j = j + 1$
 $(x_j)_k = (x_{j+1})_k$

Start refinement

$(x^*)_k = (x_j)_k$

$\text{funEvals} \geq \text{MaxFunEvals}$

No

Yes

END

$k > 1?$

No

Yes

$| (x^*)_k - (x^*)_{k-1} | \leq \text{tol2}?$

Yes

No

Is $(x^*)_k$ inside or at the limit of the sampling hypercube?

Inside

Contract sampling hypercube and center it in $(x^*)_k$

At Limit

Move sampling hypercube and center it in $(x^*)_k$

$k = k + 1$