



Computational Science:  
Computational Methods in Engineering

## Univariate Search



### Algorithm for Basic Univariate Search

Make an initial guess  $\mathbf{x}_a$  at the position of the extremum.

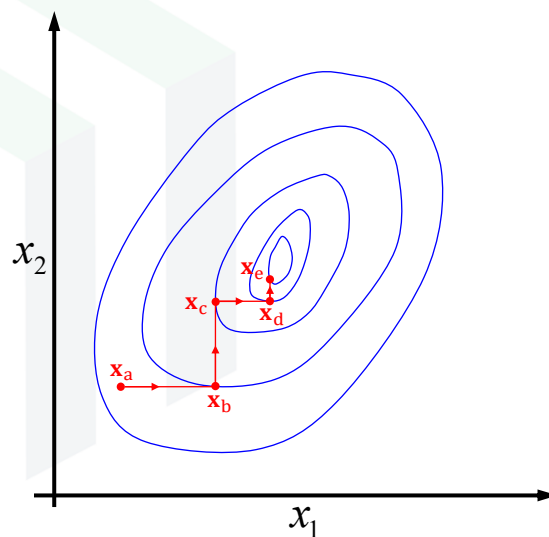
Perform a 1D optimization along  $x_1$  to arrive at the local extremum  $\mathbf{x}_b$ .

Perform a 1D optimization along  $x_2$  to arrive at the local extremum  $\mathbf{x}_c$ .

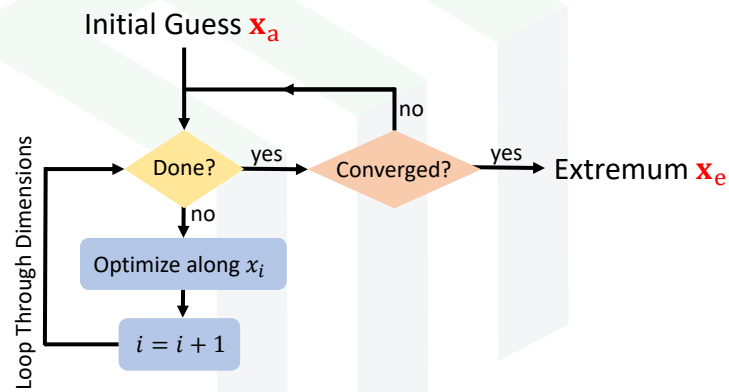
Perform a 1D optimization along  $x_1$  to arrive at the local extremum  $\mathbf{x}_d$ .

Perform a 1D optimization along  $x_2$  to arrive at the local extremum  $\mathbf{x}_e$ .

...and so on.



## Block Diagram of Univariate Search



## Pattern Direction

After a few passes through all independent variables, an overall direction becomes apparent. It is the direction connecting the starting point to the end point.

This direction points toward the extremum.

