EE530 Assignment Report

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Q1. Sol
RosenBrock function is

$$(1-x)^2 + (y-x^2)^2$$

For fixed step size = 0.003 and threshold of magnitude of gradient(for loop termination) set to 1e-3, the following results were obtained:

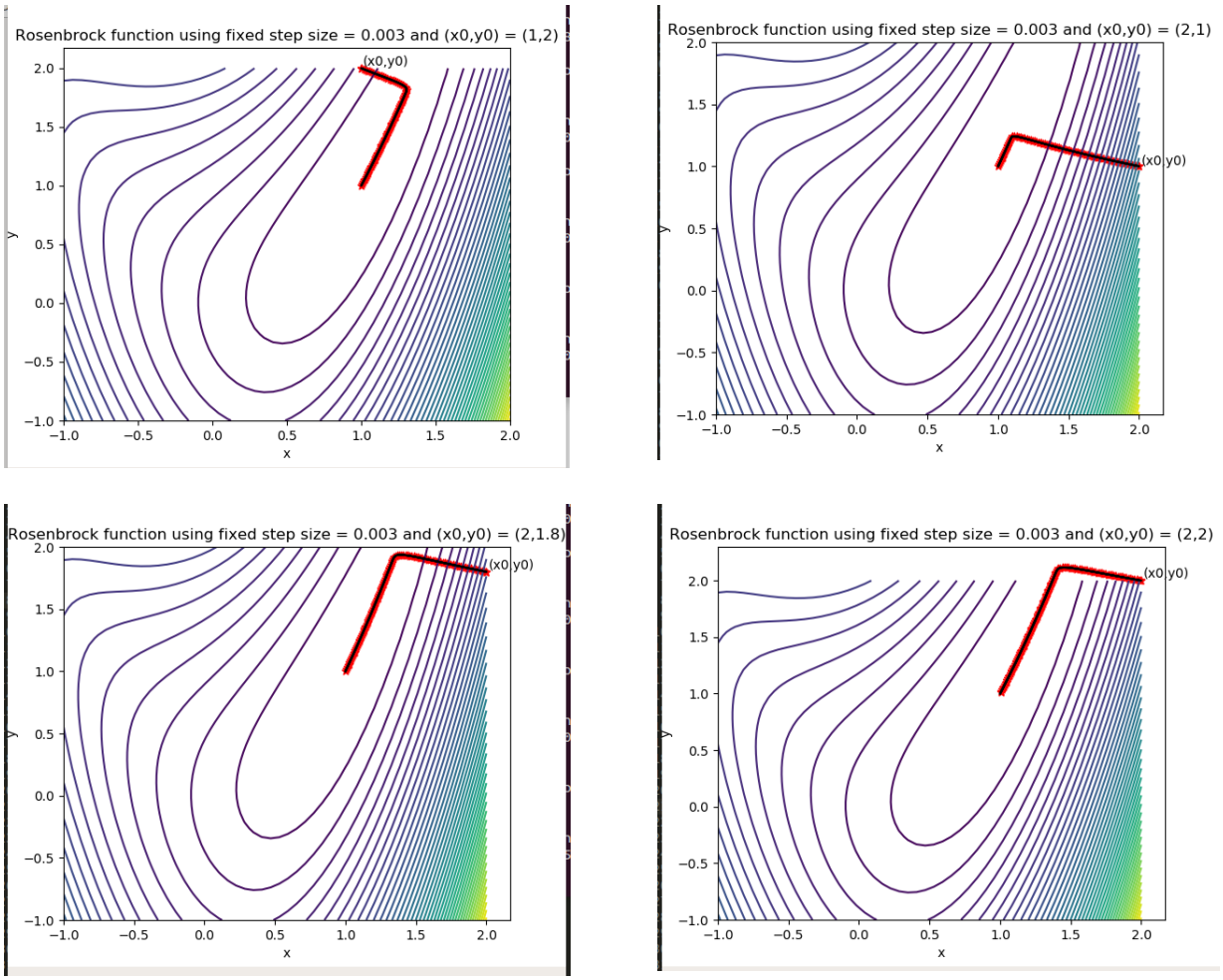

Figure 1: path taken by α in fixed case for different initial conditions

Observation Table			
Serial no.	initial points(x0,y0)	no. of steps	time of execution(sec)
1.	(1,2)	412	0.00475
2.	(2,1)	398	0.00456
3.	(2,1.8)	553	0.00622
4.	(2,2)	595	0.00644

For optimal step size keeping the threshold same, the following results were recorded:-

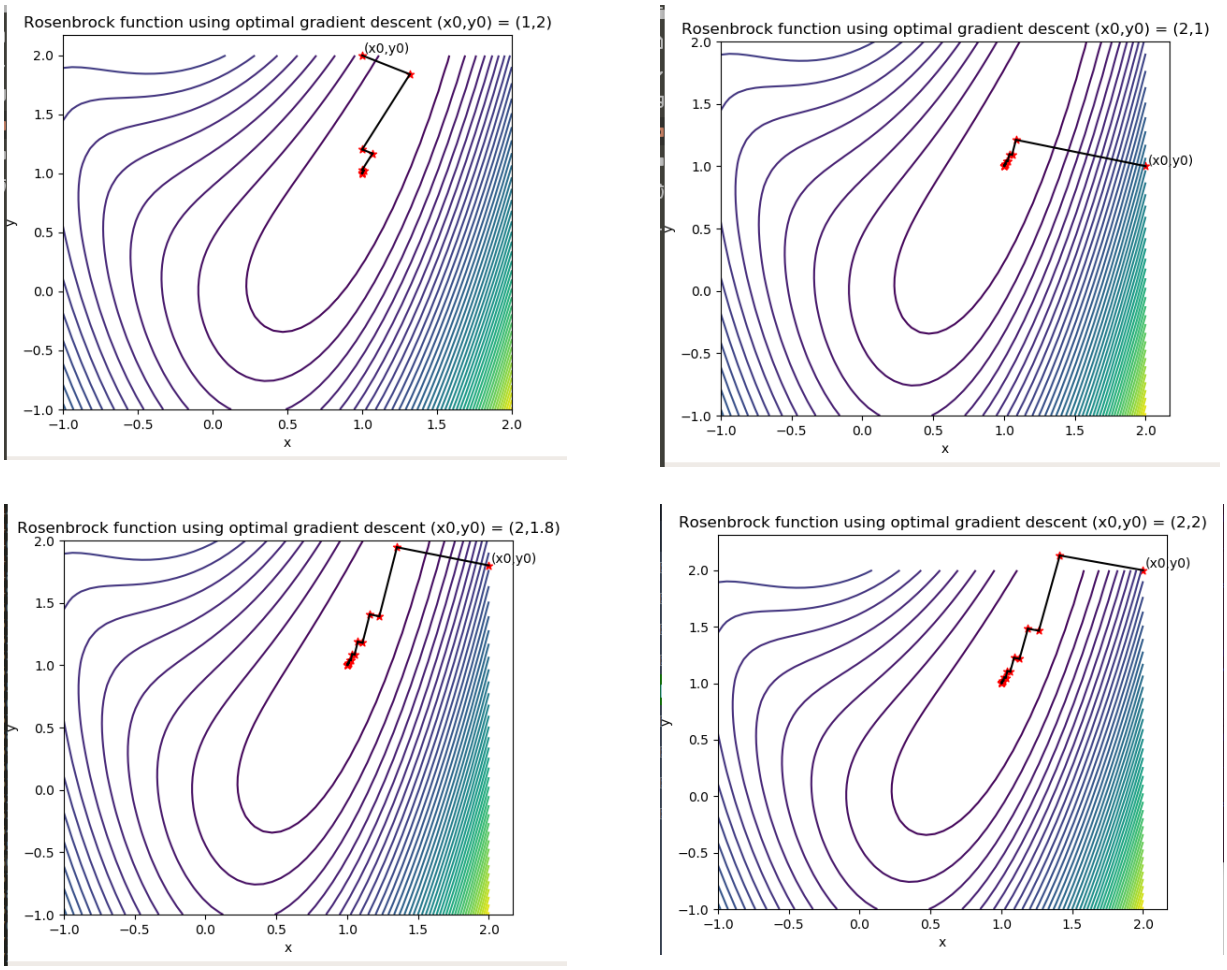

Figure 2: path taken by α in optimal case for different initial conditions

Observation Table			
Serial no.	initial points(x0,y0)	no. of steps	time of execution(sec)
1.	(1,2)	9	1.88
2.	(2,1)	13	3.599
3.	(2,1.8)	17	4.845
4.	(2,2)	19	5.265

Comparison between fixed step size and optimal steps size

(x0,y0)	no. of steps		exec time	
	fixed step	optimal step	fixed step	optimal step
(1,2)	412	9	0.00475	1.88
(2,1)	398	13	0.00456	3.599
(2,1.8)	553	17	0.00622	4.845
(2,2)	595	19	0.00644	5.265

From the table we can clearly see the trade off between the no of steps(for convergence to local optimum) and time of execution. Line search algorithm using optimal step size takes greater time due to increased computations.