色彩科學導論與應用

Logistic Map

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Assignment 9

Mathematically, the logistic map is written

$x_{n+1} = r x_n(1 - x_n)$,

where x_n is a number between zero and one. Thus, given an initial value (seed) x_0, the series x_i is computed, allowing us to produce M number of values. In addition, most values of r beyond 3.56995 exhibit chaotic behavior, but there are still certain isolated ranges of r that show non-chaotic behavior; these are sometimes called *islands of stability*.

Please write a python program.

(1) Reads an input file, input09.txt, to obtain x_0, r, M, Seed and
(2) Executes the logistic map to produce a series of M floating values between 0 and 1.
(3) Output a series of *M* floating point values between 0 and 1 using the default random function using a fixed seed ($Seed$), e.g., random.seed(Seed).
(4) Write the input four parameters in the first line, and floating point values in the second lines and after. The output file is output09.csv.
(5) At the final line of the output09.csv, please compute the mean and standard deviation for both methods.

Program:

The python program, "**學號-09-LOISTIC-MAP.py**, reads an input file, **input09.txt**, applies the logistic map, and produces the output, **output09.csv.**

Example of an Input file: **input09.txt**

0.58974 3.999999 20 100

Example of an output file: **output09.csv**

x0	r	N	seed

0.589746	3.999999	20	100
1	0.967782	0.974923	
2	0.124719	0.367630	
3	0.436655	0.039581	
4	0.983950	0.611963	
5	0.063171	0.546279	
6	0.236723	0.055078	
7	0.722741	0.710983	
8	0.801545	0.335270	
9	0.636282	0.016716	
10	0.925708	0.643062	
11	0.275090	0.208510	
12	0.797661	0.226059	
13	0.645592	0.218701	
14	0.915212	0.692008	
15	0.310395	0.332184	
16	0.856200	0.539465	
17	0.492486	0.528489	
18	0.999774	0.676886	
19	0.000904	0.717072	
20	0.003614	0.451000	
mean	0.559810	0.468501	
std	0.344075	0.281895	

Submission:

Please submit the following **THREE files.**

1. 學號-09-LOGISTIC-MAP.py
2. input09.txt
3. output09.csv