Subtractive lagged Fibbonacci generator

Subtractive lagged Fibbonacci generator uses the following equation to generate pseudo-random numbers:

$$x_n = x_{n-k} - x_{n-1} \mod M,$$

where $n \geq max(k, l)$. Values $x_1, \ldots, x_n$ are a seed for this generator. Value of M must be a power of 2.

1 Input

- n – (int) determines how many values will be generated (default: 100),
- k – (int) sets the value of k in the previous equation (default: 100),
- l – (int) sets the value of l in the previous equation (default: 37),
- Mp – (int) value of 2^{Mp} will be set as M in the previous equation (default: 30),
- seed – name of a csv file with first line containing string "seed_name" and following ones having one integer between 0 and $M-1$ in each line, number of lines (excluding the line with the string) in a file must be greater or equal to $max(k, l)$; number of lines (excluding the line with the string) should be a multiple of $max(k, l)$ (if not LCG generator is used to add numbers to fulfill this requirement); list of seeds is split into segments of length $max(k, l)$, each segment is used to generate one file (by default: LCG generator ($a = 7^5$, $c = 0$) with current time as a seed is used to generate sufficient number of integers),
- output-file – the name of the output file/files (when 2 or more files are being generated numbers are added to the base of the name), when no name is given the values are printed to the screen; **if more than one file is being generated this parameter cannot be empty** (default: `generated_numbers.pkl`),
- output-dir – name of the output directory, when no name is given the files are saved to directory where the program is located; the string cannot end with a slash or a backslash; this directory must exist before running the program (default: empty string).

2 Output

The length of the list of seeds determines the number of files generated (number of files is equal to corrected length of the list of seeds divided by $max(k, l)$). When number of files being generated is equal to 1 and the output-file parameter is empty, generated numbers will be printed to the screen (instead of being saved). **Output-file parameter cannot be empty when more than one file is being generated**. Generated files are saved to the output-dir (when output-dir parameter is empty, files are saved to the directory where the program is located). Generated files are in a pickle format with the following key value pairs:

- PRNG – string with the name of the generator and values of k and l (as strings)
- Modulus – the value of M,
- n – number of values generated
- seed – (list) segment of the list of seeds used to generated this file
- numbers – the values that were generated

3 Examples

```
python fib_sub_gen.py --n 1000 --Mp 30 --k 100 --l 37 --seed seeds.csv
python fib_sub_gen.py --output-file generated.pkl --output-dir D:\dokumenty
```