BRNO UNIVERSITY OF TECHNOLOGY
Faculty of Information Technology

Practical Aspects of Software Design
2018/2019

Profiling report

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1 Assignment

Use functions from your math library to create a script that will calculate sample standard deviation from a sequence of numbers, which will be loaded from standard input until the end of the file. The script must be capable to load at least 1000 numbers. The input file contains only numbers, the total count of numbers is unknown. The formula that will be used for calculation of sample standard deviation:

$$s = \sqrt{\frac{1}{N-1}\left(\sum_{i=1}^{N} x_i^2 - N\bar{x}^2\right)}$$

$$\bar{x} = \frac{1}{N}\sum_{i=1}^{N} x_i$$

Then profile this script with input files that contain 10, 100 and 1000 numbers. Hand over a protocol which contains output from profiler and quick summary - what you should focus on when optimizing code and which parts of your code takes longest to finish.

2 Approach and results

The tool that was used to profile the script is Pycharm's built-in profiler which is available in their professional version. Most called functions are system functions that convert input file into the array. Alongside these functions, the most called function is "add" function, which was called 2000 times, then "sub" function with little over 1000 calls and then pow. All of these functions are very efficient. Their implementation emphasizes the maximum performance of python. From this point we assume, it would only make sense to improve implementation of goniometric functions.

Name	Call Count	Time (ms)	Own Time (ms)
<method 'rstrip' of 'str' objects>	78	0 0,0%	0 0,0%
<method 'join' of 'str' objects>	41	0 0,0%	0 0,0%
_verbose_message	39	0 0,0%	0 0,0%
<listcomp>	37	0 0,0%	0 0,0%
_path_join	37	0 0,0%	0 0,0%
<built-in method builtins.isinstance>	22	0 0,0%	0 0,0%
add	20	0 0,0%	0 0,0%
<method 'rpartition' of 'str' objects>	19	0 0,0%	0 0,0%
<built-in method builtins.hasattr>	14	0 0,0%	0 0,0%
<built-in method builtins.getattr>	12	0 0,0%	0 0,0%
<built-in method posix.stat>	11	0 0,0%	0 0,0%
<method 'readline' of '_io.TextIOWrapper' objec	11	0 0,0%	0 0,0%
_path_stat	11	0 0,0%	0 0,0%
sub	11	0 0,0%	0 0,0%
__next__	11	0 0,0%	0 0,0%
<method 'append' of 'list' objects>	10	0 0,0%	0 0,0%
<built-in method _imp.acquire_lock>	10	0 0,0%	0 0,0%
<built-in method _imp.release_lock>	10	0 0,0%	0 0,0%
pow	10	0 0,0%	0 0,0%
<genexpr>	8	0 0,0%	0 0,0%
_path_importer_cache	8	0 0,0%	0 0,0%
<built-in method builtins.len>	7	0 0,0%	0 0,0%
_relax_case	7	0 0,0%	0 0,0%
find_spec	7	0 0,0%	0 0,0%
<built-in method from_bytes>	6	0 0,0%	0 0,0%
<built-in method posix.fspath>	6	0 0,0%	0 0,0%
_r_long	6	0 0,0%	0 0,0%
__enter__	6	0 0,0%	0 0,0%
__exit__	6	0 0,0%	0 0,0%

Figure 1: Visualisation of calculations with 10 input values for sample standard deviation

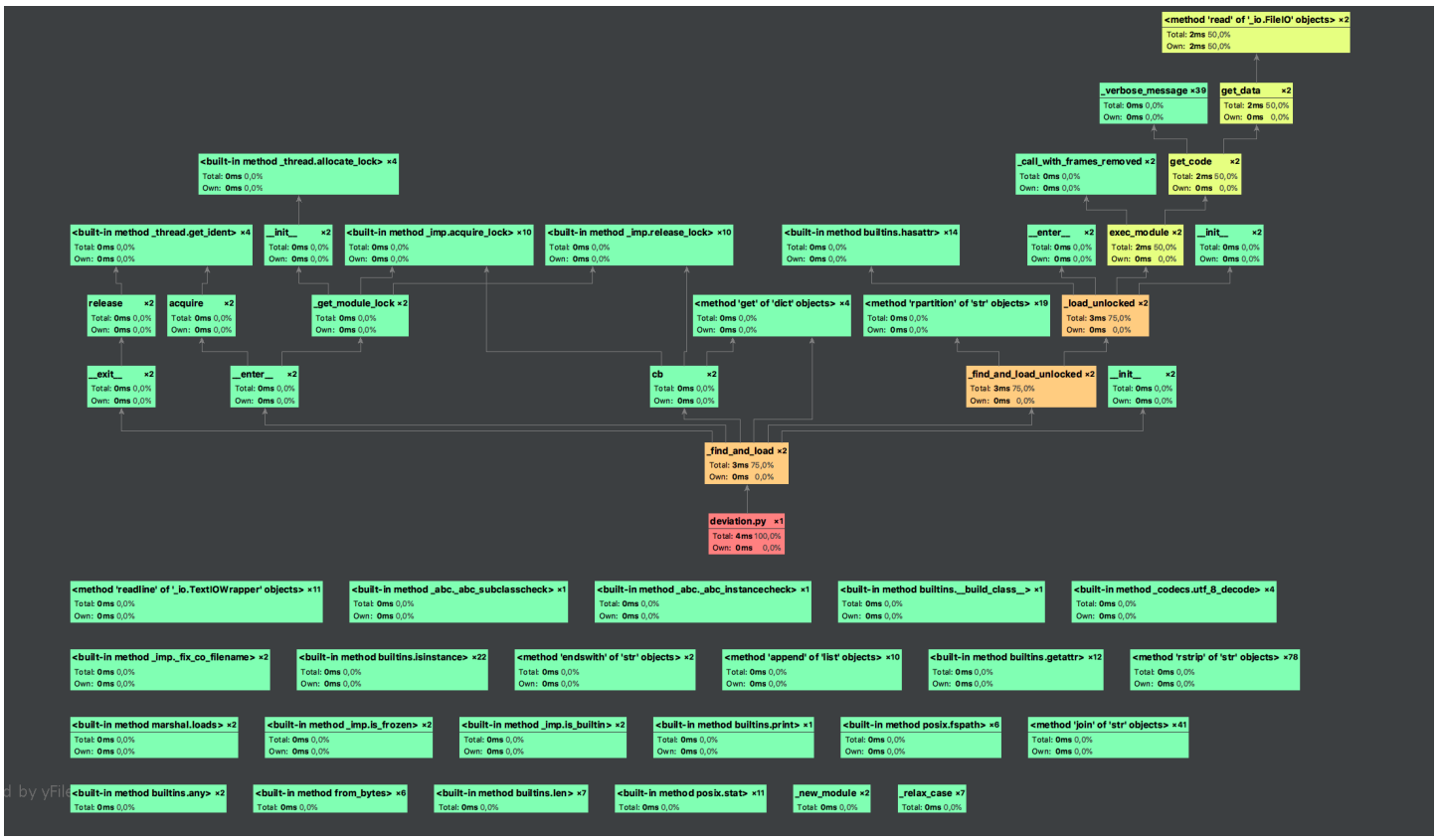

Figure 2: Tree visualisation of calculations with 10 input values for sample standard deviation

Name	Call Count	Time (ms)	Own Time (ms)
add	200	0 0,0%	0 0,0%
<built-in method builtins.isinstance>	112	0 0,0%	0 0,0%
<method 'readline' of '_io.TextIOWrapper' objec	101	0 0,0%	0 0,0%
sub	101	0 0,0%	0 0,0%
__next__	101	0 0,0%	0 0,0%
<method 'append' of 'list' objects>	100	0 0,0%	0 0,0%
pow	100	0 0,0%	0 0,0%
<method 'rstrip' of 'str' objects>	78	0 0,0%	0 0,0%
<method 'join' of 'str' objects>	41	0 0,0%	0 0,0%
_verbose_message	39	0 0,0%	0 0,0%
<listcomp>	37	0 0,0%	0 0,0%
_path_join	37	0 0,0%	0 0,0%
<method 'rpartition' of 'str' objects>	19	0 0,0%	0 0,0%
<built-in method builtins.hasattr>	14	0 0,0%	0 0,0%
<built-in method builtins.getattr>	12	0 0,0%	0 0,0%
<built-in method posix.stat>	11	0 0,0%	0 0,0%
_path_stat	11	0 0,0%	0 0,0%
<built-in method _imp.acquire_lock>	10	0 0,0%	0 0,0%
<built-in method _imp.release_lock>	10	0 0,0%	0 0,0%
<genexpr>	8	0 0,0%	0 0,0%
_path_importer_cache	8	0 0,0%	0 0,0%
<built-in method builtins.len>	7	0 0,0%	0 0,0%
_relax_case	7	0 0,0%	0 0,0%
find_spec	7	0 0,0%	0 0,0%
<built-in method from_bytes>	6	0 0,0%	0 0,0%
<built-in method posix.fspath>	6	0 0,0%	0 0,0%
_r_long	6	0 0,0%	0 0,0%
__enter__	6	0 0,0%	0 0,0%
__exit__	6	0 0,0%	0 0,0%

Figure 3: Visualisation of calculations with 100 input values for sample standard deviation

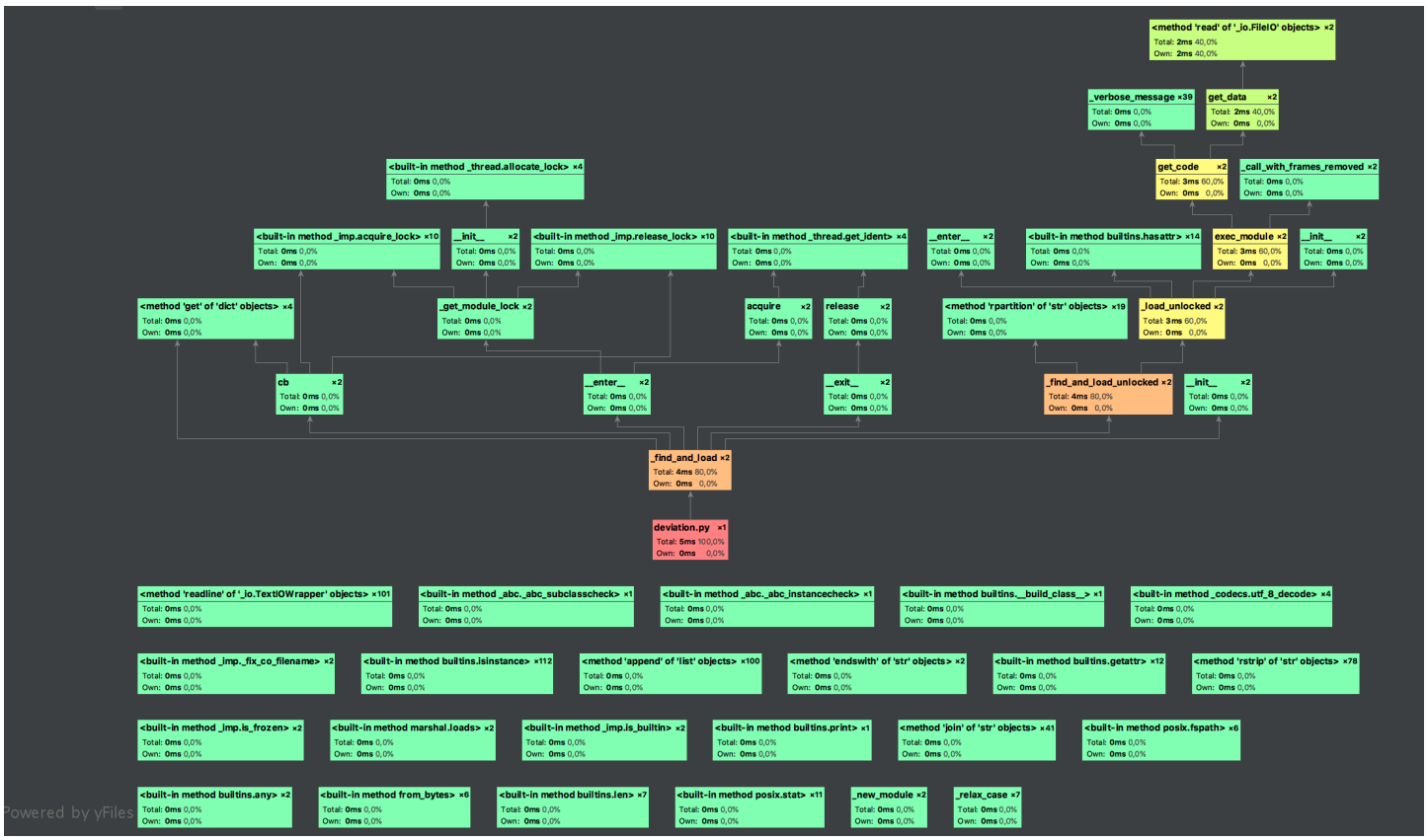

Figure 4: Tree visualisation of calculations with 100 input values for sample standard deviation

Name	Call Count	Time (ms)	Own Time (ms)
add	2000	0 0,0%	0 0,0%
<built-in method builtins.isinstance>	1012	0 0,0%	0 0,0%
<method 'readline' of '_io.TextIOWrapper' objec	1001	2 22,2%	2 22,2%
sub	1001	0 0,0%	0 0,0%
__next__	1001	3 33,3%	0 0,0%
<method 'append' of 'list' objects>	1000	0 0,0%	0 0,0%
pow	1000	0 0,0%	0 0,0%
<method 'rstrip' of 'str' objects>	78	0 0,0%	0 0,0%
<method 'join' of 'str' objects>	41	0 0,0%	0 0,0%
_verbose_message	39	0 0,0%	0 0,0%
<listcomp>	37	0 0,0%	0 0,0%
_path_join	37	0 0,0%	0 0,0%
<method 'rpartition' of 'str' objects>	19	0 0,0%	0 0,0%
<built-in method builtins.hasattr>	14	0 0,0%	0 0,0%
<built-in method builtins.getattr>	12	0 0,0%	0 0,0%
<built-in method posix.stat>	11	0 0,0%	0 0,0%
_path_stat	11	0 0,0%	0 0,0%
<built-in method _imp.acquire_lock>	10	0 0,0%	0 0,0%
<built-in method _imp.release_lock>	10	0 0,0%	0 0,0%
<genexpr>	8	0 0,0%	0 0,0%
_path_importer_cache	8	0 0,0%	0 0,0%
<built-in method builtins.len>	7	0 0,0%	0 0,0%
_relax_case	7	0 0,0%	0 0,0%
find_spec	7	0 0,0%	0 0,0%
<built-in method from_bytes>	6	0 0,0%	0 0,0%
<built-in method posix.fspath>	6	0 0,0%	0 0,0%
_r_long	6	0 0,0%	0 0,0%
__enter__	6	0 0,0%	0 0,0%
__exit__	6	0 0,0%	0 0,0%

Figure 5: Visualisation of calculations with 1000 input values for sample standard deviation

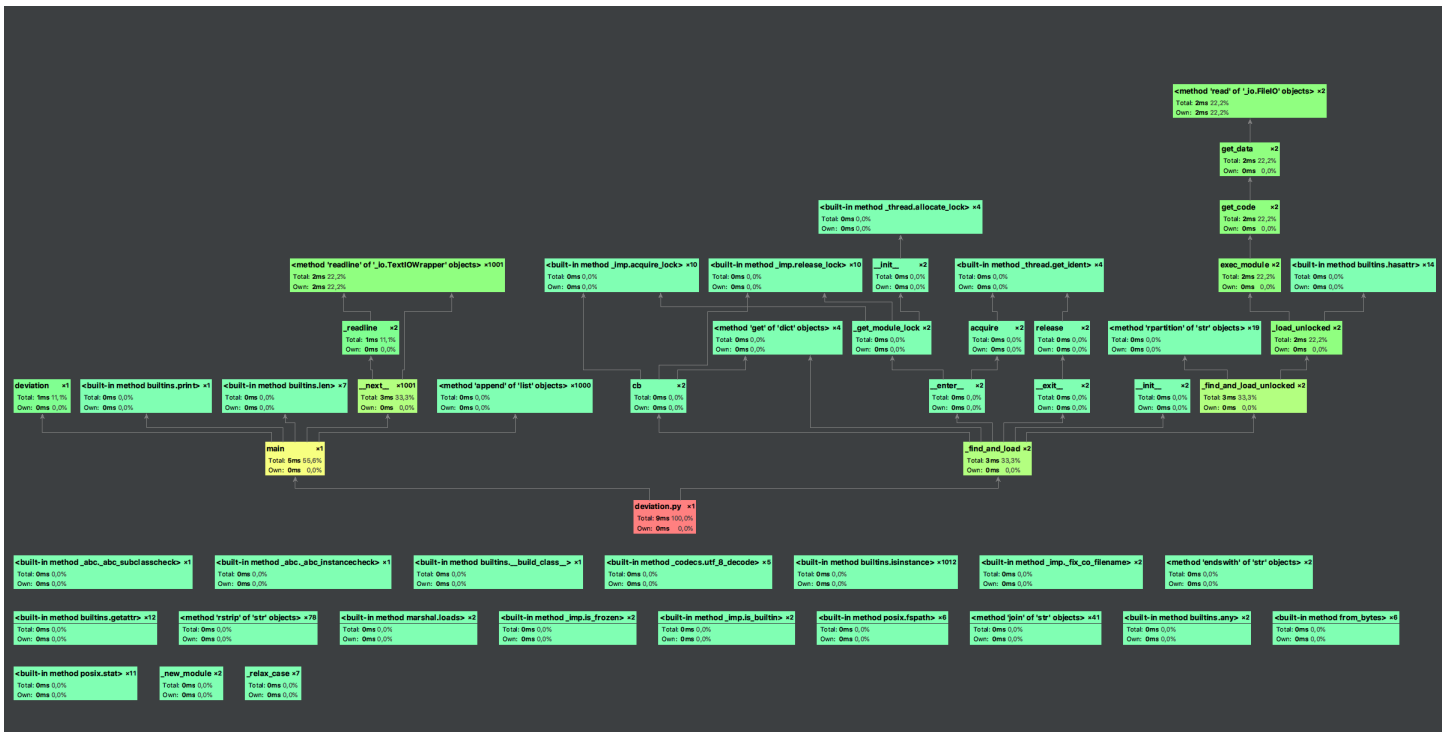

Figure 6: Tree visualisation of calculations with 1000 input values for sample standard deviation