Supplementary Data

to *NormiRazor – Tool Applying GPU-accelerated Computing for Determination of Internal References in MicroRNA Transcription Studies*

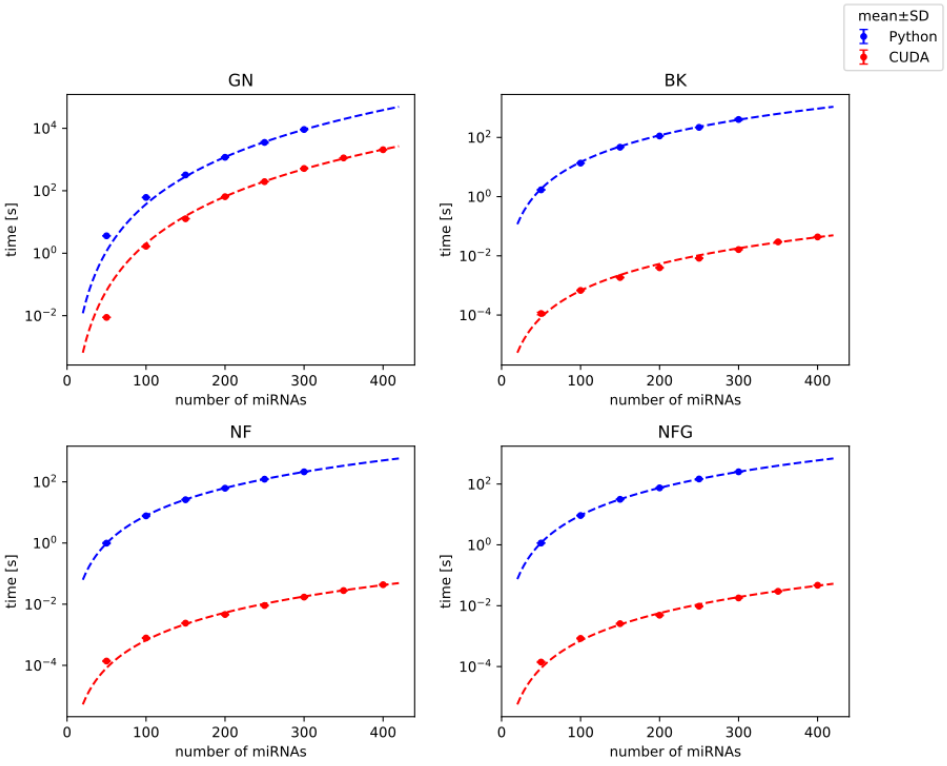
Suppl. Table 1: Hardware and software configuration of benchmark platforms.

	Platform 1	**Platform 2**
CPU	2x Intel Xeon E5-2620 v4 (8 cores, 16 threads per CPU) 2.1 GHz	Intel Xeon E5-2695 v3 (14 cores, 28 threads) 2.3 GHz
RAM	128 GB	32 GB
GPU	Nvidia Quadro P6000 24 GB GDDR5X 3840 CUDA cores	ASUS GeForce GTX 1080Ti 11 GB GDDR5X 3584 CUDA cores
CUDA Toolkit Version	9.1	8.0.62
Python Version	3.6.8	3.5.2
Relevant Python modules	Numpy 1.15.2 Scipy 1.0.1 Pandas 0.23.4	Numpy 1.14.5 Scipy 1.2.1 Pandas 0.24.1
Threads assigned to Python	24	16

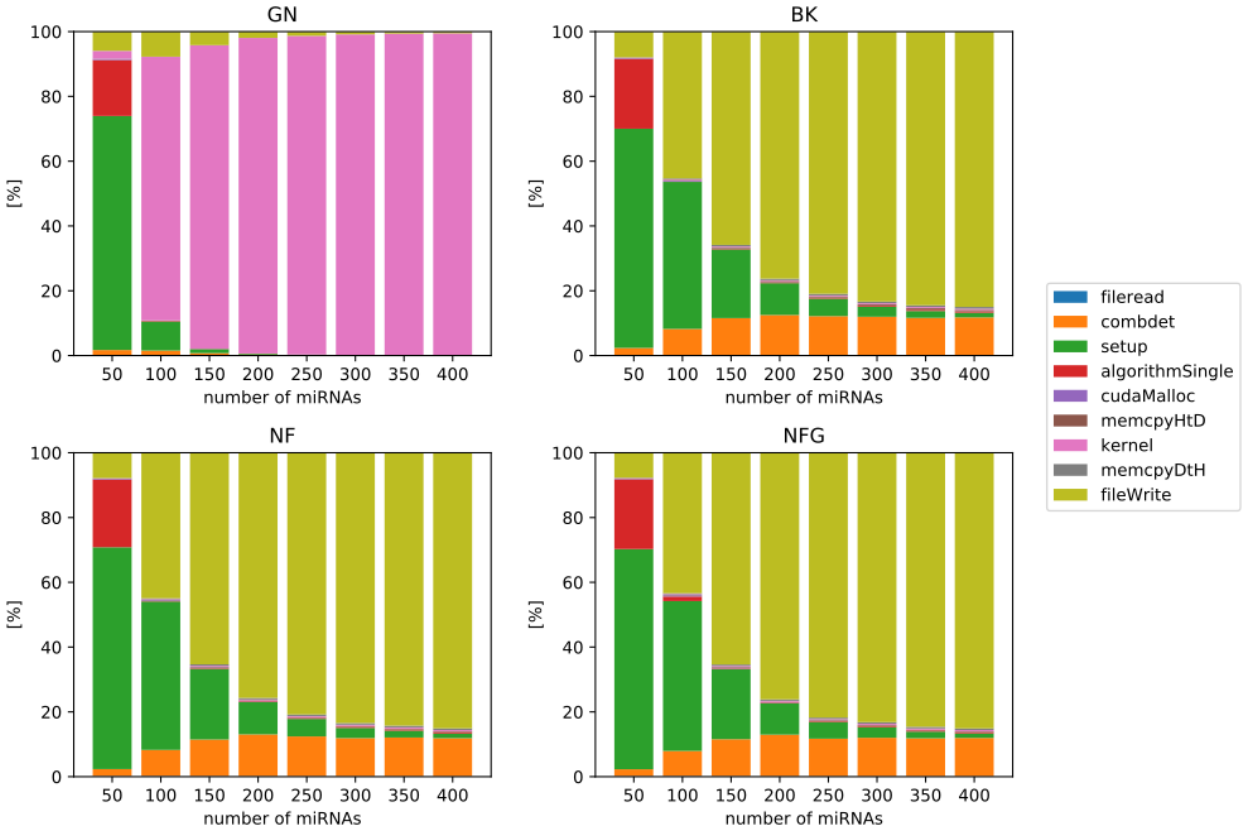
Additional results of benchmark test 1

Suppl. Table 2: Speed-up gained by CUDA implementation with respect to previous Python version. Result from both benchmark platforms.

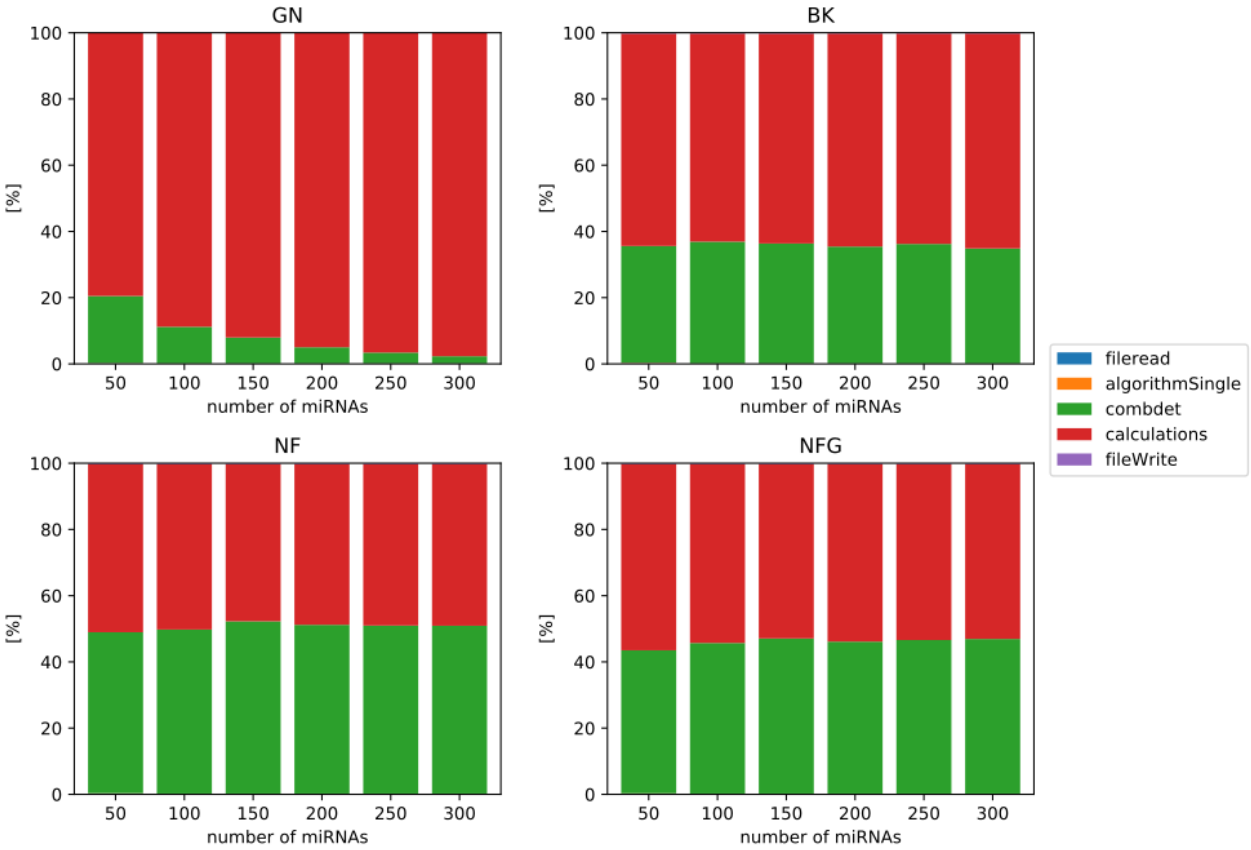
Speed-up ± SD	total		kernel			
Comb. len.	3		2		3	
Platform	1	2	1	2	1	2
GN	18.7 ± 0.6	25.6 ± 0.9	19.3 ± 1.8	26.7 ± 2.2	18.3 ± 0.6	25.0 ± 0.8
BK	104.7 ± 4.2	153.7 ± 42.1	12887.5 ± 1846.3	17123.8 ± 1841.3	21993.4 ± 1479.2	29775.5 ± 1773.2
NF	76.5 ± 2.2	115.0 ± 11.3	6195.2 ± 1035.1	8798.6 ± 1284.5	11877.1 ± 433.5	15116.2 ± 564.5
NFG	84.0 ± 3.3	113.9 ± 17.9	6665.7 ± 1105.0	7887.2 ± 1251.4	13164.5 ± 595.6	15260.3 ± 558.8



Suppl. Fig. 1: Comparison of the calculation (kernel) time of Python and CUDA implementations for 3-element normalizers on datasets with varying number of miRNAs. Benchmark done on the platform 1.

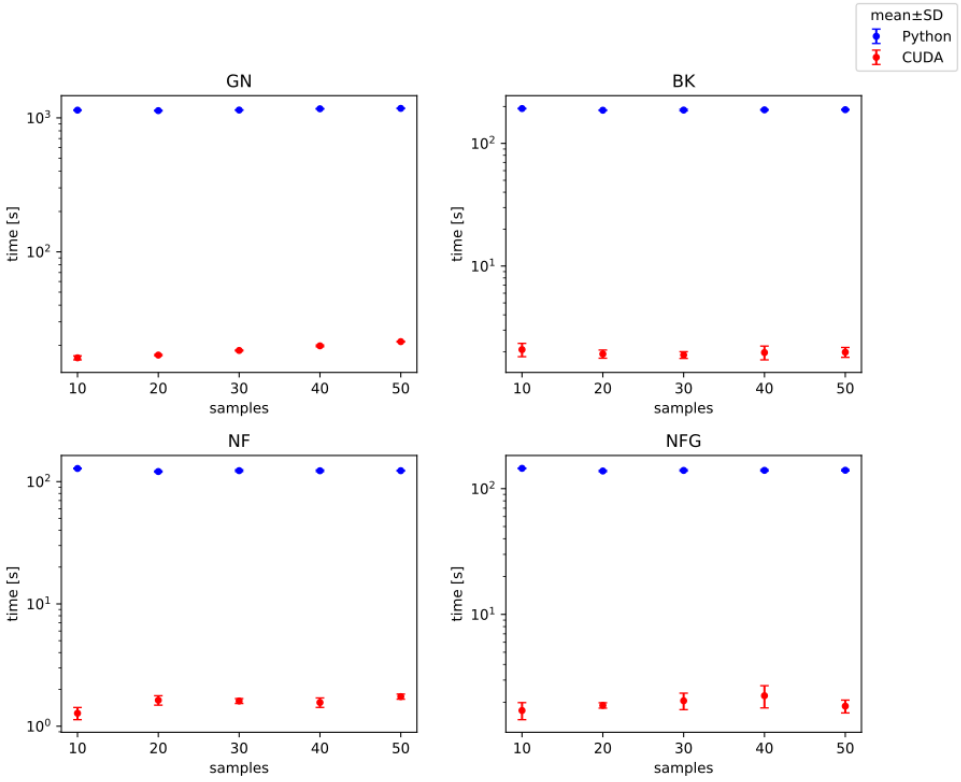


Suppl. Fig. 2: Distribution of execution time in CUDA implementations for 3-element normalizers. Test 1 on the platform 1. cudaMalloc: memory allocation on GPU, memcpyHtD – coping data from RAM to GPU memory, memcpyDtH – coping data from GPU memory to RAM, combdet – generation of a combination list, algorithSingle – execution of a given algorithm for single miRNAs.

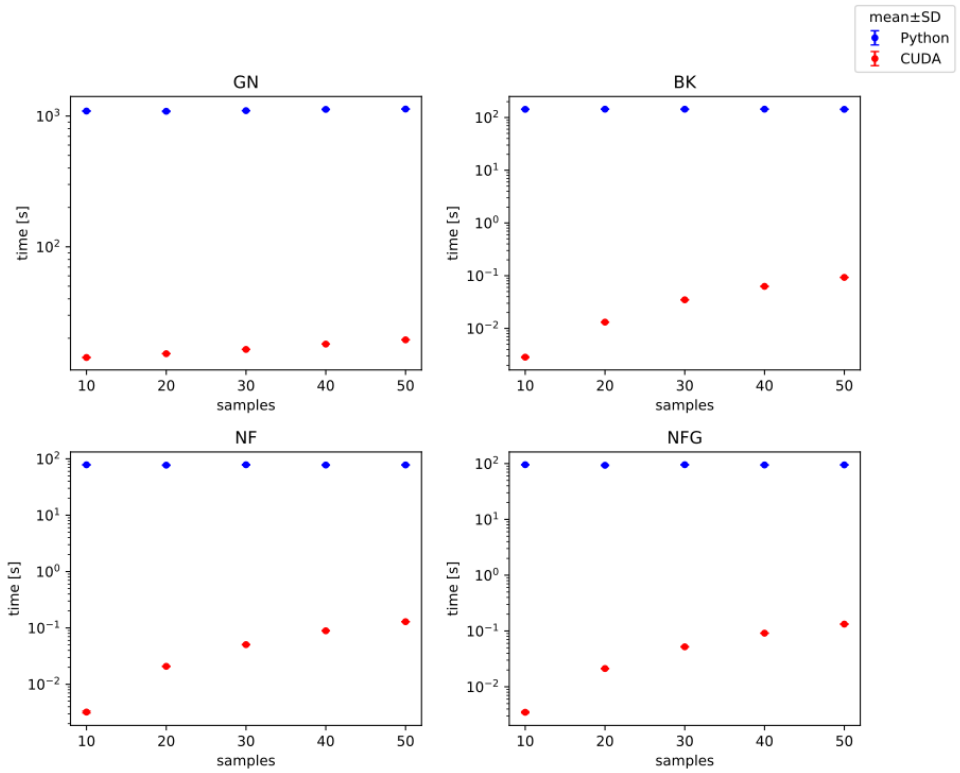


Suppl. Fig. 3: Distribution of execution time in Python implementations for 3-element normalizers. Test 1 on the platform 1.

Results of the benchmark test 2



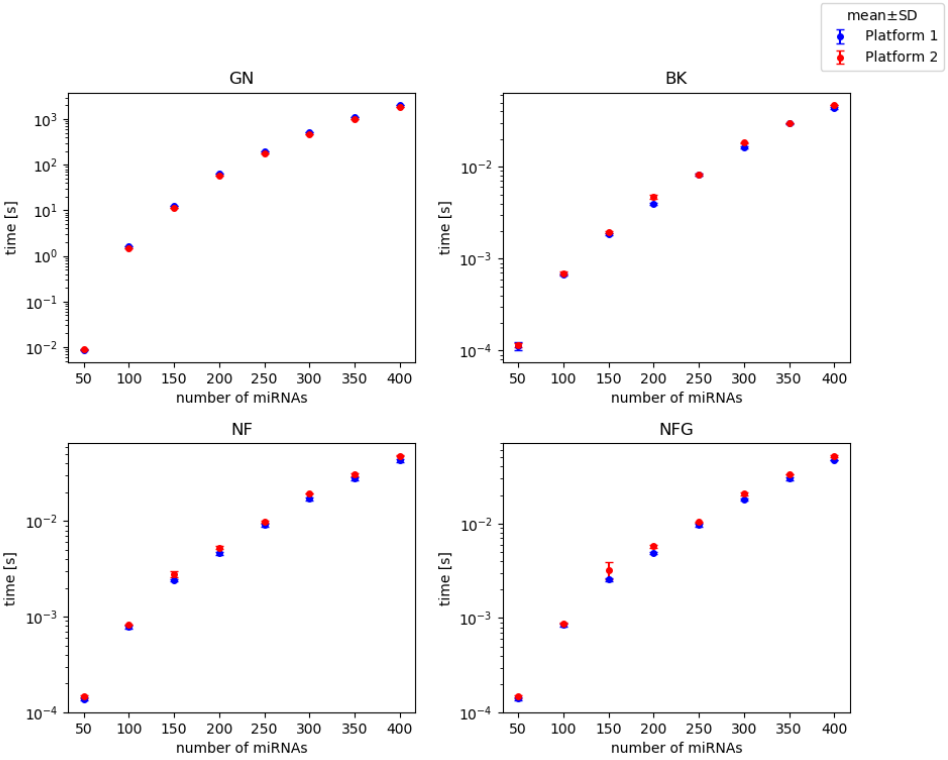
Suppl. Fig. 4: Comparison of total execution time of Python and CUDA implementations for 3-element normalizers on dataset with varying number of samples. Benchmark done on the platform 1.



Suppl. Fig. 5: Comparison of calculation time of Python and CUDA implementations for 3-element normalizers on dataset with varying number of samples. Benchmark done on the platform 1.

Comparison of two benchmark platforms

We compared kernel execution time on 2 platforms and plotted the results in Fig. 4. Even though the GPUs that the machines are equipped with are dedicated for different segments of the market, their performance in our case was comparable. Slight advantage of Platform 2 in BK, NF/NFG can be observed, while the Platform 1 was slightly faster with GN.



Suppl. Fig. 6: Comparison of total execution time on 2 platforms.