Reviewer’s report

Title: Genetically Improved BarraCUDA

Version: 0 Date: 14 Jun 2017

Reviewer: Guoshuai Cai

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Re: BIDM-D-16-00027

The study developed a new version of BarraCUDA, which is a sequencing read aligner using Burrows-Wheeler algorithm in parallel with nVidia CUDA. With a 3 times faster speed when mapping short reads (36bp) and a 10% faster speed on the long reads (100bp) than the old version, the new version has a value for providing high speed in the mapping process of the huge amount of whole genome sequencing data. However, there are several major concerns and suggestions to make it a stronger paper.

1. Introduction

- The introduction of sequencing aligners (at least BWA) and their algorithms, existing GPU aligners (at least those based on Burrows-Wheeler algorithm), such as GPUBwa, Swift, Arioc, nvBowtie and others.

- The description of algorithms of current BarraCUDA, especially how genetic programming improve the performance.

2. Method and Results

- Evaluation on more genomes will show a more persuasive result.

- According to the improvement of the speed, the accuracy of mapping of short reads (36 bp) may be much more important than that of long reads (100bp). Therefore, benchmark study on short reads is highly expected.

- It would be interesting and valuable to compare the current tool with other existing tools. Besides of the speed and accuracy, other aspects might also be important for evaluating the performance of aligners, such as the scale ability with the increasing number of query sequences, memory size and layout, data transfers between CPU and GPU memory, Divergent flow of control in parallel threads and others.
3. Some editing is needed.

- The figures of well-known fact on GPU vs CPU is not very necessary.

- Description and reference of supplementary data in the results are needed. And, it should be readable by multidisciplinary audience.

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Please indicate how interesting you found the manuscript:

An article of importance in its field

**Quality of written English**
Please indicate the quality of language in the manuscript:

Needs some language corrections before being published

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