Progress report 20173155 Kim jin kwon

My project title is simplex method using cuda. To get a speed up using gpu, I have to fully understand the simplex method and make a non-gpu program.

First I studied the simplex method and made a non-gpu program.

I found a some source code to implement a non-gpu program in c.

Here is the link <https://stackoverflow.com/questions/3956950/c-c-implementation-of-simplex-method>

I analyzed the source code. Actually the stage of the simplex method consists of selecting entering variable, selecting leaving variable, update that data..

First I add the random value problem generator to the program. I follow the similar rule in a paper(A Branch-and-Bound algorithm using multiple GPU-based LP solvers) to generate the problem. In this paper, they generate the problem with 5 variables for 1 equation. So I follow that rule.

I found there is some bug in this program. In simplex, when you select the leaving variable, you should only care of positive value in the pivot column. But this program doesn’t do that. So, it chooses the wrong leaving variable or don’t recognize unbounded problem. To solve both problem, I modify the source code. And it worked perfectly.

And there is one more important consideration to choose the leaving variable, when you select the redundancy variable. The simplex method falls into a cycle. To prevent the cycle, we should only consider the positive ratio during selecting the leaving variable.

The simplex method consists of a huge number of arithmetic operations. So it make a numerical error. I mean when the value should be zero, the value have non-zero value. (about 10^-30 value). so the simplex method runs forever. So I just set the epsilon to 10^-8, so when the value below epsilon, we consider that value to zero.

This is my progress until now. I think Converting from non-gpu program to gpu program is a half work in my project. Cause when you understand the simplex method and have a source code, it is easy to convert from non-gpu program to gpu program. So my future schedule is implementing that simplex method with gpu and optimize that code and get a result from them.fg