

# CUDA

Due:2014-11-24 23:59

## ➤ Problems

### 1. Convolution

References:

<http://en.wikipedia.org/wiki/Convolution>

[http://en.wikipedia.org/wiki/Gaussian\\_blur](http://en.wikipedia.org/wiki/Gaussian_blur)

Requirements:

Read the wiki pages above and implement Gaussian Blur Algorithm using CUDA.You should test your algorithm on real 2D images and write a report about your thoughts and results.

### 2. PrefixSum

References:

[http://en.wikipedia.org/wiki/Prefix\\_sum](http://en.wikipedia.org/wiki/Prefix_sum)

Requirements:

Read the wiki pages above and implement PrefixSum Algorithm using CUDA.You should compare your algorithm with other methods and write a report about your thoughts and results.

### 3. Sparse Matrix Vector Multiplication

References:

[http://en.wikipedia.org/wiki/Sparse\\_matrix](http://en.wikipedia.org/wiki/Sparse_matrix)

[http://en.wikipedia.org/wiki/Sparse\\_matrix-vector\\_multiplication](http://en.wikipedia.org/wiki/Sparse_matrix-vector_multiplication)

Requirements:

Read the wiki pages above and implement Sparse Matrix Vector Multiplication using CUDA.Try your best to optimize your cache and memory and write a report about your thoughts and results.

### 4. Fast Fourier Transform

References:

[http://en.wikipedia.org/wiki/Fast\\_Fourier\\_transform](http://en.wikipedia.org/wiki/Fast_Fourier_transform)

Requirements:

Read the wiki pages above and implement 2D-FFT Algorithm using CUDA.You should apply your algorithm on real 2D images and write a report about your thoughts and results.

### 5. Discrete Cosine Transform

References:

[http://en.wikipedia.org/wiki/Discrete\\_cosine\\_transform](http://en.wikipedia.org/wiki/Discrete_cosine_transform)

Requirements:

Read the wiki pages above and implement DCT Algorithm using CUDA.You should apply your algorithm on image compression and write a report about your thoughts and results.

### 6. K-Means

References:

[http://en.wikipedia.org/wiki/K-means\\_clustering](http://en.wikipedia.org/wiki/K-means_clustering)

Requirements:

Read the wiki pages above and implement K-Means Algorithm using CUDA.You should apply your algorithm on text clustering and write a report about your thoughts and results.

### 7. Bilateral Filter

References:

[http://en.wikipedia.org/wiki/Bilateral\\_filter](http://en.wikipedia.org/wiki/Bilateral_filter)

Requirements:

Read the wiki pages above and implement bilateral filter using CUDA. You should test your algorithm on real 2D images and write a report about your thoughts and results.

## 8. Non-local Means

References:

[http://en.wikipedia.org/wiki/Non-local\\_means](http://en.wikipedia.org/wiki/Non-local_means)

Requirements:

Read the wiki pages above and implement Non-local Means Algorithm using CUDA. You should apply your algorithm on image denoising and write a report about your thoughts and results.

## ➤ Task Assignment

There are 8 problems above and you can get which problem your group should complete.

Group ID	Group Member	Problem ID
1	刘涛 陈宇翔	1
2	赵申剑 陈蕾宇 徐文康	2
3	黄一峰 高脊 乐俊伟	3
4	刘天元 张阳	4
5	邱宇贤 马子泰 周浩	5
6	谢梦竹 蒋仕龙	6
7	袁野 钮敏哲	7
8	程尧 王欣 徐涵	8
9	黎俊 庞浦 MARCELO ANDRADE	4

## ➤ NOTICE

1. Marking Criterion: We will evaluate your program from several aspects.
  - Optimize Technology(40%)
  - Execution Efficiency(30%)
  - Correctness(20%)
  - Code Style(10%)
2. The group leader should send the final version to TA before due date. You should archive your source code and report with name GroupX\_Assinment3.rar(or any archive file types)(For Example: Group1\_Assignment3.rar).
3. If you have any questions, please feel free to contact TA.
4. CUDA Tutorials: <http://docs.nvidia.com/cuda/index.html>
5. If you don't have CUDA devices, you can login into our server using the account allocated for your group. Please modify your password in case of data leakage.

Account Information: [UserName/ Password: groupX/groupX, For Example: group1/group1]

Login Command Using SSH: [ssh [groupX@202.120.38.28](mailto:groupX@202.120.38.28)]

Server Configuration	
CUDA DEVICE	Tesla C2075@6GB GeForce GTS 450@1GB

CUDA VERSION	5.5.0
CPU	Intel(R) Xeon(R) CPU E5645@2.40GHz
MEMORY	24GB
OS	Arch Linux
GCC VERSION	4.8.1
IP	202.120.38.28

➤ **Warning:**

No cheating, please refer to 《上海交通大学学生学业诚信守则》, it is your responsibility to take the consequences if you violate the rule.