EE451 – Programming HW #1

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System Information:
OS: macOS Mojave (v 10.14)
Processor: 1.6GHz Intel Core i5
Memory: 8 GB 1600 MHz DDR3
Graphics: Intel HD Graphics 6000 1536 MB

Q1. 1 Naïve Matrix Multiplication (Dimensions 4K x 4K)

Took average of 3 trials for each.

Execution time (s) = 2061.79

Performance (FLOPS per sec) = 66.66 x 10_6

Q1. 2 Block Matrix Multiplication

Took average of 3 trials for each.

For b = 4:

Execution time (s) = 640.81

Performance (MFLOPS per sec) = 214.47

For b = 8:

Execution time (s) = 590.56

Performance (MFLOPS per sec) = 232.72

For b = 16:

Execution time (s) = 532.313

Performance (MFLOPS per sec) = 258.641

Fig 1:

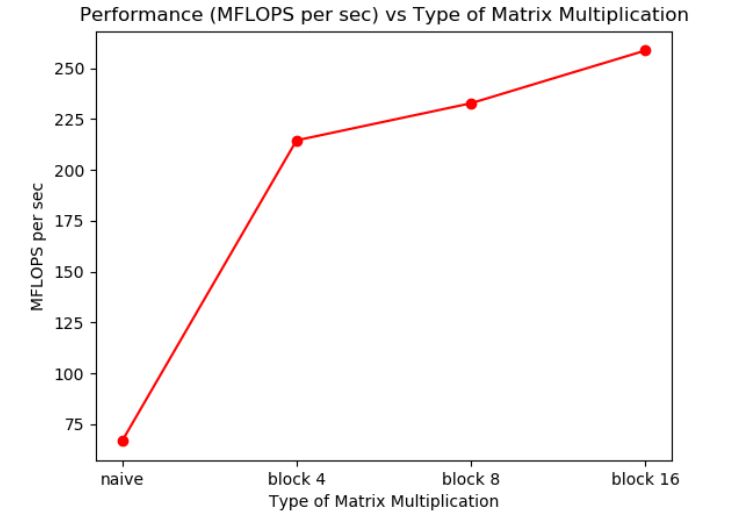
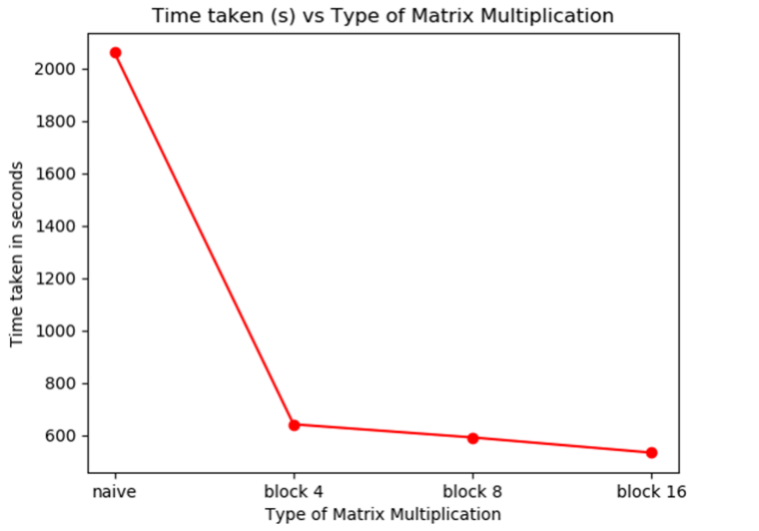


Fig 2:



Observation: In naïve matrix multiplication, the time taken for multiplication is highest and performance is lowest. Whereas in block matrix multiplication, time decreases and performance increase as we increase block size. This is because of the caching of data brought in blocks. There is higher hit ratio in cache.

Conclusion: As we increase the block size, the performance improves and time decreases

Q2. K-Means Algorithm

Execution time (s) = 43.98

Input Image Before Clustering:

Output Image after clustering: