CSI2120
PROJECT PART 3 - GO
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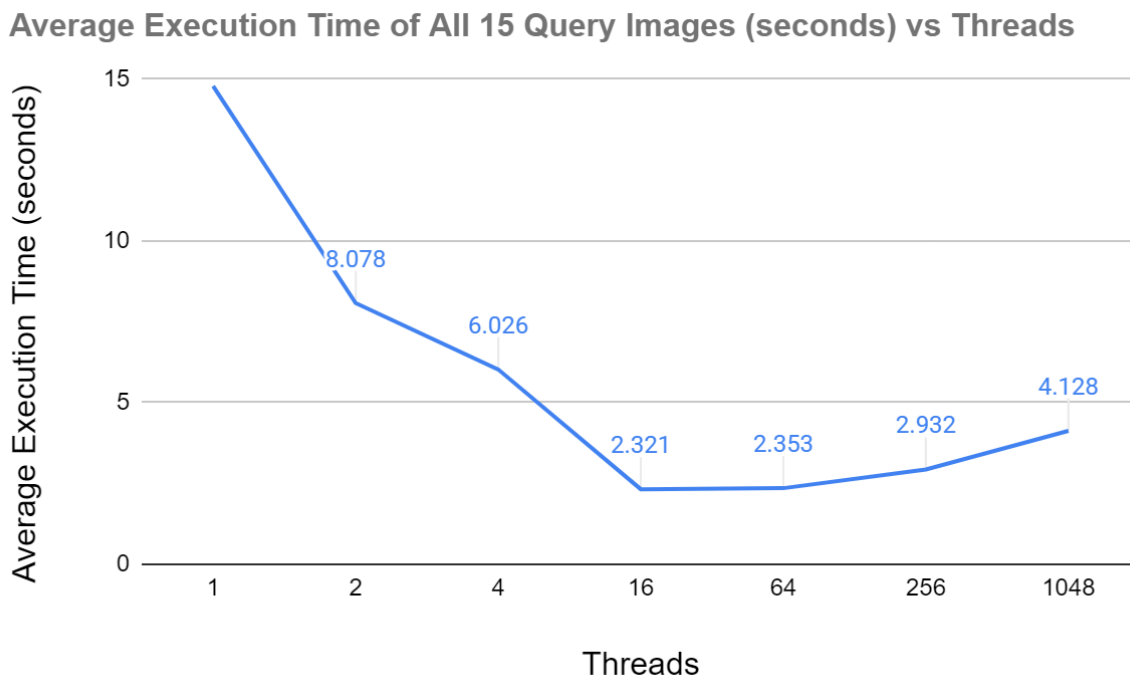To measure the execution, we took the average for all 15 query images for each K value.

The performance test was done with the following hardware specifications:
OS: Windows 11 Home Version 10.0.22631 Build 22631
CPU: AMD Ryzen 7 5800H with Radeon Graphics, 3201 Mhz, 8 Core(s), 16 Logical Processor(s)

Based on Figure 1, we can see that 16 threads is the most optimal amount of threads to use for the similarity search algorithm (this may vary depending on your hardware configuration).

Figure 1. Relationship Between Average Execution Time of All 15 Query Images and Thread Count

Average Execution Time of All 15 Query Images (seconds) vs Threads

The specifics for the performance test is shown below

Execution time for query image q00.jpg with K = 1 : 14.5961508s
Execution time for query image q01.jpg with K = 1 : 14.5809702s
Execution time for query image q02.jpg with K = 1 : 14.4544425s
Execution time for query image q03.jpg with K = 1 : 15.8092925s
Execution time for query image q04.jpg with K = 1 : 15.7125687s
Execution time for query image q05.jpg with K = 1 : 15.863003s

Execution time for query image q06.jpg with K = 1 : 15.0074285s
Execution time for query image q07.jpg with K = 1 : 14.6179104s
Execution time for query image q08.jpg with K = 1 : 14.7251314s
Execution time for query image q09.jpg with K = 1 : 14.625216s
Execution time for query image q10.jpg with K = 1 : 14.4330754s
Execution time for query image q11.jpg with K = 1 : 14.4893025s
Execution time for query image q12.jpg with K = 1 : 14.7528958s
Execution time for query image q13.jpg with K = 1 : 14.5296139s
Execution time for query image q14.jpg with K = 1 : 14.1825056s
Execution time for query image q15.jpg with K = 1 : 14.2221539s
Average execution time for 16 query images with K = 1 : 14.787603818s

Execution time for query image q00.jpg with K = 2 : 7.5730891s
Execution time for query image q01.jpg with K = 2 : 8.0269247s
Execution time for query image q02.jpg with K = 2 : 7.6467758s
Execution time for query image q03.jpg with K = 2 : 7.5151589s
Execution time for query image q04.jpg with K = 2 : 7.997942s
Execution time for query image q05.jpg with K = 2 : 8.1596421s
Execution time for query image q06.jpg with K = 2 : 8.0972361s
Execution time for query image q07.jpg with K = 2 : 7.4995839s
Execution time for query image q08.jpg with K = 2 : 8.450489s
Execution time for query image q09.jpg with K = 2 : 8.5495103s
Execution time for query image q10.jpg with K = 2 : 8.5356854s
Execution time for query image q11.jpg with K = 2 : 8.3930626s
Execution time for query image q12.jpg with K = 2 : 9.5853797s
Execution time for query image q13.jpg with K = 2 : 7.8005796s
Execution time for query image q14.jpg with K = 2 : 7.7139944s
Execution time for query image q15.jpg with K = 2 : 7.7034824s
Average execution time for 16 query images with K = 2 : 8.0780335s

Execution time for query image q00.jpg with K = 4 : 4.4103726s
Execution time for query image q01.jpg with K = 4 : 4.7218546s
Execution time for query image q02.jpg with K = 4 : 6.1012058s
Execution time for query image q03.jpg with K = 4 : 7.8147476s
Execution time for query image q04.jpg with K = 4 : 7.2826803s
Execution time for query image q05.jpg with K = 4 : 5.471761s
Execution time for query image q06.jpg with K = 4 : 6.4633899s
Execution time for query image q07.jpg with K = 4 : 6.705079s
Execution time for query image q08.jpg with K = 4 : 5.9756541s
Execution time for query image q09.jpg with K = 4 : 7.3221068s
Execution time for query image q10.jpg with K = 4 : 7.3902803s
Execution time for query image q11.jpg with K = 4 : 6.393438s
Execution time for query image q12.jpg with K = 4 : 6.8625974s
Execution time for query image q13.jpg with K = 4 : 4.2291852s
Execution time for query image q14.jpg with K = 4 : 4.7420531s
Execution time for query image q15.jpg with K = 4 : 4.5350873s
Average execution time for 16 query images with K = 4 : 6.026343312s

Execution time for query image q00.jpg with K = 16 : 2.2345057s
Execution time for query image q01.jpg with K = 16 : 2.1927915s
Execution time for query image q02.jpg with K = 16 : 2.3099005s
Execution time for query image q03.jpg with K = 16 : 2.2729642s
Execution time for query image q04.jpg with K = 16 : 2.2209224s
Execution time for query image q05.jpg with K = 16 : 2.2760742s
Execution time for query image q06.jpg with K = 16 : 2.2796405s
Execution time for query image q07.jpg with K = 16 : 2.4554821s
Execution time for query image q08.jpg with K = 16 : 2.4194577s
Execution time for query image q09.jpg with K = 16 : 2.4890608s
Execution time for query image q10.jpg with K = 16 : 2.3234316s
Execution time for query image q11.jpg with K = 16 : 2.3188852s
Execution time for query image q12.jpg with K = 16 : 2.3747892s
Execution time for query image q13.jpg with K = 16 : 2.2870508s
Execution time for query image q14.jpg with K = 16 : 2.3143462s
Execution time for query image q15.jpg with K = 16 : 2.3673084s
Average execution time for 16 query images with K = 16 : 2.321038187s

Execution time for query image q00.jpg with K = 64 : 2.4898838s
Execution time for query image q01.jpg with K = 64 : 2.2568673s
Execution time for query image q02.jpg with K = 64 : 2.3035152s
Execution time for query image q03.jpg with K = 64 : 2.3713407s
Execution time for query image q04.jpg with K = 64 : 2.2663012s
Execution time for query image q05.jpg with K = 64 : 2.3167769s
Execution time for query image q06.jpg with K = 64 : 2.3002588s
Execution time for query image q07.jpg with K = 64 : 2.2732057s
Execution time for query image q08.jpg with K = 64 : 2.3345573s
Execution time for query image q09.jpg with K = 64 : 2.3876791s
Execution time for query image q10.jpg with K = 64 : 2.4457958s
Execution time for query image q11.jpg with K = 64 : 2.3802751s
Execution time for query image q12.jpg with K = 64 : 2.5111436s
Execution time for query image q13.jpg with K = 64 : 2.388729s
Execution time for query image q14.jpg with K = 64 : 2.4282683s
Execution time for query image q15.jpg with K = 64 : 2.1972036s
Average execution time for 16 query images with K = 64 : 2.353237587s

Execution time for query image q00.jpg with K = 256 : 2.8093554s
Execution time for query image q01.jpg with K = 256 : 2.9912992s
Execution time for query image q02.jpg with K = 256 : 2.824714s
Execution time for query image q03.jpg with K = 256 : 2.8056345s
Execution time for query image q04.jpg with K = 256 : 3.0346003s
Execution time for query image q05.jpg with K = 256 : 2.9680229s
Execution time for query image q06.jpg with K = 256 : 2.9244635s
Execution time for query image q07.jpg with K = 256 : 2.9132762s
Execution time for query image q08.jpg with K = 256 : 2.9829102s
Execution time for query image q09.jpg with K = 256 : 2.8767222s

Execution time for query image q10.jpg with K = 256 : 2.8631382s
Execution time for query image q11.jpg with K = 256 : 3.0700553s
Execution time for query image q12.jpg with K = 256 : 2.9345445s
Execution time for query image q13.jpg with K = 256 : 2.9614798s
Execution time for query image q14.jpg with K = 256 : 2.9280937s
Execution time for query image q15.jpg with K = 256 : 3.0252683s
Average execution time for 16 query images with K = 256 : 2.932098637s

Execution time for query image q00.jpg with K = 1048 : 3.8658793s
Execution time for query image q01.jpg with K = 1048 : 3.9551346s
Execution time for query image q02.jpg with K = 1048 : 4.0832624s
Execution time for query image q03.jpg with K = 1048 : 4.2147981s
Execution time for query image q04.jpg with K = 1048 : 4.4571864s
Execution time for query image q05.jpg with K = 1048 : 4.1698675s
Execution time for query image q06.jpg with K = 1048 : 4.0905865s
Execution time for query image q07.jpg with K = 1048 : 4.2810439s
Execution time for query image q08.jpg with K = 1048 : 4.164511s
Execution time for query image q09.jpg with K = 1048 : 4.02963s
Execution time for query image q10.jpg with K = 1048 : 4.1658755s
Execution time for query image q11.jpg with K = 1048 : 4.1252708s
Execution time for query image q12.jpg with K = 1048 : 3.7636006s
Execution time for query image q13.jpg with K = 1048 : 4.2511194s
Execution time for query image q14.jpg with K = 1048 : 4.2457832s
Execution time for query image q15.jpg with K = 1048 : 4.1822349s
Average execution time for 16 query images with K = 1048 : 4.127861506s