by Jeremy Williams

Kmeans CPU-GPU Class (K) + Multi-Dimensional Performance Analysis

2019

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1. CLASS K (CLUSTER) PERFORMANCE ANALYSIS

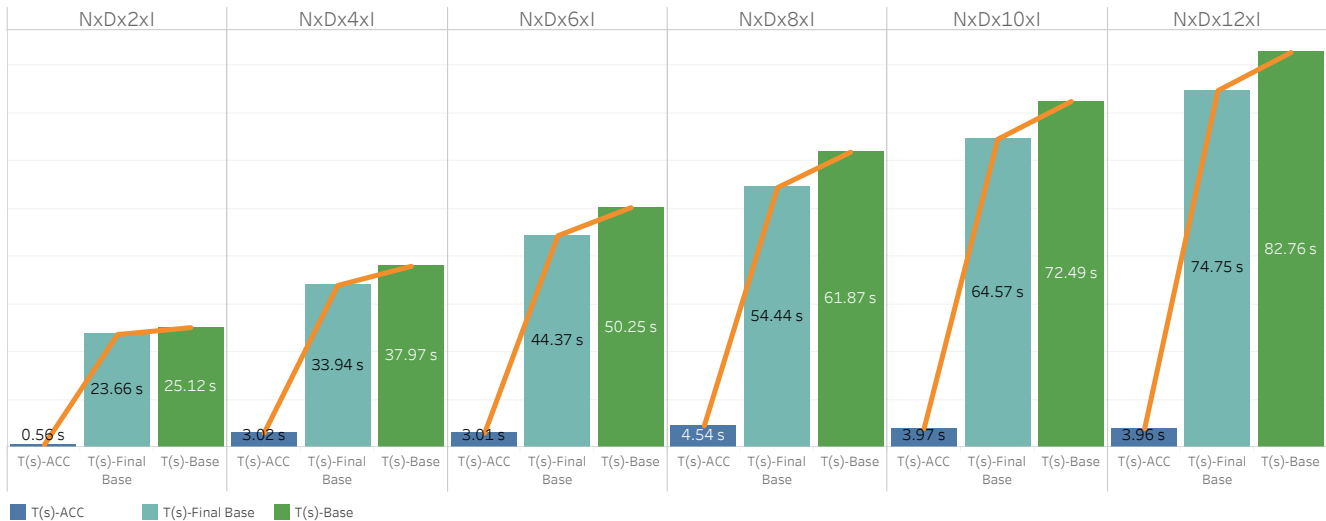**2**. MULTI-DIMENSIONAL PERFORMANCE ANALYSIS

Analysis Report Bases

- The USCensus1990raw data set was collected as part of the 1990 census from the (U.S. Department of Commerce) Census Bureau website at http://www.census.gov/.

- The data set was extracted using the Data Extraction System found at http://dataferrett.census.gov/.

- The data set is a 1% sample of the Public Use Microdata Samples (PUMS) person records drawn from the full 1990 census sample.

- The sample contains 68 categorical attributes with a sequence of operations via Randomization and Selection of Attributes.

- The sample also contains 2,458,285 number of instances reduced by 40.68% (1million) for advanced analytics insight and final results readability via .CSV to Microsoft Excel.

CLASS K - PERFORMANCE TABLE PER TIME(s)

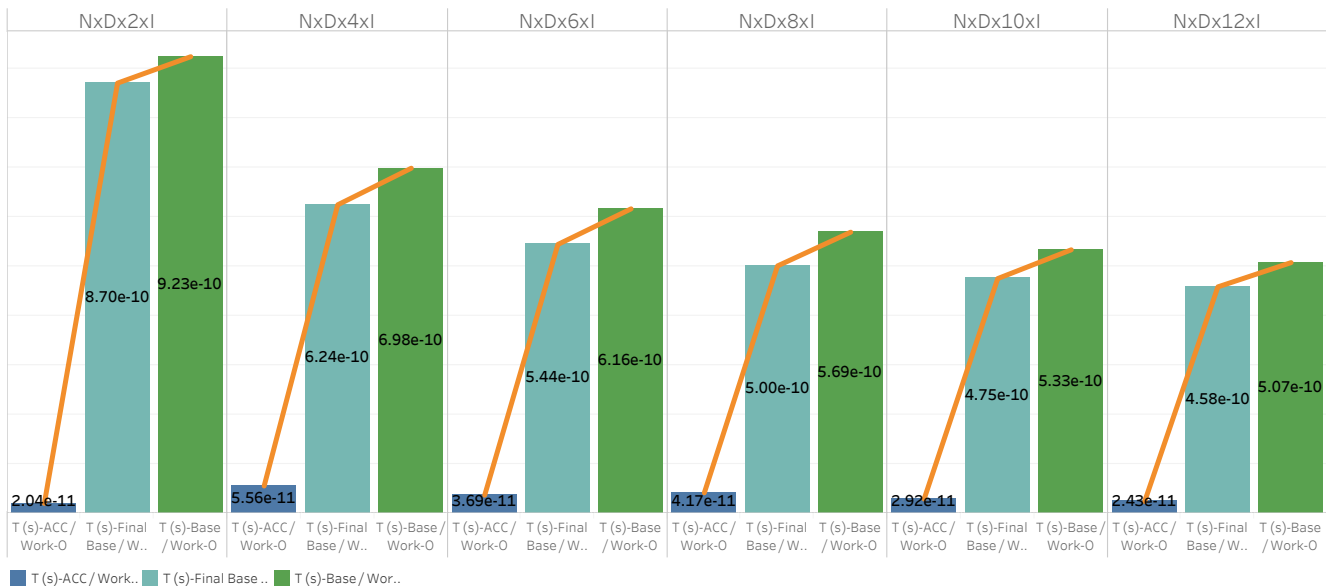| Class (K) Performance Analysis	N(Rows)	Dimensions	Class (K)	I (Iterations)	Work-O (NxKxDxI)	T(s)-ACC	T(s)-Final Base	T(s)-Base
NxDx2xI	1,000,000	68	2	200	27.20B	0.56 s	23.66 s	25.12 s
NxDx4xI	1,000,000	68	4	200	54.40B	3.02 s	33.94 s	37.97 s
NxDx6xI	1,000,000	68	6	200	81.60B	3.01 s	44.37 s	50.25 s
NxDx8xI	1,000,000	68	8	200	108.80B	4.54 s	54.44 s	61.87 s
NxDx10xI	1,000,000	68	10	200	136.00B	3.97 s	64.57 s	72.49 s
NxDx12xI	1,000,000	68	12	200	163.20B	3.96 s	74.75 s	82.76 s

CLASS K - PERFORMANCE FLOW PER TIME (s)

CLASS K - PERFORMANCE TABLES PER TIME(s)/WORK O(NxDxKxI)

Class (K) Performance Analysis	N(Rows)	Dimensions	Class (K)	I (Iterations)	Work-O (NxKxDxI)	T (s)-ACC / Work-O	T (s)-Final Base / Work..	T (s)-Base / Work-O
NxDx2xI	1,000,000	68	2	200	27.20B	2.04e-11	8.70e-10	9.23e-10
NxDx4xI	1,000,000	68	4	200	54.40B	5.56e-11	6.24e-10	6.98e-10
NxDx6xI	1,000,000	68	6	200	81.60B	3.69e-11	5.44e-10	6.16e-10
NxDx8xI	1,000,000	68	8	200	108.80B	4.17e-11	5.00e-10	5.69e-10
NxDx10xI	1,000,000	68	10	200	136.00B	2.92e-11	4.75e-10	5.33e-10
NxDx12xI	1,000,000	68	12	200	163.20B	2.43e-11	4.58e-10	5.07e-10

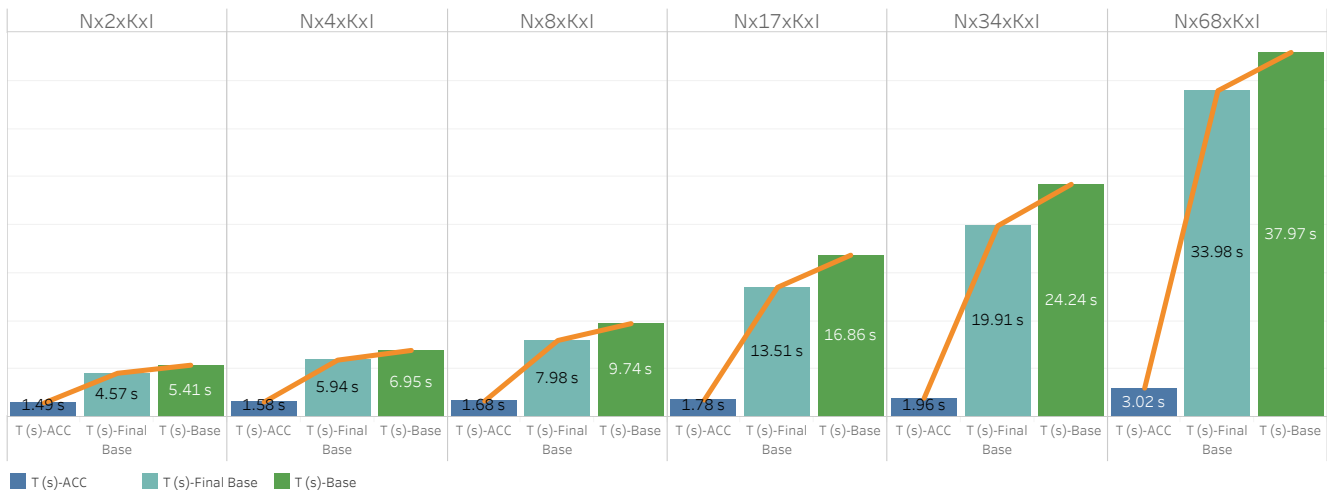## CLASS K - PERFORMANCE FLOW PER TIME(s)/WORK O(NxDxKxI)

DIMENSION - PERFORMANCE TABLE PER TIME(s)

Dimension Performance Analysis	N(Rows)	Dimensions	Class (K)	I (Iterations)	Work-O (NxKxDxI)	T (s)-ACC	T (s)-Final Base	T (s)-Base
Nx2xKxI	1,000,000	2	4	200	1.60B	1.49 s	4.57 s	5.41 s
Nx4xKxI	1,000,000	4	4	200	3.20B	1.58 s	5.94 s	6.95 s
Nx8xKxI	1,000,000	8	4	200	6.40B	1.68 s	7.98 s	9.74 s
Nx17xKxI	1,000,000	17	4	200	13.60B	1.78 s	13.51 s	16.86 s
Nx34xKxI	1,000,000	34	4	200	27.20B	1.96 s	19.91 s	24.24 s
Nx68xKxI	1,000,000	68	4	200	54.40B	3.02 s	33.98 s	37.97 s

DIMENSION PERFORMANCE PER TIME (s)

DIMENSION - PERFORMANCE TABLES PER TIME(s)/WORK O(NxDxKxI)

Dimension Performance Analysis	N(Rows)	Dimensions	Class (K)	I (Iterations)	Work-O (NxKxDxI)	T (s)-ACC / Work-O	T (s)-Final Base / Work-O	T (s)-Base / Work-O
Nx2xKxI	1,000,000	2	4	200	1.60B	9.30e-10	2.86e-09	3.38e-09
Nx4xKxI	1,000,000	4	4	200	3.20B	4.92e-10	1.86e-09	2.17e-09
Nx8xKxI	1,000,000	8	4	200	6.40B	2.62e-10	1.25e-09	1.52e-09
Nx17xKxI	1,000,000	17	4	200	13.60B	1.31e-10	9.94e-10	1.24e-09
Nx34xKxI	1,000,000	34	4	200	27.20B	7.22e-11	7.32e-10	8.91e-10
Nx68xKxI	1,000,000	68	4	200	54.40B	5.56e-11	6.25e-10	6.98e-10

DIMENSION PERFORMANCE PER TIME (s)/WORK O(NxDxKxI)