UTS – Big Data implementasi penggunaan worker

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100 X 100

Worker 2

```
if __name__ == "__main__":
    spark = SparkSession.builder.appName("MatrixMultiply").getOrCreate()

    matrix_a = np.random.rand(100, 100)
    matrix_b = np.random.rand(100, 100)

    start = time.time()
    hasil = matrix_multiply_spark(spark, matrix_a, matrix_b)
    end = time.time()

    print(f"Waktu eksekusi: {end - start:.2f} detik")
    print("Hasil 5x5 pertama:")
    print(hasil[:5, :5])

    spark.stop()
```

```
Waktu eksekusi: 23.67 detik
Hasil 5x5 pertama:
[[23.10119105 21.07833969 27.45987034 23.92855414 24.81610378]
 [24.7734894  22.25279869 27.01480398 25.38804959 24.33272654]
 [25.85183138 23.19183927 28.9863343  26.08380498 25.79736086]
 [27.34003124 23.55905953 28.23101197 25.29015953 25.47095674]
 [24.41344873 22.53473711 27.58223423 26.23570435 23.61746054]]
```

Worker 4

```
if __name__ == "__main__":
    spark = SparkSession.builder.appName("MatrixMultiply").getOrCreate()

    matrix_a = np.random.rand(100, 100)
    matrix_b = np.random.rand(100, 100)

    start = time.time()
    hasil = matrix_multiply_spark(spark, matrix_a, matrix_b)
    end = time.time()

    print(f"Waktu eksekusi: {end - start:.2f} detik")
    print("Hasil 5x5 pertama:")
    print(hasil[:5, :5])

    spark.stop()
```

```
Waktu eksekusi: 23.13 detik
Hasil 5x5 pertama:
[[23.76180205 27.08111624 24.75981734 21.63368934 21.69278442]
 [27.71289544 27.60312725 26.86410631 21.33524151 23.47408469]
 [25.17540633 26.04772841 24.65200163 21.63266643 21.29582378]
 [28.84073857 26.92057994 25.95832022 21.56496648 24.73666106]
 [26.86417344 28.95150776 25.67520531 22.81515026 24.06012349]]
```

[ ]:

Worker 6

```
if __name__ == "__main__":
    spark = SparkSession.builder.appName("MatrixMultiply").getOrCreate()

    matrix_a = np.random.rand(100, 100)
    matrix_b = np.random.rand(100, 100)

    start = time.time()
    hasil = matrix_multiply_spark(spark, matrix_a, matrix_b)
    end = time.time()

    print(f"Waktu eksekusi: {end - start:.2f} detik")
    print("Hasil 5x5 pertama:")
    print(hasil[:5, :5])

    spark.stop()
```

```
Waktu eksekusi: 21.52 detik
Hasil 5x5 pertama:
[[27.79129678 28.4972946  27.22530298 25.30206044 24.88580634]
 [22.56072699 23.58946173 24.20582769 22.5825585  22.05946308]
 [26.47793697 27.90843782 29.07004135 27.72003229 25.3964938 ]
 [27.13610314 27.32071654 27.04530839 26.28180971 25.0552395 ]
 [24.72724915 22.82192744 25.34038402 22.47813503 22.24369751]]
```

200 X 200

Worker 2

```
if __name__ == "__main__":
    spark = SparkSession.builder.appName("MatrixMultiply").getOrCreate()

    matrix_a = np.random.rand(200, 200)
    matrix_b = np.random.rand(200, 200)

    start = time.time()
    hasil = matrix_multiply_spark(spark, matrix_a, matrix_b)
    end = time.time()

    print(f"Waktu eksekusi: {end - start:.2f} detik")
    print("Hasil 5x5 pertama:")
    print(hasil[:5, :5])

    spark.stop()
```

```
Waktu eksekusi: 27.06 detik
Hasil 5x5 pertama:
[[47.88549774 45.41903915 44.29984865 44.10999725 42.84329823]
 [48.48564664 49.03726031 48.23592127 47.62247151 44.23126508]
 [51.63459947 52.1392028  50.12483461 48.1768477  47.43404424]
 [53.05578828 50.89961683 51.11291256 51.55609904 50.09961461]
 [43.55451674 44.38541923 44.90747723 43.12237014 43.34229509]]
```

Worker 4

```
if __name__ == "__main__":
    spark = SparkSession.builder.appName("MatrixMultiply").getOrCreate()

    matrix_a = np.random.rand(200, 200)
    matrix_b = np.random.rand(200, 200)

    start = time.time()
    hasil = matrix_multiply_spark(spark, matrix_a, matrix_b)
    end = time.time()

    print(f"Waktu eksekusi: {end - start:.2f} detik")
    print("Hasil 5x5 pertama:")
    print(hasil[:5, :5])

    spark.stop()
```

```
Waktu eksekusi: 24.10 detik
Hasil 5x5 pertama:
[[47.41399849 54.79735996 49.33290457 51.36701102 53.71750865]
 [51.12488049 54.06055174 50.84183125 51.70088813 54.44256926]
 [47.29004447 51.53556364 47.58946592 47.92416702 50.7916396 ]
 [45.4863462  51.26253485 49.59950242 49.71200341 51.18125873]
 [49.35326837 50.19420292 50.14387858 51.34415806 53.25115711]]
```

Worker 6

```
if __name__ == "__main__":
    spark = SparkSession.builder.appName("MatrixMultiply").getOrCreate()

    matrix_a = np.random.rand(200, 200)
    matrix_b = np.random.rand(200, 200)

    start = time.time()
    hasil = matrix_multiply_spark(spark, matrix_a, matrix_b)
    end = time.time()

    print(f"Waktu eksekusi: {end - start:.2f} detik")
    print("Hasil 5x5 pertama:")
    print(hasil[:5, :5])

    spark.stop()
```

```
Waktu eksekusi: 23.17 detik
Hasil 5x5 pertama:
[[47.65228728 43.42800461 47.56060889 45.40781972 50.44612559]
 [52.16929255 45.75452664 51.54498388 46.20892643 51.46748814]
 [51.89187846 44.37745988 48.44703622 47.46437052 52.54560204]
 [53.93067587 44.3972761  50.80805147 48.21214704 53.02053744]
 [50.05671702 44.18641516 49.51756388 48.06537629 52.3509803 ]]
```

500 x 500

Worker 2

```
if __name__ == "__main__":
    spark = SparkSession.builder.appName("MatrixMultiply").getOrCreate()

    matrix_a = np.random.rand(500, 500)
    matrix_b = np.random.rand(500, 500)

    start = time.time()
    hasil = matrix_multiply_spark(spark, matrix_a, matrix_b)
    end = time.time()

    print(f"Waktu eksekusi: {end - start:.2f} detik")
    print("Hasil 5x5 pertama:")
    print(hasil[:5, :5])

    spark.stop()
```

```
Waktu eksekusi: 38.38 detik
Hasil 5x5 pertama:
[[135.28149179 128.14438937 121.26053558 124.31186053 129.42066357]
 [129.56764237 125.30314398 117.8606525  119.91736547 125.87495071]
 [127.8821076  120.8955516  119.36870656 118.97036707 126.97322607]
 [131.58783329 124.21888947 119.37839715 119.54857107 125.78516287]
 [131.51421375 122.84680742 119.61844992 117.67840197 124.27380231]]
```

Worker 4

```
if __name__ == "__main__":
    spark = SparkSession.builder.appName("MatrixMultiply").getOrCreate()

    matrix_a = np.random.rand(500, 500)
    matrix_b = np.random.rand(500, 500)

    start = time.time()
    hasil = matrix_multiply_spark(spark, matrix_a, matrix_b)
    end = time.time()

    print(f"Waktu eksekusi: {end - start:.2f} detik")
    print("Hasil 5x5 pertama:")
    print(hasil[:5, :5])

    spark.stop()
```

```
Waktu eksekusi: 37.51 detik
Hasil 5x5 pertama:
[[125.25426597 129.69132948 124.43029036 122.84074215 129.21215623]
 [124.23412317 125.33081391 126.17618918 122.87904869 128.37299093]
 [128.57233827 128.89154327 131.63994604 128.11631859 133.49464198]
 [122.31572493 119.24776316 120.83377011 120.34259014 125.8739785 ]
 [118.8324337  120.26864858 118.43983231 118.65090209 121.64683899]]
```

Worker 6

```python
if __name__ == "__main__":
    spark = SparkSession.builder.appName("MatrixMultiply").getOrCreate()

    matrix_a = np.random.rand(500, 500)
    matrix_b = np.random.rand(500, 500)

    start = time.time()
    hasil = matrix_multiply_spark(spark, matrix_a, matrix_b)
    end = time.time()

    print(f"Waktu eksekusi: {end - start:.2f} detik")
    print("Hasil 5x5 pertama:")
    print(hasil[:5, :5])

    spark.stop()
```

```
Waktu eksekusi: 37.22 detik
Hasil 5x5 pertama:
[[123.75644792 120.53945418 136.95389178 125.80782117 129.8603312 ]
 [123.43407231 118.90318997 131.60195967 128.75001801 126.94014334]
 [121.88687712 115.09972318 131.61475284 131.51357551 128.16353942]
 [117.91921778 115.12460328 129.27012313 124.96741084 118.71520332]
 [123.75032181 115.01419127 129.53118148 126.96707717 124.03792832]]
```