**Performance Study**

**Strong Scaling**

Number of pages (matrix shape) = 1000

Max iterations: 30

|  |  |
| --- | --- |
| Number of MPI ranks | Total Time |
| 2 | 1.233929 |
| 5 | 1.010658 |
| 10 | 0.948826 |
| 15 | 0.934777 |
| 20 | 0.992467 |
| 25 | 1.007636 |
| 35 | 1.070955 |
| 45 | 1.058260 |
| 55 | 1.083374 |
| 60 | 1.150670 |

**Weak Scaling**

Number of MPI ranks = 25

Max iterations: 30

|  |  |
| --- | --- |
| Number of pages | Total Time |
| 50 | 0.022950 |
| 100 | 0.031524 |
| 500 | 0.296735 |
| 1000 | 1.007636 |
| 2000 | 11.536185 |
| 3000 | 31.840089 |
| 5000 | 85.480386 |
| 10000 | 343.753117 |

Strong scaling and weak scaling is done. There is a variation in total time each time when the program is run. Number of pages, maximum iterations, testing or random run, etc can be controlled using NUM\_PAGES, ITERR, test\_and\_debug in the code.

When not testing, the default 1 initialised L matrix is randomised by making certain number of positions in each row, zeros. Seed is set based on the global row index of the L matrix. Convergence and maximum number of iterations are used as the stop condition for the power iteration. The power iteration gives us the rank vector, whose maximum eigenvalue is calculated using by the Rayleigh-Quotient. Each step is parallelised using MPI.

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