**Table S6**

Comparison of runtimes and memory requirements for RUTH and PCAngsd in simulated and 1000G data.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Data set | Genotype Format | Software | Test | N | Total Variant Count | Runtime (s) | Memory requirement (MB) |
| Simulated | GT | PLINK | Unadjusted | 5,000 | 50,000 | 22 | 10 |
| GT | RUTH | RUTH LRT | 5,000 | 50,000 | 348 | 15 |
| GL | RUTH | RUTH LRT | 5,000 | 50,000 | 341 | 15 |
| GT | RUTH | RUTH Score | 5,000 | 50,000 | 460 | 15 |
| GL | RUTH | RUTH Score | 5,000 | 50,000 | 469 | 15 |
| Simulated (5x) | GL | PCAngsd | PCAngsd | 5,000 | 50,000 | 6,068 | 6,946 |
| Simulated (30x) | GL | PCAngsd | PCAngsd | 5,000 | 50,000 | 5,337 | 6,872 |
| 1000G | GT | PLINK | Unadjusted | 2,504 | 28,706 | 2 | 8 |
| GL | RUTH | RUTH LRT | 2,504 | 28,706 | 147 | 14 |
| GT | RUTH | RUTH LRT | 2,504 | 28,706 | 96 | 13 |
| GL | RUTH | RUTH Score | 2,504 | 28,706 | 216 | 14 |
| GT | RUTH | RUTH Score | 2,504 | 28,706 | 177 | 13 |
| GL | PCAngsd | PCAngsd | 2,504 | 28,660 | 4,105 | 2,073 |
| TOPMed | GT | RUTH | RUTH LRT | 53,831 | 347,223 | 158,731 | 57 |
| GL | RUTH | RUTH LRT | 53,831 | 347,223 | 196,169 | 57 |

Simulation runtimes for PLINK and RUTH are averaged over 360 runs, across combinations of different simulation parameters. Simulation results for PCAngsd are averaged over 66 runs each for 5x and 30x coverage data. The higher uncertainty in low depth simulated data appears to have led to slower convergence in PCAngsd. All results for 1000G were from single runs. The listed TOPMed runtimes and memory requirements are for single-threaded analyses of all variants.