Distribution of Matrix Values

Issue:

Skim matrices by their very nature contain an exponential amount of information. For the TIM 2.3 zonal system, there are 3,574 zones which equates to 12.8 million (12,773,476) zone pairs. Further increasing the amount of data are multiple skim types (roughly 48) and a temporal component (4 time periods). In summation, to store just the skim matrix data for a completed model run inside of a database, an estimated 2.5 billion (2,452,507,392) rows need to be inserted.

Each record at a minimum requires fields for origin and destination zone identifiers and the corresponding skim value. To make the table usable, two zonal indices are added since nearly all queries will have at least one zonal |WHERE| clause.

Originally, the table was set up with a |bigserial| counter field, |integer| zone identifiers, and |double precision| values. The required disk space to store a complete skim matrix given the table definition is 821 MB. With the added primary key and zonal indices, the grand total is 1457 MB. For a full model run the disk space required balloons to 279.7 GB.

Both the zone identifiers can be set as |smallint| data types which are 2 bytes in size. The skim value could be set as |real| (at a cost of 4 bytes) but a higher degree of precision is desired; skim values are saved as 8 byte |double precision| data types.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Number | Code | 0-1 | 0 | >0-1 | 1-10 | 10-100 | 100-1,000 | 1,000-10,000 | 10,000-100,000 | 100,000+ |
| 210 | IMP | 3329 | 122 | 3207 | 263231 | 11833902 | 648009 | 3570 | 21435 | 0 |
| 220 | IVT | 3347 | 122 | 3225 | 268851 | 11941514 | 534759 | 3570 | 0 | 21435 |
| 250 | OVT | 21643 | 174 | 21469 | 12332607 | 397794 | 0 | 0 | 0 | 21432 |
| 260 | TOL | 6207472 | 5794393 | 413079 | 6537188 | 7381 | 0 | 0 | 0 | 21435 |
| 270 | DIS | 26050 | 122 | 25928 | 1161113 | 11475867 | 89011 | 0 | 0 | 21435 |
| 290 | TTC | 3347 | 122 | 3225 | 268851 | 11941514 | 534759 | 3570 | 0 | 21435 |
| 291 | UDS | 21643 | 174 | 21469 | 12332607 | 397794 | 0 | 0 | 0 | 21432 |
| 400 | IPD | 12773476 | 12773476 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 420 | IVT | 4024 | 184 | 3840 | 98591 | 4840816 | 1103065 | 0 | 0 | 6726980 |
| 421 | IVTT(RR) | 2419916 | 1858377 | 561539 | 699225 | 2867586 | 59769 | 0 | 0 | 6726980 |
| 422 | IVTT(Sub) | 3093295 | 2501534 | 591761 | 1348193 | 1605008 | 0 | 0 | 0 | 6726980 |
| 423 | IVTT(Pat) | 4788132 | 4606900 | 181232 | 764083 | 494281 | 0 | 0 | 0 | 6726980 |
| 424 | IVTT(LRT) | 4891532 | 4660090 | 231442 | 363614 | 791350 | 0 | 0 | 0 | 6726980 |
| 426 | IVTT(BRT) | 6046496 | 6046496 | 0 | 0 | 0 | 0 | 0 | 0 | 6726980 |
| 428 | IVTT(Bus) | 619034 | 389838 | 229196 | 795122 | 4444028 | 188312 | 0 | 0 | 6726980 |
| 429 | IVTT(Trl) | 6004273 | 5965782 | 38491 | 34916 | 7307 | 0 | 0 | 0 | 6726980 |
| 450 | OVT | 0 | 0 | 0 | 45778 | 5323883 | 676835 | 0 | 0 | 6726980 |
| 451 | OWTA | 91948 | 0 | 91948 | 2053005 | 3901543 | 0 | 0 | 0 | 6726980 |
| 460 | FAR | 61501 | 34922 | 26579 | 5735993 | 229631 | 0 | 0 | 0 | 6745213 |
| 480 | NTR | 803354 | 216101 | 587253 | 5243142 | 0 | 0 | 0 | 0 | 6726980 |
| 481 | XIMP | 6046496 | 6046496 | 0 | 0 | 0 | 0 | 0 | 0 | 6726980 |
| 490 | JRT | 0 | 0 | 0 | 8103 | 3042441 | 2995952 | 0 | 0 | 6726980 |