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DIV: B/B1

ADBMS
Exp9

Aim: Processing of Spatial and Temporal data

Theory:

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                      [Exp 9]

Aim: Processing of spatial & Temporal data

Theory:

⊛ Temporal Database

⊙ Database that store information which is time dependent in one way or another one called Temporal Database

⊙ Temporal DB store information about states of real world across time

⊙ Temporal DB is a database with built-in support for handling data involving time

⊙ Examples:
  1) Health care systems
     · Here history of patients health is required
     · The past record of operation is also necessary

  2) Insurance systems
     · We need to keep a track of claims accident history
     · Also the time when policies are in effect.

⊛ Spatial Database

⊙ A spatial database is a database that deals

with information associated with geographical locations such as cities, towns etc.
- A spatial Database is optimized to store & query data representing object.
- These are the objects which are defined in a geometric space
- Spatial data is majorly of 3 types.
  - Vector data :- data represented as discrete pts, lines & polygon
  - Raster data :- Data represented as matrix of square cells.
  - Image data :- Data typically form of images.

Conclusion:

Thus, we studied & implemented spatial & temporal data

Queries:

Temporal:

```
mysql> select * from 2022_july where start_time < "04:00:00";
+------------+------------+----------+----------------------+------------+----------------------------------+
| start_date | start_time | distance | mode                 | confidence | Places                           |
+------------+------------+----------+----------------------+------------+----------------------------------+
| 02-07-2022 |            |    18716 | IN_PASSENGER_VEHICLE | MEDIUM     |                                  |
| 06-07-2022 | 03:23:42   |     1669 | MOTORCYCLING         | LOW        |                                  |
| 06-07-2022 | 03:35:46   |    11483 | IN_TRAIN             | LOW        |                                  |
| 06-07-2022 | 03:58:13   |     1069 | MOTORCYCLING         | MEDIUM     |                                  |
| 08-07-2022 | 03:11:39   |      461 | MOTORCYCLING         | LOW        |                                  |
| 08-07-2022 | 03:26:15   |     1099 | IN_PASSENGER_VEHICLE | LOW        |                                  |
| 08-07-2022 | 03:42:42   |     7548 | IN_TRAIN             | MEDIUM     | Anhad Misal                      |
| 11-07-2022 | 03:48:22   |     1609 | IN_BUS               | MEDIUM     | Kandivali Bus Station (W)        |
| 13-07-2022 | 03:19:59   |      905 | WALKING              | LOW        |                                  |
| 13-07-2022 | 03:48:02   |     1896 | IN_BUS               | LOW        | Kandivali Railway Station (W)    |
| 14-07-2022 | 03:54:54   |     8949 | IN_BUS               | HIGH       |                                  |
| 15-07-2022 | 03:48:49   |     8500 | IN_PASSENGER_VEHICLE | LOW        |                                  |
| 16-07-2022 | 03:44:35   |     9838 | IN_BUS               | MEDIUM     | Laxmi Industrial Colony          |
| 18-07-2022 | 03:51:31   |     1292 | IN_BUS               | LOW        |                                  |
| 18-07-2022 | 03:57:47   |     9400 | IN_BUS               | LOW        | Anhad Misal                      |
| 19-07-2022 | 03:54:30   |    10085 | IN_BUS               | MEDIUM     | Lotus Business Park              |
| 20-07-2022 | 03:32:29   |     1721 | IN_BUS               | MEDIUM     | Bajaj Municipal School           |
| 20-07-2022 | 03:47:40   |     9487 | IN_TRAIN             | MEDIUM     | Andheri Police Station           |
| 21-07-2022 | 03:46:02   |     8698 | UNKNOWN_ACTIVITY_TYPE| LOW        | Sun-n-Sand Hotel                 |
| 23-07-2022 | 03:45:05   |    11590 | IN_PASSENGER_VEHICLE | LOW        |                                  |
| 25-07-2022 | 03:34:52   |    10629 | IN_BUS               | MEDIUM     | Doolally Taproom - Andheri       |
| 26-07-2022 | 03:52:48   |    10072 | IN_BUS               | MEDIUM     | Doolally Taproom - Andheri       |
| 27-07-2022 | 03:48:55   |     9483 | IN_BUS               | LOW        | Doolally Taproom - Andheri       |
| 28-07-2022 | 03:29:48   |     9599 | IN_BUS               | MEDIUM     | RikÄ? - Terrace Bar & Grill      |
| 29-07-2022 | 03:31:35   |     1948 | MOTORCYCLING         | LOW        | Kandivali Bus Station (W)        |
| 29-07-2022 | 03:47:34   |     9579 | IN_TRAIN             | MEDIUM     |                                  |
+------------+------------+----------+----------------------+------------+----------------------------------+
26 rows in set (0.00 sec)
```

Spatial:

```
mysql> select * from 2022_july where distance>10000;
+------------+------------+----------+-----------------------+------------+------------------------------+
| start_date | start_time | distance | mode                  | confidence | Places                       |
+------------+------------+----------+-----------------------+------------+------------------------------+
| 02-07-2022 |            |    18716 | IN_PASSENGER_VEHICLE  | MEDIUM     |                              |
| 06-07-2022 | 03:35:46   |    11483 | IN_TRAIN              | LOW        |                              |
| 13-07-2022 | 13:44:17   |    11855 | IN_TRAIN              | LOW        | Kandivali Station (W)        |
| 19-07-2022 | 03:54:30   |    10085 | IN_BUS                | MEDIUM     | Lotus Business Park          |
| 21-07-2022 | 18:59:35   |    41236 | UNKNOWN_ACTIVITY_TYPE | LOW        | Jay's Dosa & Paratha Center  |
| 23-07-2022 | 03:45:05   |    11590 | IN_PASSENGER_VEHICLE  | LOW        |                              |
| 24-07-2022 | 06:56:09   |    10674 | MOTORCYCLING          | LOW        | Axis Bank ATM                |
| 25-07-2022 | 03:34:52   |    10629 | IN_BUS                | MEDIUM     | Doolally Taproom - Andheri   |
| 26-07-2022 | 03:52:48   |    10072 | IN_BUS                | MEDIUM     | Doolally Taproom - Andheri   |
+------------+------------+----------+-----------------------+------------+------------------------------+
9 rows in set (0.03 sec)
```

```
mysql> select * from 2022_july where Places="Doolally Taproom - Andheri";
+------------+------------+----------+--------+------------+------------------------------+
| start_date | start_time | distance | mode   | confidence | Places                       |
+------------+------------+----------+--------+------------+------------------------------+
| 25-07-2022 | 03:34:52   |    10629 | IN_BUS | MEDIUM     | Doolally Taproom - Andheri   |
| 26-07-2022 | 03:52:48   |    10072 | IN_BUS | MEDIUM     | Doolally Taproom - Andheri   |
| 27-07-2022 | 03:48:55   |     9483 | IN_BUS | LOW        | Doolally Taproom - Andheri   |
+------------+------------+----------+--------+------------+------------------------------+
3 rows in set (0.00 sec)
```

Data:

```
mysql> select * from 2022_july;
+------------+------------+----------+-----------------------+------------+----------------------------------------------------------+
| start_date | start_time | distance | mode                  | confidence | Places                                                   |
+------------+------------+----------+-----------------------+------------+----------------------------------------------------------+
| 02-07-2022 |            |    18716 | IN_PASSENGER_VEHICLE  | MEDIUM     |                                                          |
| 06-07-2022 | 03:23:42   |     1669 | MOTORCYCLING          | LOW        |                                                          |
| 06-07-2022 | 03:35:46   |    11483 | IN_TRAIN              | LOW        |                                                          |
| 06-07-2022 | 03:58:13   |     1069 | MOTORCYCLING          | MEDIUM     |                                                          |
| 08-07-2022 | 03:11:39   |      461 | MOTORCYCLING          | LOW        |                                                          |
| 08-07-2022 | 03:26:15   |     1099 | IN_PASSENGER_VEHICLE  | LOW        |                                                          |
| 08-07-2022 | 03:42:42   |     7548 | IN_TRAIN              | MEDIUM     | Anhad Misal                                              |
| 11-07-2022 | 03:48:22   |     1609 | IN_BUS                | MEDIUM     | Kandivali Bus Station (W)                                |
| 11-07-2022 | 04:11:17   |     9363 | IN_TRAIN              | MEDIUM     | Agarkar Chowk                                            |
| 11-07-2022 | 04:39:15   |     2125 | IN_SUBWAY             | LOW        | SAMMOHI BY MOKSHA & HIRAL                                 |
| 11-07-2022 | 04:48:18   |      896 | IN_PASSENGER_VEHICLE  | LOW        | Trumpet Sky Lounge                                       |
| 11-07-2022 | 12:22:26   |     2972 | IN_PASSENGER_VEHICLE  | LOW        | McDonald's                                               |
| 11-07-2022 | 12:48:32   |     9467 | IN_TRAIN              | MEDIUM     | Kandivali Bus Depot                                      |
| 11-07-2022 | 13:10:00   |     2203 | IN_PASSENGER_VEHICLE  | LOW        | State Bank of India                                      |
| 13-07-2022 | 03:19:59   |      905 | WALKING               | LOW        |                                                          |
| 13-07-2022 | 03:48:02   |     1896 | IN_BUS                | LOW        | Kandivali Railway Station (W)                            |
| 13-07-2022 | 04:04:12   |     9348 | IN_TRAIN              | MEDIUM     | Agarkar Chowk / Pinky Cinema                             |
| 13-07-2022 | 04:33:49   |     3270 | IN_PASSENGER_VEHICLE  | LOW        | Lotus Business Park                                      |
| 13-07-2022 | 13:06:26   |     5297 | IN_BUS                | LOW        | Villa Decor - Premium Bed, Bath & Mattresses Store       |
| 13-07-2022 | 13:44:17   |    11855 | IN_TRAIN              | LOW        | Kandivali Station (W)                                    |
| 13-07-2022 | 14:15:27   |     1969 | IN_PASSENGER_VEHICLE  | MEDIUM     | State Bank of India                                      |
| 14-07-2022 | 03:54:54   |     8949 | IN_BUS                | HIGH       |                                                          |
| 14-07-2022 | 04:39:02   |      578 | WALKING               | MEDIUM     | UK Realty                                                |
| 14-07-2022 | 14:12:01   |     6005 | IN_BUS                | LOW        | Yoko Sizzlers                                            |
| 14-07-2022 | 14:58:50   |     4087 | UNKNOWN_ACTIVITY_TYPE | LOW        | Xth Central Mall                                         |
| 15-07-2022 | 03:48:49   |     8500 | IN_PASSENGER_VEHICLE  | LOW        |                                                          |
| 15-07-2022 | 04:41:11   |     9105 | IN_BUS                | LOW        | RikÄ? - Terrace Bar & Grill                              |
| 15-07-2022 | 14:15:09   |     5691 | IN_BUS                | MEDIUM     | D Mart                                                   |
| 15-07-2022 | 15:08:26   |     4933 | IN_BUS                | MEDIUM     | La Pino'z Pizza Kandivali                                |
| 16-07-2022 | 03:44:35   |     9838 | IN_BUS                | MEDIUM     | Laxmi Industrial Colony                                  |
| 16-07-2022 | 13:08:07   |     2965 | MOTORCYCLING          | LOW        | Andheri Station (W)                                      |
| 16-07-2022 | 13:32:44   |     9292 | IN_TRAIN              | MEDIUM     | Kandivali West                                           |
| 16-07-2022 | 13:53:02   |     2074 | IN_PASSENGER_VEHICLE  | LOW        | La Pino'z Pizza Kandivali                                |
| 17-07-2022 | 08:38:08   |      880 | MOTORCYCLING          | LOW        | Malad Industrial Estate                                  |
| 17-07-2022 | 10:23:08   |     1492 | IN_PASSENGER_VEHICLE  | LOW        | Aadhar Center                                            |
| 17-07-2022 | 10:57:46   |     1294 | MOTORCYCLING          | MEDIUM     | La Pino'z Pizza Kandivali                                |
| 17-07-2022 | 11:38:53   |     5829 | MOTORCYCLING          | LOW        | State Bank Of India ATM                                  |
| 18-07-2022 | 03:51:31   |     1292 | IN_BUS                | LOW        |                                                          |
| 18-07-2022 | 03:57:47   |     9400 | IN_BUS                | LOW        | Anhad Misal                                              |
```

Conclusion:

We successfully implemented spatial and temporal queries to make the database more efficient for the user.