Introduction

The City of Melbourne has made available the dataset with hourly pedestrian Count from sensors deployed across the city. The dataset contains the hourly pedestrian count since year 2009. The analysis should be done on the dataset to produce following statistics:

1. Top 10 (most pedestrians) locations by day
2. Top 10 (most pedestrians) locations by month
3. Location that has shown most decline due to lockdowns in last 2 years
4. Location that has most growth in last year

Approach

For the purpose of this coding test, the analysis was done on the source file using Python. The file was read and loaded into Python Pandas Dataframe. Pandas Dataframe capability used to derive the required statistics.

DQ Issue

During data profiling of the data, below data quality issue identified:

- Distinct value count of Sensor ID and Sensor Name didn't match
    - Further investigation found that for some Sensor IDs multiple variants of the Sensor Name exist in the data set
    - In order to fix this data quality issue, the Sensor Names were standardised for those Sensor IDs

Refer to the Jupyter notebook link for the code and outcome of the data profiling that identified the DQ issue:

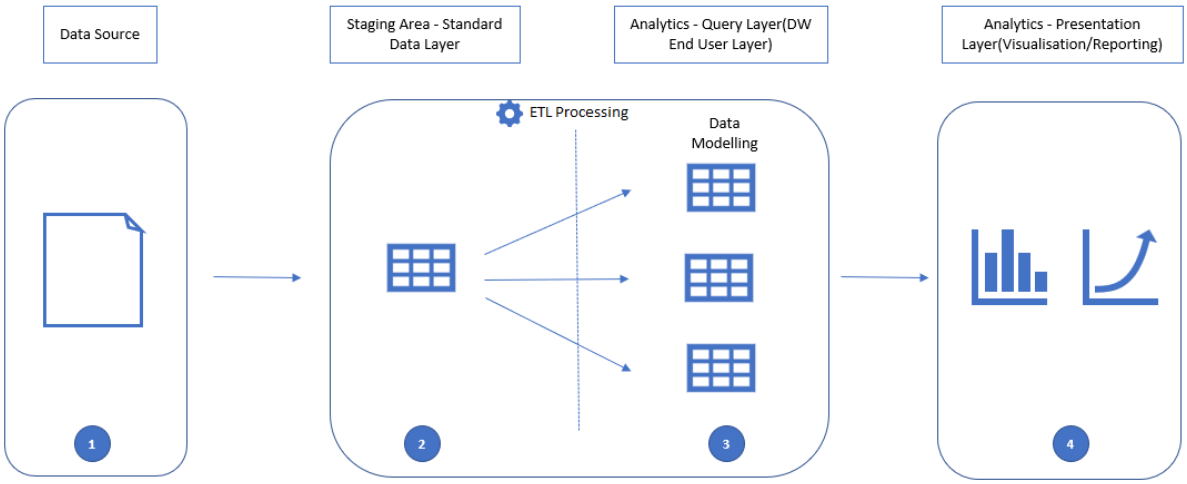
- data-analytics/Pedestrian_Counting_System_DataProfiling.ipynb at main · rameshpachamuthu80/data-analytics (github.com)

Proposed Future State Architecture

The following considerations have been made to propose the architecture:

- Hourly pedestrian count source data available in CSV flat file format in file landing area
- Source file will contain the entire history of the sensor reading data

Data Flow Architecture



The brief summary of the above data flow architecture

1. Ingestion Layer: The source data made available in a file landing area ready for data ingestion
2. Standard Data Layer: Source data ingested and loaded into this staging area. Data stored in source/raw format with no transformation
3. Data warehouse Layer: In this layer where data from standard data layer (staging area) were read, processed and stored in a meaningful conformed dimension, facts, measures and business logic applied
4. Presentation Layer: which consumes warehouse dimensions and facts for reporting and analytics

Expected Outputs

1.Top 10 (most pedestrians) locations by day

Top 10 pedestrian count by days: For Sunday

Location	Pedestrian Count
Town Hall (West)	18,172,940
Melbourne Central	15,659,936
Princes Bridge	15,588,544
Bourke Street Mall (North)	13,719,617
Bourke Street Mall (South)	13,474,209
Flinders Street Station Underpass	13,016,524
Flinders St-Elizabeth St (East)	9,225,154
Southbank	9,199,517
The Arts Centre	8,963,423
State Library	8,931,922

Top 10 pedestrian count by days: For Monday

Location	Pedestrian Count
Town Hall (West)	19,272,251
Flinders Street Station Underpass	17,820,508
Melbourne Central	15,661,642
Bourke Street Mall (South)	14,738,561
Princes Bridge	14,581,093
Bourke Street Mall (North)	14,281,681
Spencer St-Collins St (North)	11,849,061
Flinders St-Elizabeth St (East)	11,537,518
State Library	10,339,353
Flagstaff Station	9,654,896

Top 10 pedestrian count by days: For Tuesday

Location	Pedestrian Count
Town Hall (West)	19,457,168
Flinders Street Station Underpass	18,537,064
Melbourne Central	16,161,824
Bourke Street Mall (South)	14,480,606
Princes Bridge	14,460,721
Bourke Street Mall (North)	14,337,781
Spencer St-Collins St (North)	12,623,319
Flinders St-Elizabeth St (East)	11,864,474
State Library	10,617,852
Flagstaff Station	10,430,342

Top 10 pedestrian count by days: For Wednesday

Location	Pedestrian Count
Town Hall (West)	20,360,823
Flinders Street Station Underpass	19,083,684
Melbourne Central	16,753,294
Princes Bridge	15,665,642
Bourke Street Mall (South)	15,396,248
Bourke Street Mall (North)	15,112,531
Spencer St-Collins St (North)	13,004,087
Flinders St-Elizabeth St (East)	12,031,778
State Library	11,000,867
Flagstaff Station	10,553,562

Top 10 pedestrian count by days: For Thursday

Location	Pedestrian Count
Town Hall (West)	21,187,600
Flinders Street Station Underpass	19,496,066
Melbourne Central	17,114,784
Bourke Street Mall (South)	16,378,446
Bourke Street Mall (North)	16,037,716
Princes Bridge	15,776,348
Spencer St-Collins St (North)	13,007,689
Flinders St-Elizabeth St (East)	12,088,848
State Library	11,091,657
Southern Cross Station	10,465,545

Top 10 pedestrian count by days: For Friday

Location	Pedestrian Count
Town Hall (West)	24,393,876
Flinders Street Station Underpass	21,320,727
Melbourne Central	19,993,700
Bourke Street Mall (South)	18,881,248
Princes Bridge	18,484,231
Bourke Street Mall (North)	18,445,974
Spencer St-Collins St (North)	13,058,283
Flinders St-Elizabeth St (East)	12,619,633
State Library	12,265,360
Southbank	11,080,180

Top 10 pedestrian count by days: For Saturday

Location	Pedestrian Count
Town Hall (West)	22,499,236
Melbourne Central	19,171,957
Princes Bridge	18,369,336
Bourke Street Mall (South)	17,095,304
Bourke Street Mall (North)	16,862,095
Flinders Street Station Underpass	15,417,211
Southbank	11,062,405
State Library	10,673,040
Flinders St-Elizabeth St (East)	10,583,641
The Arts Centre	9,883,781

2.Top 10 (most pedestrians) locations by month

Top 10 pedestrian count by months: For January

Location	Pedestrian Count
Town Hall (West)	11,967,639
Princes Bridge	10,796,073
Flinders Street Station Underpass	10,279,628
Bourke Street Mall (South)	9,106,886
Melbourne Central	8,433,264
Bourke Street Mall (North)	8,136,291
Flinders St-Elizabeth St (East)	6,307,184
Southbank	6,279,974
The Arts Centre	6,214,671
Spencer St-Collins St (North)	6,096,117

Top 10 pedestrian count by months: For-February

Location	Pedestrian Count
Town Hall (West)	11,156,945
Flinders Street Station Underpass	10,292,516
Princes Bridge	9,493,960
Melbourne Central	9,004,266
Bourke Street Mall (North)	8,335,328
Bourke Street Mall (South)	8,134,134
Spencer St-Collins St (North)	6,591,467
Flinders St-Elizabeth St (East)	6,547,085
State Library	5,708,978
The Arts Centre	5,657,723

Top 10 pedestrian count by months: For-March

Location	Pedestrian Count
Town Hall (West)	12,655,259
Melbourne Central	11,737,486
Flinders Street Station Underpass	11,419,121
Princes Bridge	11,001,403
Bourke Street Mall (North)	9,643,824
Bourke Street Mall (South)	9,017,586
Flinders St-Elizabeth St (East)	7,566,831
Spencer St-Collins St (North)	7,149,300
State Library	7,091,544
Southbank	5,930,487

Top 10 pedestrian count by months: For-April

Location	Pedestrian Count
Town Hall (West)	12,463,968
Melbourne Central	10,862,976
Princes Bridge	10,660,422
Flinders Street Station Underpass	10,135,936
Bourke Street Mall (North)	9,194,871
Bourke Street Mall (South)	8,815,472
Flinders St-Elizabeth St (East)	7,561,340
Spencer St-Collins St (North)	6,215,026
State Library	6,159,571
The Arts Centre	6,090,009

Top 10 pedestrian count by months: For-May

Location	Pedestrian Count
Town Hall (West)	11,591,495
Flinders Street Station Underpass	10,787,077
Melbourne Central	10,615,667
Bourke Street Mall (North)	9,774,547
Princes Bridge	9,561,337
Bourke Street Mall (South)	8,901,477
Flinders St-Elizabeth St (East)	7,592,610
State Library	6,580,684
Spencer St-Collins St (North)	6,009,446
Southbank	5,862,252

Top 10 pedestrian count by months: For-June

Location	Pedestrian Count
Town Hall (West)	11,934,368
Melbourne Central	10,287,904
Flinders Street Station Underpass	9,867,379
Bourke Street Mall (North)	9,455,301
Princes Bridge	8,997,795
Bourke Street Mall (South)	8,818,621
Flinders St-Elizabeth St (East)	6,549,459
Spencer St-Collins St (North)	6,139,724
State Library	5,463,552
Southbank	5,242,526

Top 10 pedestrian count by months: For-July

Location	Pedestrian Count
Town Hall (West)	12,555,809
Melbourne Central	11,224,490
Flinders Street Station Underpass	10,808,119
Bourke Street Mall (North)	9,677,482
Bourke Street Mall (South)	9,499,308
Princes Bridge	9,159,764
Spencer St-Collins St (North)	6,588,137
State Library	6,434,716
Southbank	5,903,894
Flinders St-Elizabeth St (East)	5,883,997

Top 10 pedestrian count by months: For-August

Location	Pedestrian Count
Town Hall (West)	11,675,587
Melbourne Central	10,477,135
Flinders Street Station Underpass	9,214,815
Bourke Street Mall (North)	8,299,742
Bourke Street Mall (South)	8,282,631
Princes Bridge	7,861,189
State Library	6,404,288
Spencer St-Collins St (North)	5,933,432
Flinders St-Elizabeth St (East)	4,805,402
Flagstaff Station	4,648,096

Top 10 pedestrian count by months: For-September

Location	Pedestrian Count
Town Hall (West)	11,475,209
Melbourne Central	9,902,555
Flinders Street Station Underpass	9,602,620
Bourke Street Mall (South)	8,286,561
Bourke Street Mall (North)	8,192,967
Princes Bridge	7,823,066
Flinders St-Elizabeth St (East)	6,435,942
State Library	6,321,620
Spencer St-Collins St (North)	6,126,071
The Arts Centre	4,742,644

Top 10 pedestrian count by months: For-October

Location	Pedestrian Count
Town Hall (West)	11,152,763
Flinders Street Station Underpass	10,333,881
Bourke Street Mall (North)	8,737,215
Bourke Street Mall (South)	8,675,275
Melbourne Central	8,260,476
Princes Bridge	7,877,358
State Library	6,942,115
Spencer St-Collins St (North)	6,728,313
Flinders St-Elizabeth St (East)	5,860,962
Southbank	5,276,274

Top 10 pedestrian count by months: For-November

Location	Pedestrian Count
Town Hall (West)	12,136,661
Flinders Street Station Underpass	10,598,560
Bourke Street Mall (South)	9,772,438
Melbourne Central	9,752,026
Princes Bridge	8,942,629
Bourke Street Mall (North)	8,871,745
Flinders St-Elizabeth St (East)	7,197,048
Spencer St-Collins St (North)	6,661,345
State Library	6,630,549
Southbank	5,660,775

Top 10 pedestrian count by months: For-December

Location	Pedestrian Count
Town Hall (West)	14,578,191
Bourke Street Mall (South)	13,134,233
Flinders Street Station Underpass	11,352,132
Princes Bridge	10,750,919
Bourke Street Mall (North)	10,478,082
Melbourne Central	9,958,892
Flinders St-Elizabeth St (East)	7,643,186
Southbank	7,087,552
State Library	6,079,839
Spencer St-Collins St (North)	5,946,613

3.Location that has shown most decline due to lockdowns in last 2 years

Location	Pedestrian Count in 2021	Change Compared to 2020
Flinders St-Elizabeth St (East)	5,852,590	-1,507,594

4.Location that has most growth in last year

Location	Pedestrian Count in 2021	Change Compared to 2020
State Library - New	3,994,935	2,188,455

Code to Derive the Outputs

Refer to the Jupyter notebook link for the Python script written to derive the above outcome:

- data-analytics/Pedestrian_Counting_System_Analysis.ipynb at main · rameshpachamuthu80/data-analytics (github.com)