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April 23, 2023

1 CHAPTER 1: DEFINITIONS OF THE PROBLEM STATEMENT AND EXPLORATORY DATA ANALYSIS

1.1 Introduction to Delhivery

DELHIVERY WIKIPEDIA:

Delhivery (stylized as DELHIVERy) is an Indian logistics and supply chain company, based in Gurugram. It was founded in 2011 by Sahil Barua, Mohit Tandon, Bhavesh Manglani, Suraj Saharan, and Kapil Bharati.

The company has over 85 fulfillment centers, 24 automated sort centers, 70 hubs, 7,500+ partner centers, and 3,000+ direct delivery centers, as of 2021.

About two-thirds of its revenue comes from providing third-party logistics and delivery services to e-commerce companies.

Delhivery is the largest and fastest-growing fully integrated player in India by revenue in Fiscal 2021. They aim to build the operating system for commerce, through a combination of world-class infrastructure, logistics operations of the highest quality, and cutting-edge engineering and technology capabilities.

1.2 Problem Definition and Objectives

The Data team of Delhivery builds intelligence and capabilities. Using this data analysis, Data team wants to widen the gap between the quality, efficiency, and profitability of their business versus their competitors.

The company wants to understand and process the data coming out of data engineering pipelines:

- Clean, sanitize and manipulate data to get useful features out of raw fields
- Make sense out of the raw data and help the data science team to build forecasting models on it

1.3 Dataset

1.3.1 Importing the required Libraries

```
[113]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from scipy import stats
from scipy.stats import bernoulli, binom, norm, expon, geom, poisson, lognorm, boxcox
from scipy.stats import shapiro, levene
from scipy.stats import ttest_ind, ttest_rel, f_oneway, chi2_contingency, kruskal
import math
import io
import warnings
import re
from sklearn.preprocessing import OneHotEncoder, LabelEncoder, StandardScaler
pd.set_option("display.max_columns", 100)
```

1.3.2 Importing the dataset delhivery_data.csv

```
[114]: delhivery = pd.read_csv("delhivery_data.csv")
```

The company collected data from data engineering pipelines. It is RAW Data

```
[115]: delhivery.head()
```

```
[115]:
```

	data	trip_creation_time	\
0	training	2018-09-20 02:35:36.476840	
1	training	2018-09-20 02:35:36.476840	
2	training	2018-09-20 02:35:36.476840	
3	training	2018-09-20 02:35:36.476840	
4	training	2018-09-20 02:35:36.476840	

	route_schedule_uuid	route_type	\
0	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
1	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
2	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
3	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
4	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	

	trip_uuid	source_center	source_name	\
0	trip-153741093647649320	IND388121AAA	Anand_VUNagar_DC	(Gujarat)
1	trip-153741093647649320	IND388121AAA	Anand_VUNagar_DC	(Gujarat)
2	trip-153741093647649320	IND388121AAA	Anand_VUNagar_DC	(Gujarat)
3	trip-153741093647649320	IND388121AAA	Anand_VUNagar_DC	(Gujarat)
4	trip-153741093647649320	IND388121AAA	Anand_VUNagar_DC	(Gujarat)

	destination_center	destination_name	\
0	IND388620AAB	Khambhat_MotvdDPP_D (Gujarat)	
1	IND388620AAB	Khambhat_MotvdDPP_D (Gujarat)	
2	IND388620AAB	Khambhat_MotvdDPP_D (Gujarat)	
3	IND388620AAB	Khambhat_MotvdDPP_D (Gujarat)	
4	IND388620AAB	Khambhat_MotvdDPP_D (Gujarat)	

	od_start_time	od_end_time	\
0	2018-09-20 03:21:32.418600	2018-09-20 04:47:45.236797	
1	2018-09-20 03:21:32.418600	2018-09-20 04:47:45.236797	
2	2018-09-20 03:21:32.418600	2018-09-20 04:47:45.236797	
3	2018-09-20 03:21:32.418600	2018-09-20 04:47:45.236797	
4	2018-09-20 03:21:32.418600	2018-09-20 04:47:45.236797	

	start_scan_to_end_scan	is_cutoff	cutoff_factor	\
0	86.0	True	9	
1	86.0	True	18	
2	86.0	True	27	
3	86.0	True	36	
4	86.0	False	39	

	cutoff_timestamp	actual_distance_to_destination	actual_time	\
0	2018-09-20 04:27:55	10.435660	14.0	
1	2018-09-20 04:17:55	18.936842	24.0	
2	2018-09-20 04:01:19.505586	27.637279	40.0	
3	2018-09-20 03:39:57	36.118028	62.0	
4	2018-09-20 03:33:55	39.386040	68.0	

	osrm_time	osrm_distance	factor	segment_actual_time	segment_osrm_time	\
0	11.0	11.9653	1.272727	14.0	11.0	
1	20.0	21.7243	1.200000	10.0	9.0	
2	28.0	32.5395	1.428571	16.0	7.0	
3	40.0	45.5620	1.550000	21.0	12.0	
4	44.0	54.2181	1.545455	6.0	5.0	

	segment_osrm_distance	segment_factor
0	11.9653	1.272727
1	9.7590	1.111111
2	10.8152	2.285714
3	13.0224	1.750000
4	3.9153	1.200000

1.3.3 Details regarding each column in dataset

column names	Regarding information of column
data	tells whether the data is testing or training data
trip_creation_time	Timestamp of trip creation

column names	Regarding information of column
route_schedule_uuid	Unique Id for a particular route schedule
route_type	Transportation Type
1. route_type: FTL	Full Truck Load-FTL Shipments get to the destination sooner, as the truck is making no other pickups or drop-offs along the way
2. route_type: Carting	Handling system consisting of small vehicles(carts)
trip_uuid	Unique ID given to a particular trip (A trip may include different source and destination centers)
source_center	Source ID of trip origin
source_name	Source Name of trip origin
destination_center	Destination ID
destination_name	Destination Name
od_start_time	Trip start time
od_end_time	Trip end time
start_scan_to_end_scan	Time taken to deliver from source to destination
is_cutoff	Unknown field
cutoff_factor	Unknown field
cutoff_timestamp	Unknown field
actual_distance_to_destination	Distance in Kms between source and destination ware house
actual_time	Actual time taken to complete the delivery(Cumulative)
osrm_time	An open-source routing engine time calculator which computes the shortest path between paths in a given map (Includes usual traffic, distance through major and minor roads) and gives the time(Cumulative)
osrm_distance	An open source routing engine which computes the shortest path between points in a given map(Includes usual traffic, distance through major and minor roads)(Cumulative)
factor	Unknown field (actual_time/osrm_time)
segment_actual_time	This is a segment time. Time taken by the subset of the package delivery
segment_osrm_time	This is the OSRM segment time. Time taken by the subset of the package delivery
segment_osrm_distance	This is the OSRM distance. Distance covered by subset of package delivery
segment_factor	Unknown field (segment_actual_time/segment_osrm_time)

1.4 Analysing Basic Metrics of Raw data

1.4.1 Number of rows, columns, datatypes

```
[116]: #Number of rows and columns
print("Number of rows: {},\nNumber of columns: {}".format(delhivery.
↪shape[0],delhivery.shape[1]))
```

```
Number of rows: 144867,
Number of columns: 24
```

```
[117]: delhivery.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 144867 entries, 0 to 144866
Data columns (total 24 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   data                                  144867 non-null  object
1   trip_creation_time                   144867 non-null  object
2   route_schedule_uuid                 144867 non-null  object
3   route_type                           144867 non-null  object
4   trip_uuid                            144867 non-null  object
5   source_center                       144867 non-null  object
6   source_name                         144574 non-null  object
7   destination_center                  144867 non-null  object
8   destination_name                    144606 non-null  object
9   od_start_time                       144867 non-null  object
10  od_end_time                         144867 non-null  object
11  start_scan_to_end_scan               144867 non-null  float64
12  is_cutoff                           144867 non-null  bool
13  cutoff_factor                       144867 non-null  int64
14  cutoff_timestamp                    144867 non-null  object
15  actual_distance_to_destination       144867 non-null  float64
16  actual_time                         144867 non-null  float64
17  osrm_time                           144867 non-null  float64
18  osrm_distance                       144867 non-null  float64
19  factor                              144867 non-null  float64
20  segment_actual_time                 144867 non-null  float64
21  segment_osrm_time                   144867 non-null  float64
22  segment_osrm_distance               144867 non-null  float64
23  segment_factor                      144867 non-null  float64
dtypes: bool(1), float64(10), int64(1), object(12)
memory usage: 25.6+ MB
```

1.4.2 Convert trip_creation_time,od_start_time,od_end_time,cut_off_timestamp to datetime data type.

```
[118]: Columns_to_convert_as_datetime =_
        ↳["trip_creation_time","od_start_time","od_end_time","cutoff_timestamp"]
delhivery[Columns_to_convert_as_datetime] =_
        ↳delhivery[Columns_to_convert_as_datetime].astype("datetime64[ns]")
#Checking datatypes
delhivery.dtypes
```

```
[118]: data                                object
trip_creation_time                      datetime64[ns]
route_schedule_uuid                     object
```

```

route_type          object
trip_uuid           object
source_center       object
source_name         object
destination_center  object
destination_name    object
od_start_time       datetime64[ns]
od_end_time         datetime64[ns]
start_scan_to_end_scan  float64
is_cutoff           bool
cutoff_factor       int64
cutoff_timestamp    datetime64[ns]
actual_distance_to_destination float64
actual_time         float64
osrm_time           float64
osrm_distance       float64
factor             float64
segment_actual_time float64
segment_osrm_time   float64
segment_osrm_distance float64
segment_factor      float64
dtype: object

```

1.4.3 nunique and unique

```

[119]: #number of unique values in each column of given dataset
for i in delhivery.columns:
    print(i,":",delhivery[i].nunique())

```

```

data : 2
trip_creation_time : 14817
route_schedule_uuid : 1504
route_type : 2
trip_uuid : 14817
source_center : 1508
source_name : 1498
destination_center : 1481
destination_name : 1468
od_start_time : 26369
od_end_time : 26369
start_scan_to_end_scan : 1915
is_cutoff : 2
cutoff_factor : 501
cutoff_timestamp : 93180
actual_distance_to_destination : 144515
actual_time : 3182
osrm_time : 1531

```

```
osrm_distance : 138046
factor : 45641
segment_actual_time : 747
segment_osrm_time : 214
segment_osrm_distance : 113799
segment_factor : 5675
```

Observations:

unique values of route_schedule_uuid, source_center, source_name, destination_center, destination_name are in same range (around 1500s). So there should be some relation between these columns

```
[120]: #unique values of columns whose nunique < 10
for i in delhivery.columns:
    if delhivery[i].nunique() < 10:
        print(i,sorted(delhivery[i].unique()),"",sep = "\n")
```

```
data
['test', 'training']
```

```
route_type
['Carting', 'FTL']
```

```
is_cutoff
[False, True]
```

1.4.4 Range of Numerical Columns

```
[121]: num_cols = []
for i in delhivery.columns:
    if (delhivery[i].dtype in ["float64","int64"]):
        num_cols.append(i)
print("Numerical columns:",num_cols)
print("Number of numerical columns:",len(num_cols))
```

```
Numerical columns: ['start_scan_to_end_scan', 'cutoff_factor',
'actual_distance_to_destination', 'actual_time', 'osrm_time', 'osrm_distance',
'factor', 'segment_actual_time', 'segment_osrm_time', 'segment_osrm_distance',
'segment_factor']
```

```
Number of numerical columns: 11
```

```
[122]: #Minimum and Maximum value for all Numerical Columns
for i in num_cols:
    print(f"Maximum of {i}",delhivery[i].max())
    print(f"Minimum of {i}",delhivery[i].min())
    print()
```

```

Maximum of start_scan_to_end_scan 7898.0
Minimum of start_scan_to_end_scan 20.0

Maximum of cutoff_factor 1927
Minimum of cutoff_factor 9

Maximum of actual_distance_to_destination 1927.4477046975032
Minimum of actual_distance_to_destination 9.00004535977208

Maximum of actual_time 4532.0
Minimum of actual_time 9.0

Maximum of osrm_time 1686.0
Minimum of osrm_time 6.0

Maximum of osrm_distance 2326.1991000000003
Minimum of osrm_distance 9.0082

Maximum of factor 77.38709677419355
Minimum of factor 0.144

Maximum of segment_actual_time 3051.0
Minimum of segment_actual_time -244.0

Maximum of segment_osrm_time 1611.0
Minimum of segment_osrm_time 0.0

Maximum of segment_osrm_distance 2191.4037000000003
Minimum of segment_osrm_distance 0.0

Maximum of segment_factor 574.25
Minimum of segment_factor -23.444444444444443

```

```

[123]: #memory used by each column
delhivery.memory_usage()

```

```

[123]: Index                                132
      data                                1158936
      trip_creation_time                   1158936
      route_schedule_uuid                 1158936
      route_type                          1158936
      trip_uuid                           1158936
      source_center                       1158936
      source_name                         1158936
      destination_center                  1158936
      destination_name                    1158936

```



```

od_start_time          1158936
od_end_time            1158936
start_scan_to_end_scan 1158936
is_cutoff              144867
cutoff_factor          1158936
cutoff_timestamp       1158936
actual_distance_to_destination 1158936
actual_time            1158936
osrm_time              1158936
osrm_distance          1158936
factor                 1158936
segment_actual_time    1158936
segment_osrm_time      1158936
segment_osrm_distance  1158936
segment_factor         1158936
dtype: int64

```

1.4.5 Statistical Summary

```

[124]: warnings.filterwarnings("ignore")
delhivery.describe(include = "all")

```

```

[124]:      data      trip_creation_time \
count      144867      144867
unique         2      14817
top  training  2018-09-28 05:23:15.359220
freq      104858      101
first      NaN  2018-09-12 00:00:16.535741
last      NaN  2018-10-03 23:59:42.701692
mean      NaN      NaN
std      NaN      NaN
min      NaN      NaN
25%      NaN      NaN
50%      NaN      NaN
75%      NaN      NaN
max      NaN      NaN

      route_schedule_uuid route_type \
count      144867      144867
unique      1504         2
top  thanos::sroute:4029a8a2-6c74-4b7e-a6d8-f9e069f...  FTL
freq      1812      99660
first      NaN      NaN
last      NaN      NaN
mean      NaN      NaN
std      NaN      NaN
min      NaN      NaN

```

25%	NaN	NaN
50%	NaN	NaN
75%	NaN	NaN
max	NaN	NaN

	trip_uuid	source_center	source_name \
count	144867	144867	144574
unique	14817	1508	1498
top	trip-153811219535896559	IND000000ACB	Gurgaon_Bilaspur_HB (Haryana)
freq	101	23347	23347
first	NaN	NaN	NaN
last	NaN	NaN	NaN
mean	NaN	NaN	NaN
std	NaN	NaN	NaN
min	NaN	NaN	NaN
25%	NaN	NaN	NaN
50%	NaN	NaN	NaN
75%	NaN	NaN	NaN
max	NaN	NaN	NaN

	destination_center	destination_name \
count	144867	144606
unique	1481	1468
top	IND000000ACB	Gurgaon_Bilaspur_HB (Haryana)
freq	15192	15192
first	NaN	NaN
last	NaN	NaN
mean	NaN	NaN
std	NaN	NaN
min	NaN	NaN
25%	NaN	NaN
50%	NaN	NaN
75%	NaN	NaN
max	NaN	NaN

	od_start_time	od_end_time \
count	144867	144867
unique	26369	26369
top	2018-09-21 18:37:09.322207	2018-09-24 09:59:15.691618
freq	81	81
first	2018-09-12 00:00:16.535741	2018-09-12 00:50:10.814399
last	2018-10-06 04:27:23.392375	2018-10-08 03:00:24.353479
mean	NaN	NaN
std	NaN	NaN
min	NaN	NaN
25%	NaN	NaN
50%	NaN	NaN

75%	NaN	NaN
max	NaN	NaN

	start_scan_to_end_scan	is_cutoff	cutoff_factor \
count	144867.000000	144867	144867.000000
unique	NaN	2	NaN
top	NaN	True	NaN
freq	NaN	118749	NaN
first	NaN	NaN	NaN
last	NaN	NaN	NaN
mean	961.262986	NaN	232.926567
std	1037.012769	NaN	344.755577
min	20.000000	NaN	9.000000
25%	161.000000	NaN	22.000000
50%	449.000000	NaN	66.000000
75%	1634.000000	NaN	286.000000
max	7898.000000	NaN	1927.000000

	cutoff_timestamp	actual_distance_to_destination \
count	144867	144867.000000
unique	93180	NaN
top	2018-09-24 05:19:20	NaN
freq	40	NaN
first	2018-09-12 00:02:09.740725	NaN
last	2018-10-06 23:44:12	NaN
mean	NaN	234.073372
std	NaN	344.990009
min	NaN	9.000045
25%	NaN	23.355874
50%	NaN	66.126571
75%	NaN	286.708875
max	NaN	1927.447705

	actual_time	osrm_time	osrm_distance	factor \
count	144867.000000	144867.000000	144867.000000	144867.000000
unique	NaN	NaN	NaN	NaN
top	NaN	NaN	NaN	NaN
freq	NaN	NaN	NaN	NaN
first	NaN	NaN	NaN	NaN
last	NaN	NaN	NaN	NaN
mean	416.927527	213.868272	284.771297	2.120107
std	598.103621	308.011085	421.119294	1.715421
min	9.000000	6.000000	9.008200	0.144000
25%	51.000000	27.000000	29.914700	1.604264
50%	132.000000	64.000000	78.525800	1.857143
75%	513.000000	257.000000	343.193250	2.213483
max	4532.000000	1686.000000	2326.199100	77.387097

	segment_actual_time	segment_osrm_time	segment_osrm_distance \
count	144867.000000	144867.000000	144867.000000
unique	NaN	NaN	NaN
top	NaN	NaN	NaN
freq	NaN	NaN	NaN
first	NaN	NaN	NaN
last	NaN	NaN	NaN
mean	36.196111	18.507548	22.82902
std	53.571158	14.775960	17.86066
min	-244.000000	0.000000	0.000000
25%	20.000000	11.000000	12.07010
50%	29.000000	17.000000	23.51300
75%	40.000000	22.000000	27.81325
max	3051.000000	1611.000000	2191.40370

	segment_factor
count	144867.000000
unique	NaN
top	NaN
freq	NaN
first	NaN
last	NaN
mean	2.218368
std	4.847530
min	-23.444444
25%	1.347826
50%	1.684211
75%	2.250000
max	574.250000

1.5 Delete Unwanted columns from Raw Data

```
[125]: Unwanted_cols = ["data", "is_cutoff", "cutoff_factor", "cutoff_timestamp", "factor", "segment_factor"]
delhivery.drop(Unwanted_cols, axis = 1, inplace = True)
print("Number of remained columns:", len(delhivery.columns))
```

Number of remained columns: 18

1.6 Missing Value Detection and Handling on Raw data

```
[126]: delhivery.isna().sum()
```

```
[126]: trip_creation_time    0
route_schedule_uuid         0
route_type                  0
```

trip_uuid	0
source_center	0
source_name	293
destination_center	0
destination_name	261
od_start_time	0
od_end_time	0
start_scan_to_end_scan	0
actual_distance_to_destination	0
actual_time	0
osrm_time	0
osrm_distance	0
segment_actual_time	0
segment_osrm_time	0
segment_osrm_distance	0
dtype:	int64

Null values are present in only two columns: `source_name` and `destination_name`

```
[127]: delhivery.dropna(inplace=True)
delhivery.isna().sum()
```

[127]: trip_creation_time	0
route_schedule_uuid	0
route_type	0
trip_uuid	0
source_center	0
source_name	0
destination_center	0
destination_name	0
od_start_time	0
od_end_time	0
start_scan_to_end_scan	0
actual_distance_to_destination	0
actual_time	0
osrm_time	0
osrm_distance	0
segment_actual_time	0
segment_osrm_time	0
segment_osrm_distance	0
dtype:	int64

2 CHAPTER 2: FEATURE CREATION NEW

2.1 Extraction of City, Place, Code and State from source_name column

2.1.1 Visual Inspection of source_name column to find its different formats

```
[128]: delhivery["source_name"].nunique()
```

```
[128]: 1496
```

```
[129]: #list of all unique source names. Open in text editor to view all the_  
       ↪source_names  
       print(list(delhivery["source_name"].unique()))
```

```
['Anand_VUNagar_DC (Gujarat)', 'Khambhat_MotvdDPP_D (Gujarat)',  
'Bhiwandi_Mankoli_HB (Maharashtra)', 'LowerParel_CP (Maharashtra)',  
'Bangalore_Nelmngla_H (Karnataka)', 'Bengaluru_Bomsndra_HB (Karnataka)',  
'Ludhiana_GillChwk_DC (Punjab)', 'Jagraon_DC (Punjab)', 'Raikot_DC (Punjab)',  
'Junagadh_DPC (Gujarat)', 'Veraval_DC (Gujarat)', 'Kodinar_NCplxDPD_D  
(Gujarat)', 'Una_Mamlatdr_DC (Gujarat)', 'Talala_SsnRdDPP_D (Gujarat)',  
'Sonipat_Kundli_H (Haryana)', 'Roorkee_IOTCEncl_L (Uttarakhand)', 'Haridwar  
(Uttarakhand)', 'MAA_Poonamallee_HB (Tamil Nadu)', 'Ludhiana_MilrGanj_HB  
(Punjab)', 'Jalandhar_DPC (Punjab)', 'Gurgaon_Begumpur_CP (Haryana)',  
'Jaipur_Hub (Rajasthan)', 'Ajmer_FoySGRRD_I (Rajasthan)', 'Pali_Nayagaon_I  
(Rajasthan)', 'Jodhpur_Basni_I (Rajasthan)', 'Hyderabad_Chikdply_C (Telangana)',  
'Bhopal_Trnsport_H (Madhya Pradesh)', 'Kanpur_Central_H_6 (Uttar Pradesh)',  
'Auraiya_AryaNagr_D (Uttar Pradesh)', 'Etawah_MhraChng_D (Uttar Pradesh)',  
'Gurgaon_Bilaspur_HB (Haryana)', 'Ahmedabad_East_H_1 (Gujarat)', 'Surat_HUB  
(Gujarat)', 'Nanded_Aswningr_I (Maharashtra)', 'Loha_SivjiCWK_D (Maharashtra)',  
'Gangakher_Busstand_D (Maharashtra)', 'Parli_JirgeNgr_D (Maharashtra)',  
'Ambajogai_BnsllNgr_D (Maharashtra)', 'Mumbai_MaladWest_CP (Maharashtra)',  
'Bengaluru_Hoodi_IP (Karnataka)', 'Loharu_BstndDPP_D (Haryana)',  
'ChrkhiDdri_PuranDPP_D (Haryana)', 'Boisar_OstwlEmp_D (Maharashtra)',  
'Dahanu_KetyDPP_D (Maharashtra)', 'Hapur_Swargash_D (Uttar Pradesh)',  
'Bangana_Bhaleti_D (Himachal Pradesh)', 'Nadaun_Ward6_D (Himachal Pradesh)',  
'Balotra_BsnoiHPL_D (Rajasthan)', 'Pokhran_SttinDPP_D (Rajasthan)',  
'Phalodi_PalikDPP_D (Rajasthan)', 'Mehsana_Panchot_IP (Gujarat)', 'Unjha_DC  
(Gujarat)', 'Patan_Central_D_2 (Gujarat)', 'Bhabhar_TirupDPP_D (Gujarat)',  
'AMD_Memnagar (Gujarat)', 'Aluva_Peedika_H (Kerala)', 'Cochin_Chtrpuza_D  
(Kerala)', 'Pune_Tathawde_H (Maharashtra)', 'Solapur_Central_I_2 (Maharashtra)',  
'Kakinada_DC (Andhra Pradesh)', 'Tuni_Eaglvvari_D (Andhra Pradesh)',  
'Purnia_Central_H_2 (Bihar)', 'Supaul_SadrHsptl_D (Bihar)', 'Saharsa_Gangjala_D  
(Bihar)', 'Madhepura_Krishnpr_D (Bihar)', 'Triveninganj_Central_D_1 (Bihar)',  
'Visakhapatnam_Gajuwaka_IP (Andhra Pradesh)', 'Anakapalle_Kothuru_D (Andhra  
Pradesh)', 'Narsiptnm_Wardno8_D (Andhra Pradesh)', 'Ranchi_Hub (Jharkhand)',  
'Ramgarh_HotelPrk_D (Jharkhand)', 'Hazaribag_BodomBzr_DC (Jharkhand)',  
'JhumriTilya_RadhaCpx_D (Jharkhand)', 'Beawar_DC (Rajasthan)',  
'Bilara_Central_DPP_2 (Rajasthan)', 'Bijainagar_Central_DPP_1 (Rajasthan)',
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'Kekri_LxmntDPP_D (Rajasthan)', 'Nasirabad_Central_DPP_2 (Rajasthan)',
 'Hyderabad_Uppal_I (Telangana)', 'Bhuvanagiri_HBColny_D (Telangana)',
 'Mothkur_Mainroad_D (Telangana)', 'Thirumalagiri_Xroad_D (Telangana)',
 'Madhupur_Sitarmrd_D (Jharkhand)', 'Khammam_NSTRoad_I (Telangana)',
 'Kodad_VidyaNgr_D (Telangana)', 'Mumbai_Hub (Maharashtra)', 'Jaipur_Central_I_7
 (Rajasthan)', 'Guwahati_Hub (Assam)', 'Morbi_DC (Gujarat)', 'Wankaner_JivanDPP_D
 (Gujarat)', 'BLR_JPNagar_Pc (Karnataka)', 'Bengaluru_KGAirprt_HB (Karnataka)',
 'Kolkata_Dankuni_HB (West Bengal)', 'Bhubaneshwar_Hub (Orissa)',
 'Alwar_Central_I_1 (Rajasthan)', 'Bharatpur_NraynDPP_D (Rajasthan)',
 'Bharatpur_DC (Rajasthan)', 'Weir_BsstdDPP_D (Rajasthan)', 'Kherli_GodamDPP_D
 (Rajasthan)', 'Kolkata_North_I_4 (West Bengal)', 'Bagnan_Harop_D (West Bengal)',
 'Kolaghat_Central_DPP_2 (West Bengal)', 'Delhi_Airport_H (Delhi)',
 'Guwahati_North (Assam)', 'Mumbai_Sanpada_I (Maharashtra)', 'Delhi_North_R_8
 (Delhi)', 'Puttaprthi_Gokulam_D (Andhra Pradesh)', 'Hindupur_Parigi_D (Andhra
 Pradesh)', 'GreaterThane_Anjur_C (Maharashtra)', 'Hyderabad_Shamsabd_H
 (Telangana)', 'Patancheru_Ameenpur_I (Telangana)', 'Del_Okhla_PC (Delhi)',
 'Bengaluru_KHRoad_I (Karnataka)', 'Muzaffrpur_Bbganj_I (Bihar)', 'Darbhanga
 (Bihar)', 'Benipur_Javahar_D (Bihar)', 'Jhanjharpur_Nagar_D (Bihar)',
 'Dhule_MIDCAvdn_I (Maharashtra)', 'Sakri_DhuleRoad_D (Maharashtra)',
 'Nandurbar_DhuleRd_D (Maharashtra)', 'Shahada_Nandrbar_D (Maharashtra)',
 'Shirpur_KrantiNgr_D (Maharashtra)', 'Hooghly_DC (West Bengal)',
 'Hoogly_Bandel_D (West Bengal)', 'GZB_Mohan_Nagar_DPC (Uttar Pradesh)',
 'Pilkhuwa_HapurRD_D (Uttar Pradesh)', 'Ahmedabad_Paldi_D (Gujarat)',
 'Bengaluru_Peenya_IP (Karnataka)', 'Sedam_DBRCmplx_D (Karnataka)',
 'Chincholi_Mainroad_D (Karnataka)', 'Dindigul_Central_D_1 (Tamil Nadu)',
 'Oddnchtram_Palani_D (Tamil Nadu)', 'Palani_RjndraRd_D (Tamil Nadu)',
 'Kodaikanal_Athithnr_DC (Tamil Nadu)', 'Batlagundu_RTOffice_D (Tamil Nadu)',
 'Villupuram_Thirumtr_IP (Tamil Nadu)', 'Panruti_GandhiRd_D (Tamil Nadu)',
 'Neyveli_NJVNgr_D (Tamil Nadu)', 'Virudhchlm_SelamRd_D (Tamil Nadu)',
 'Pennadam_EastmnRD_D (Tamil Nadu)', 'Chinnasalem_VkotRoad_D (Tamil Nadu)',
 'Kazhakkootam_Rdiosttn_D (Kerala)', 'Attingal_Central_D_2 (Kerala)',
 'Kalluvathukal_Pariplly_D (Kerala)', 'Bhubaneshwar_Nayapalli (Orissa)',
 'Visakhapatnam_VislnNgr_DC (Andhra Pradesh)', 'Bheemunipatnam_SaiTempl_D (Andhra
 Pradesh)', 'Vizianagaram_NcsRd_DC (Andhra Pradesh)', 'AMD_Rakhial (Gujarat)',
 'Baddi_ByePass_D (Himachal Pradesh)', 'Faridabad (Haryana)', 'Mumbai_Sanpada_CP
 (Maharashtra)', 'Hassan_Pandrngr_I (Karnataka)', 'Channarayana_patna_D
 (Karnataka)', 'Koppa_BMRd_D (Karnataka)', 'Madikeri_MuthpTnp_D (Karnataka)',
 'Ramanathapura_Central_D_2 (Karnataka)', 'Tiptur_YTRd_D (Karnataka)',
 'Mudigere_HesglDPP_D (Karnataka)', 'Sakleshpur_RgvdrDPP_D (Karnataka)',
 'Mumbai_East_I_21 (Maharashtra)', 'Gurgaon_Central_D_15 (Haryana)', 'Pataudi_DC
 (Haryana)', 'Sankari_Trchngrd_D (Tamil Nadu)', 'Murshidabad_Sirjudol_D (West
 Bengal)', 'Lalgola_KrsprDPP_D (West Bengal)', 'Ragunthgnj_GopalDPP_D (West
 Bengal)', 'Jangipur_Central_D_1 (West Bengal)', 'Sagardighi_UtBzrDPP_D (West
 Bengal)', 'Thiruvadanai_RamnadrD_D (Tamil Nadu)', 'Oriyur_Vllyaprm_D (Tamil
 Nadu)', 'Manamelkudi_TmpleSrt_D (Tamil Nadu)', 'Hubli_Adargchi_IP (Karnataka)',
 'Ramdurg_GndhiNGR_D (Karnataka)', 'Bagalkot_Sector4_D (Karnataka)',
 'Rona_GadagRD_D (Karnataka)', 'Gadag_Cdosclrd_D (Karnataka)',
 'Chandigarh_Mehmdpur_H (Punjab)', 'Ganga_Nagar_DC (Rajasthan)',

'Noida_Chukhndi_D (Uttar Pradesh)', 'Hyderabad_Chikdply_I (Telangana)',
 'Dhaka_PchpkrRD_D (Bihar)', 'Bettiah_BypassRd_D (Bihar)',
 'Narktiganj_Central_DPP_2 (Bihar)', 'Coimbatore_Karayam_H (Tamil Nadu)',
 'Udumalpet_Artclgrd_D (Tamil Nadu)', 'Pollachi_Venkatsa_DC (Tamil Nadu)',
 'Kathua_BOB_D (Jammu & Kashmir)', 'Jammu_TrnptNgr_L (Jammu & Kashmir)',
 'Samba_Wardno13_D (Jammu & Kashmir)', 'Delhi_Nangli_IP (Delhi)',
 'DehriSone_Dilliyand_D (Bihar)', 'AurngbadBR_Mahindra_D (Bihar)',
 'Kendrpara_Kapleswr_D (Orissa)', 'Cuttack_SliprDPP_DC (Orissa)',
 'Kunnathund_Pringla_D (Kerala)', 'Delhi_Gateway_HB (Delhi)', 'Delhi_Kapshera_L
 (Delhi)', 'Salem (Tamil Nadu)', 'Tirchngode_Mhdhvpur_D (Tamil Nadu)', 'Moga_DPC
 (Punjab)', 'Muktsar_DPC (Punjab)', 'GGN_DPC (Haryana)', 'Tirunelveli_VdkkuSrt_I
 (Tamil Nadu)', 'Vallior_Radhaprm_D (Tamil Nadu)', 'Marthandam_Nallur_D (Tamil
 Nadu)', 'CCU_New Alipore_DPC (West Bengal)', 'Gorakhpur_Matriprmd_IP (Uttar
 Pradesh)', 'Sahatwar_PnchmdPP_D (Uttar Pradesh)', 'Bariya_BgnprDPP_D (Uttar
 Pradesh)', 'Ratanpura_MubardPP_D (Uttar Pradesh)', 'Chandausi_Ganesh_D (Uttar
 Pradesh)', 'Patiala_GainMrkt_L (Punjab)', 'Malerkotla_DC (Punjab)', 'Sunam_DC
 (Punjab)', 'Patiala (Punjab)', 'Moradabad_DC (Uttar Pradesh)',
 'Rudrapur_UdhamNgr_H (Uttarakhand)', 'Dibrugarh_Bokule_H (Assam)',
 'Digboi_JyotiNgr_D (Assam)', 'Margherita_CivilHPL_D (Assam)', 'Itarsi_DivrsnRd_D
 (Madhya Pradesh)', 'Betul_PatelWrd_D (Madhya Pradesh)', 'Pandhurna_Mataward_D
 (Madhya Pradesh)', 'Kurnool_AbbasNgr_I (Andhra Pradesh)', 'Wanaparthy_VallaDPP_D
 (Telangana)', 'Amravati_DC (Maharashtra)', 'Akola_Gaurkshn_I (Maharashtra)',
 'Ghaziabad_MohanNgr_C (Uttar Pradesh)', 'Kolhapur_Shivaji_I (Maharashtra)',
 'Nipani_AkkolRD_D (Karnataka)', 'Chikodi_IndraNgr_D (Karnataka)',
 'Athani_VikrmMah_D (Karnataka)', 'Bijapur_Central_D_2 (Karnataka)',
 'FBD_Balabgarh_DPC (Haryana)', 'Palwal (Haryana)', 'Narsinghpur_KndliDPP_D
 (Madhya Pradesh)', 'Gadarwara_MPward_D (Madhya Pradesh)', 'Kalka_Pinjore_DC
 (Haryana)', 'Nalagarh_Central_DPP_2 (Himachal Pradesh)', 'Jorhat_RicMilRd_D
 (Assam)', 'Teok_Wardno3_D (Assam)', 'Mariani_Mainroad_D (Assam)',
 'Bengaluru_Kengeri_IP (Karnataka)', 'Sitamari_Durma_D (Bihar)',
 'Benipatti_WardNo1_D (Bihar)', 'Sitarganj_SidculRd_D (Uttarakhand)',
 'Trivandrum_Pettah_D (Kerala)', 'Neyatinkra_Arlumodu_D (Kerala)',
 'Kallikkad_Mutyvila_D (Kerala)', 'Islampur_Shantanu_D (Maharashtra)',
 'Karad_Mundhe_D (Maharashtra)', 'Chiplun_LxmiNiws_D (Maharashtra)',
 'Kolkata_TrtilaRD_L (West Bengal)', 'Chennai_Mdhavram_C (Tamil Nadu)', 'Jaipur
 (Rajasthan)', 'Sehore_Mangalam_D (Madhya Pradesh)', 'Ashta_ShantiNg_D (Madhya
 Pradesh)', 'Rajgurunagar_Chakan_D (Maharashtra)', 'Talegaon_Central_DPP_4
 (Maharashtra)', 'Guskhara_Itachnda_D (West Bengal)', 'Chennai_Porur_DPC (Tamil
 Nadu)', 'Chennai_Vepmpttu_DC (Tamil Nadu)', 'Chennai_Thiruvlr_DC (Tamil Nadu)',
 'Chandigarh_Raiprklnd_C (Chandigarh)', 'Mumbai_Chndivli_PC (Maharashtra)',
 'Mumbai_MiraRd_IP (Maharashtra)', 'Mumbai_Vasai_CP (Maharashtra)',
 'Davangere_Central_I_1 (Karnataka)', 'Ranebennur_SriRmNGR_D (Karnataka)',
 'Haveri_GuttalRD_D (Karnataka)', 'Allahabad_Central_H_1 (Uttar Pradesh)',
 'Attur_KaaduRd_D (Tamil Nadu)', 'BilaspurHP_Indsarea_D (Himachal Pradesh)',
 'SundarNgr_Bhogpur_D (Himachal Pradesh)', 'Mandi_PlaceCol_D (Himachal Pradesh)',
 'Kullu_AkhraBzr_D (Himachal Pradesh)', 'Kottayam_Central_H_1 (Kerala)',
 'Haripad_Kumrpurm_D (Kerala)', 'Alappuzha_Pazhvedu_D (Kerala)', 'Theni_Rathnam_D
 (Tamil Nadu)', 'Cumbum_LFRoad_D (Tamil Nadu)', 'Kattappana_Palikval_D (Kerala)',

'Udaipur_Mangri_I (Rajasthan)', 'Tumkur_Veersagr_I (Karnataka)',
 'Doddablpur_ChikaDPP_D (Karnataka)', 'Chikblapur_ShntiSgr_D (Karnataka)',
 'Bagepalli_TBCross_D (Karnataka)', 'Karur (Tamil Nadu)', 'Mumbai_Ambernath_Dc
 (Maharashtra)', 'Surat_Central_I_4 (Gujarat)', 'Thrissur_Poothole_D (Kerala)',
 'Vadakkencherry_Robinson_D (Kerala)', 'Pallakad_ChndrNgr_D (Kerala)',
 'AhmedNagar_DC (Maharashtra)', 'Parner_Hindcwk_D (Maharashtra)',
 'Shirur_Central_DPP_3 (Maharashtra)', 'Pukhrayan_Arulimod_D (Uttar Pradesh)',
 'Orai_Ajnari_D (Uttar Pradesh)', 'Bailhongal_NamoNagr_D (Karnataka)',
 'Kanker_KrisnKunj_D (Chhattisgarh)', 'Bengaluru_Bnnrgha_L (Karnataka)',
 'Rampur_RoshnBgh_I (Uttar Pradesh)', 'Bareilly_Central_D_2 (Uttar Pradesh)',
 'Faridpur_ShjnprRD_D (Uttar Pradesh)', 'Chennai_Hub (Tamil Nadu)',
 'Tirupati_Balajicly_I (Andhra Pradesh)', 'Puttur_Artmclny_D (Andhra Pradesh)',
 'Koduru_MGRoad_D (Andhra Pradesh)', 'Rajampet_RSroad_D (Andhra Pradesh)',
 'Midnapore_Talkui_D (West Bengal)', 'Bangarapet_KolarRd_D (Karnataka)',
 'Bethamangala_FshryOFC_D (Karnataka)', 'Balasore_Ganeshwr_D (Orissa)',
 'Betnoti_MhliadPP_D (Orissa)', 'Ramnagar_BhwniGnj_D (Uttarakhand)',
 'Kashipur_Vaishali_D (Uttarakhand)', 'Kashipur_BajprDPP_D (Uttarakhand)',
 'Baraut_SrnprHwy_D (Uttar Pradesh)', 'Shamli_KarnalRd_D (Uttar Pradesh)',
 'Budhana_Busstand_D (Uttar Pradesh)', 'Mumbai_Ghansoli_DC (Maharashtra)',
 'Aurangabad_Central_H_1 (Maharashtra)', 'Patran_MheshNGR_D (Punjab)', 'Vadodara
 (Gujarat)', 'Bellary_Dc (Karnataka)', 'Molakalmuru_KnsgraRD_D (Karnataka)',
 'Challakere_Shivangr_D (Karnataka)', 'Mumbai_Jogshwri_I (Maharashtra)',
 'Ranipet_MBTRd_DC (Tamil Nadu)', 'Sholinghur_ArkonmRD_D (Tamil Nadu)',
 'Manbazar_Central_DPP_1 (West Bengal)', 'Khatra_KoralDPP_D (West Bengal)',
 'Simlapal_Central_D_1 (West Bengal)', 'Bhadrachalam_ITDARd_D (Telangana)',
 'Manuguru_AskNagar_D (Telangana)', 'Cjb_Kovaipudur_Dc (Tamil Nadu)',
 'Cjb_West_Dc (Tamil Nadu)', 'Bhandara_RjnaiDPP_D (Maharashtra)',
 'Bhandara_KaremDPP_D (Maharashtra)', 'Guwahati_Sixmile (Assam)',
 'Vadodara_Karelibaug_DPC (Gujarat)', 'PNQ_Vadgaon_Sheri_DPC (Maharashtra)',
 'Durgapur_Central_I_1 (West Bengal)', 'Noida_Sec-83_DC (Uttar Pradesh)',
 'Saundatti_ShanthiS_D (Karnataka)', 'Guruvayoor_ManhrBld_D (Kerala)',
 'Tirur_PmthuKlm_D (Kerala)', 'Kozhikode_Central_H_4 (Kerala)', 'Mumbai_Panvel_D
 (Maharashtra)', 'Kotputli_LXngrDPP_D (Rajasthan)', 'Panipat_PC (Haryana)',
 'Sonipat_AmzonDev_V (Haryana)', 'Noida_Surajpur_DC (Uttar Pradesh)',
 'Noida_Sector02_C (Uttar Pradesh)', 'Goa_ZuariNgr_IP (Goa)',
 'Faridabad_Blbgarh_DC (Haryana)', 'Araria_Wardn13_D (Bihar)',
 'Raniganj_Central_DPP_1 (Bihar)', 'Forbesganj_JhumanCk_D (Bihar)',
 'Simrahi_Bazar_D (Bihar)', 'Narpatganj_Central_DPP_1 (Bihar)',
 'Chennai_Poonamallee (Tamil Nadu)', 'Chennai_Egmore_DPC (Tamil Nadu)',
 'Hyderabad_Tolichwk_I (Telangana)', 'Dholi_WardNo4_D (Bihar)',
 'Samastipur_Haripur_D (Bihar)', 'HazratJandaha_HajiprRD_D (Bihar)',
 'Kolkata_Narynpur_C (West Bengal)', 'Rajamundry_AtoNgrRd_I (Andhra Pradesh)',
 'Mandapeta_Mainrd_D (Andhra Pradesh)', 'Madhubani_Bardivan_D (Bihar)',
 'Jaynagar_Wardno6_D (Bihar)', 'Sathupally_VidyaNGR_D (Telangana)',
 'Berhampore_Central_I_2 (West Bengal)', 'Domkal_Central_D_2 (West Bengal)',
 'Nazirpur_Central_D_1 (West Bengal)', 'Nowda_ArhamDPP_D (West Bengal)',
 'Nowda_AmtlaDPP_D (West Bengal)', 'Bhuj_DC (Gujarat)', 'Chikmagalur_DC
 (Karnataka)', 'Anjar_DC (Gujarat)', 'Chandigarh_Kharar_DC (Chandigarh)',

'Chandigarh_Mullanpr_DC (Chandigarh)', 'Pune_PC (Maharashtra)',
 'Hyderabad_South_D_4 (Telangana)', 'Osmanabad_Kakdepot_D (Maharashtra)',
 'Barshi_Kurduwadi_D (Maharashtra)', 'Noida_Sec 02_DPC (Uttar Pradesh)',
 'Khurja_Pnjbijon_D (Uttar Pradesh)', 'Jewar_SJRoad_D (Uttar Pradesh)',
 'Pahasu_Kanongyn_D (Uttar Pradesh)', 'Anupshahar_DcntCLY_D (Uttar Pradesh)',
 'Raipur_Katora_IP (Chhattisgarh)', 'Bhopal MP Nagar (Madhya Pradesh)',
 'Koyilandy_Pshrikvu_D (Kerala)', 'Vadakara_Mandodi_D (Kerala)',
 'Kallachi_ZamQuatr_D (Kerala)', 'Sasaram_Central_I_2 (Bihar)', 'Mohania_Bhabua_D
 (Bihar)', 'Kolar_Ambedkar_D (Karnataka)', 'Mulbagal_Sunku_D (Karnataka)',
 'Chintamani_Central_D_2 (Karnataka)', 'Kollam_Central_H_1 (Kerala)',
 'Kottarakkara_Amankovl_D (Kerala)', 'Punalur_PostofJN_D (Kerala)',
 'Pthnmthitt_Klskhrpt_D (Kerala)', 'Adoor_Town_D (Kerala)', 'Nichlaul_Wardno13_D
 (Uttar Pradesh)', 'Atmakur_IndraNgr_D (Andhra Pradesh)', 'Srisailam_Sishumdr_D
 (Andhra Pradesh)', 'Jalandhar_Sodal Road (Punjab)', 'Chandigarh_Raiprvlg_L
 (Chandigarh)', 'Godhra_DC (Gujarat)', 'Dahod_DC (Gujarat)', 'Kanchipuram_DC
 (Tamil Nadu)', 'Arakkonam_HousngBd_D (Tamil Nadu)', 'Gandhinagar_DC (Gujarat)',
 'Bengaluru_Peenya_L (Karnataka)', 'Brahmapuri_DhnliRth_D (Maharashtra)',
 'Chamorshi_Central_DPP_1 (Maharashtra)', 'Goa_Hub (Goa)', 'Canacona_CharRsta_D
 (Goa)', 'Chennai_Chrompet_DPC (Tamil Nadu)', 'Pondicherry_Vasanthm_I
 (Pondicherry)', 'Kalpakkam_Sadras_D (Tamil Nadu)', 'Mumbai_Pawane_L
 (Maharashtra)', 'Guntakal_Verpatem_D (Andhra Pradesh)', 'Rayadurgam_RailGate_D
 (Andhra Pradesh)', 'Kalyandurg_Shankrpa_D (Andhra Pradesh)',
 'Sriklahsti_SDKNgr_D (Andhra Pradesh)', 'Venktagiri_TirupthiRd_D (Andhra
 Pradesh)', 'Gudur_Bngisheb_D (Andhra Pradesh)', 'Karimnagar_KamHbRD_I
 (Telangana)', 'Cherthala_Mulapali_D (Kerala)', 'CCU_Beliaghata_DPC (West
 Bengal)', 'Bhavnagar_Mahuva_DC (Gujarat)', 'Jaipur_NgrNigam_DC (Rajasthan)',
 'Chittaurgarh_DC (Rajasthan)', 'Rajsamand_kankroli_D (Rajasthan)',
 'Kadi_KaranNGR_D (Gujarat)', 'Vijayawada_Rynapadu_H (Andhra Pradesh)',
 'Akhnoor_ThthiCwk_D (Jammu & Kashmir)', 'Kumbakonam_Mettu_DC (Tamil Nadu)',
 'Mylduthuri_Thiruviz_D (Tamil Nadu)', 'Mannargudi_Vadasari_D (Tamil Nadu)',
 'Ukkadagatri_Tuminkte_D (Karnataka)', 'Dadri_ICDCant_D (Uttar Pradesh)',
 'Faridabad_Mthurard_L (Haryana)', 'Delhi_Mayapuri_PC (Delhi)',
 'Panagarh_Central_D_1 (West Bengal)', 'Bolpur_WebelDPP_D (West Bengal)',
 'Nanoor_Central_DPP_1 (West Bengal)', 'Delhi_Wazirpur_L (Delhi)',
 'Eluru_Agraham_DC (Andhra Pradesh)', 'Kaikaluru_Atapaka_D (Andhra Pradesh)',
 'Anantapur_KamaStrt_I (Andhra Pradesh)', 'Dharmavram_SaiNgr_D (Andhra Pradesh)',
 'Kadiri_GVManu_D (Andhra Pradesh)', 'Rayachoti_Madnpali_D (Andhra Pradesh)',
 'Pulivendula_RTCStand_D (Andhra Pradesh)', 'Shegaon_SChwkDPP_D (Maharashtra)',
 'Chaksu_TonkRoad_D (Rajasthan)', 'Ghatal_KrshDPP_D (West Bengal)', 'HBR Layout
 PC (Karnataka)', 'Chhapra_Prbbhunth_D (Bihar)', 'Siwan_HmmntNgr_D (Bihar)',
 'Sambhal_Khwssrai_D (Uttar Pradesh)', 'Aonla_KdidmCLY_D (Uttar Pradesh)',
 'Nainital_Sookhtal_D (Uttarakhand)', 'Ranikhet_Subhash_D (Uttarakhand)',
 'Almora_SuzkiSrv_D (Uttarakhand)', 'Musiri_ThryrRD_D (Tamil Nadu)',
 'Thuraiyur_Mthrapuri_D (Tamil Nadu)', 'Perambalur_goplurm_D (Tamil Nadu)',
 'Ariyalur_Kmrajngr_D (Tamil Nadu)', 'Lalpet_PriyrNGR_D (Tamil Nadu)',
 'Bongaon_SukntDPP_D (West Bengal)', 'Helencha_ColnyDPP_D (West Bengal)',
 'Gajraula_JawaharN_D (Uttar Pradesh)', 'Amroha_SamitiRd_D (Uttar Pradesh)',
 'Bhopal_Kolar_Mandakni (Madhya Pradesh)', 'Coimbatore_Ukkadam_D (Tamil Nadu)',

'Vizag_Gajuwaka_L (Andhra Pradesh)', 'Ranaghat_ArickDPP_D (West Bengal)',
 'Karwar_Central_D_1 (Karnataka)', 'Mallapur_ShtDRDPP_D (Karnataka)',
 'Dandeli_RKComplx_D (Karnataka)', 'Moodbidri_MrdiVlge_D (Karnataka)',
 'Karkala_MarketRd_D (Karnataka)', 'Dhrmsthala_Beltngdi_D (Karnataka)', 'CCU_Hub
 (West Bengal)', 'Tiruppattur_KoilStrt_D (Tamil Nadu)', 'Uthangarai_RgstrOFC_D
 (Tamil Nadu)', 'Thamarassery_Chungam_D (Kerala)', 'SultnBthry_Kollgpra_D
 (Kerala)', 'Dinhata_WrdN4DPP_D (West Bengal)', 'Bewar_BndhuTRH_D (Uttar
 Pradesh)', 'Silvassa_Samrvrni_D (Dadra and Nagar Haveli)', 'Bengaluru_Sarjapur_D
 (Karnataka)', 'Sawantwadi_LaxmiNgr_D (Maharashtra)', 'Modinagar_SikriKla_DC
 (Uttar Pradesh)', 'Khatauli_TilakNgr_D (Uttar Pradesh)', 'Dhar_Trimurti_D
 (Madhya Pradesh)', 'Ratlam_Khjurwli_DC (Madhya Pradesh)', 'Jaora_RtlamNka_D
 (Madhya Pradesh)', 'Sonari_Central_DPP_1 (Assam)', 'Mangalore_Kuntikna_H
 (Karnataka)', 'Kanpur_Central_D_7 (Uttar Pradesh)', 'Silchar_Sirikona_H
 (Assam)', 'Anand_Vaghasi_IP (Gujarat)', 'Manjeshwar_Central_D_1 (Kerala)',
 'Kanhagad_Arangadi_D (Kerala)', 'Trivandrum_Mnanthla_H (Kerala)',
 'Mainaguri_MilpaDPP_D (West Bengal)', 'Mathabhang_Pshimpra_D (West Bengal)',
 'Barmer_Nehru3PL_D (Rajasthan)', 'Jaisalmer_Gopa3PL_D (Rajasthan)',
 'Bihta_ShivNgar_D (Bihar)', 'Arrah_Katira_D (Bihar)', 'Neemuch_KarjuDPP_D
 (Madhya Pradesh)', 'BariSadri_BhmprDPP_D (Rajasthan)', 'Deoghar_Barmasia_D
 (Jharkhand)', 'Godda_Central_D_2 (Jharkhand)', 'Sahebganj_BaraLoha_D
 (Jharkhand)', 'Vadnagar_BsstdDPP_D (Gujarat)', 'Palanpur_DC (Gujarat)',
 'Deesa_HawaiPlr_DC (Gujarat)', 'Arimbur_Veluthur_D (Kerala)',
 'Sankaramangalam_Central_D_1 (Kerala)', 'Shoranur_KdrShrRd_D (Kerala)',
 'Pazhayannur_AlathurRD_D (Kerala)', 'Thiruvavarur_Bypasrd_D (Tamil Nadu)',
 'Thirthurpondi_Madapuram_D (Tamil Nadu)', 'Pushpavanam_Thmpulam_D (Tamil Nadu)',
 'Dhanbad_Kalynpur_I (Jharkhand)', 'Chimkurthy_MSRClgRd_D (Andhra Pradesh)',
 'Markapur_VidyaNgr_D (Andhra Pradesh)', 'Hamirpur_GutmgrCl_D (Himachal
 Pradesh)', 'Faizabad_TrnspNgr_D (Uttar Pradesh)', 'Gosainganj_Pakrela_D (Uttar
 Pradesh)', 'Cuddalore_KtsiGrsm_D (Tamil Nadu)', 'Chidambaram_ARBNorth_DC (Tamil
 Nadu)', 'Sirkazhi_Pngktgudi_D (Tamil Nadu)', 'Karaikal_Thalthru_DC
 (Pondicherry)', 'Nagapattinm_Sttyapar_D (Tamil Nadu)', 'Hyderabad_Alwal_L
 (Telangana)', 'Vijayawada (Andhra Pradesh)', 'Nandigama_Chndrlpd_D (Andhra
 Pradesh)', 'Chennai_Egmore_C (Tamil Nadu)', 'Hyderabad_Mhdiptnm_C (Telangana)',
 'Malda_Central_I_3 (West Bengal)', 'Manikchak_Enayetpr_D (West Bengal)',
 'Paranpur_Nijgan_D (West Bengal)', 'Samsi_RatuaDPP_D (West Bengal)',
 'Biswan_PatelNGR_D (Uttar Pradesh)', 'Sitapur_Chowk_D (Uttar Pradesh)',
 'Lakhimpur_Maheva_D (Uttar Pradesh)', 'Gola_BkgnRoad_D (Uttar Pradesh)',
 'Dehradun_Selakui_D (Uttarakhand)', 'Mussoorie_BrlwgDPP_D (Uttarakhand)',
 'Mumbai_Virar_DC (Maharashtra)', 'Gonda_KotwaliN_D (Uttar Pradesh)', 'Nadiad_DC
 (Gujarat)', 'Umreth_Dakor_DC (Gujarat)', 'Gandhinagar_Kalol_DC (Gujarat)',
 'Nagamangala_MandyaRD_D (Karnataka)', 'Krishnarajpet_MuruPost_D (Karnataka)',
 'Tirurangadi_Kooriyad_D (Kerala)', 'Malappuram_Munduprm_D (Kerala)', 'Roorkee_Dc
 (Uttarakhand)', 'Mumbai_CottonGreen_DPC (Maharashtra)', 'Shimoga_DC
 (Karnataka)', 'Rishikesh_DC (Uttarakhand)', 'Basti_GndhiNgr_D (Uttar Pradesh)',
 'Pune_Chinchwad DC (Maharashtra)', 'Samana_PODPP_D (Punjab)', 'Amd_Chandkheda_Dc
 (Gujarat)', 'Mainpuri_Agraroad_I (Uttar Pradesh)', 'Farrukhbad_Pnchlght_D (Uttar
 Pradesh)', 'Shahabad_KDRoad_D (Uttar Pradesh)', 'Tilhar_SingCLNY_D (Uttar
 Pradesh)', 'Jalalabad_farukngr_D (Uttar Pradesh)', 'Bhatinda_DPC (Punjab)',

'Brajrajnagar_LamtiDPP_D (Orissa)', 'Sundargarh_DiyoDPP_D (Orissa)',
 'Narsinggarh_Central_D_1 (Madhya Pradesh)', 'Pachore_Shop3DPP_D (Madhya
 Pradesh)', 'Ongole_SubhVRTL_I (Andhra Pradesh)', 'Makrana_Mwalibad_D
 (Rajasthan)', 'Degana_BhukrdPP_D (Rajasthan)', 'Merta_Central_DPP_1
 (Rajasthan)', 'Firozabad_Sudmpuri_D (Uttar Pradesh)', 'Chinnur_AsnsdhRD_D
 (Telangana)', 'Manthani_Chaitnya_D (Telangana)', 'Jamnagar_Dc (Gujarat)',
 'Gooty_StatonRd_D (Andhra Pradesh)', 'Duddhi_MChwkDPP_D (Uttar Pradesh)',
 'Renukoot_Govind_D (Uttar Pradesh)', 'Anpara_Parasi_D (Uttar Pradesh)',
 'Singrauli_Waidhan_D (Madhya Pradesh)', 'Singrauli_Ward8DPP_D (Madhya Pradesh)',
 'Chopan_PreetDPP_D (Uttar Pradesh)', 'Chennai_Madhavaram_DPC (Tamil Nadu)',
 'Himmatnagar_DC (Gujarat)', 'LakhimpurN_SashPhkn_D (Assam)', 'Dhemaji_WardNo3_D
 (Assam)', 'Likabali_ZoomCDPP_D (Arunachal Pradesh)', 'Vapi_IndEstat_I
 (Gujarat)', 'Katwa_BSarani_D (West Bengal)', 'Chapra_NagarDPP_D (West Bengal)',
 'Nakashipara_MaxDPP_D (West Bengal)', 'Plassey_BtaiRoad_D (West Bengal)',
 'Surendranagar_DC (Gujarat)', 'Limbd_Busstand_D (Gujarat)', 'Tiruvalla_TKRoad_D
 (Kerala)', 'Kuthuparamba_IdstrlAr_D (Kerala)', 'Ghumarwin_Gndhichk_D (Himachal
 Pradesh)', 'Jahu_Sulgowan_D (Himachal Pradesh)', 'JognderNgr_Dhelu_D (Himachal
 Pradesh)', 'Chandigarh_Panchkula (Chandigarh)', 'Chennai_Chrompet_L (Tamil
 Nadu)', 'Wardha_RamaNgr_D (Maharashtra)', 'Deoli_Central_DPP_2 (Maharashtra)',
 'Fatepur_NH117_D (West Bengal)', 'Barnala_DC (Punjab)', 'Muzaffrngr_MhmodNgr_D
 (Uttar Pradesh)', 'Deoband_Ramvlg_D (Uttar Pradesh)', 'Deoria_CCRoad_D (Uttar
 Pradesh)', 'Kushinagar_KasyaDPP_D (Uttar Pradesh)', 'Padrauna_BawliDPPP_D (Uttar
 Pradesh)', 'Kaptanganj_Subshngr_D (Uttar Pradesh)', 'Gwalior_HrihrNgr_I (Madhya
 Pradesh)', 'Tirpur_Palladam_DC (Tamil Nadu)', 'Dharapuram_Techrcly_D (Tamil
 Nadu)', 'Kangayam_Thvlrsrt_D (Tamil Nadu)', 'Mumbai_Antop_Hill (Maharashtra)',
 'Jalore_RoopNgr_D (Rajasthan)', 'Bhinmal_RwStnDPP_D (Rajasthan)', 'Porbandar_DC
 (Gujarat)', 'Jamjodhpur_Court_D (Gujarat)', 'Aligarh_KhirByps_I (Uttar
 Pradesh)', 'Shikohabad_Katrmira_D (Uttar Pradesh)', 'Hyderabad_North_D_2
 (Telangana)', 'Medchal_MR0offce_D (Telangana)', 'Coimbatore_ElngoNgr_C (Tamil
 Nadu)', 'Jalandhar_DC (Punjab)', 'Chennai_Perungudi_DPC (Tamil Nadu)',
 'Bulndshahr_Ymunpurm_D (Uttar Pradesh)', 'Bhopal_Old_City (Madhya Pradesh)',
 'Hisar_ModelTwn_P (Haryana)', 'Hanumangarh_DC (Rajasthan)', 'Mumbai_CotnGren_M
 (Maharashtra)', 'Parakkdavu_KeRoad_D (Kerala)', 'Mundakayam_Central_D_1
 (Kerala)', 'Hailakandi_kalibari_D (Assam)', 'Karimganj_Alngjuri_D (Assam)',
 'Guwahati_East (Assam)', 'Sathyamangalam_Mlydpthr_D (Tamil Nadu)',
 'Anthiyour_TherSRT_D (Tamil Nadu)', 'Akbarpur_NehruNGR_D (Uttar Pradesh)',
 'Kurukshetra_DC (Haryana)', 'Pehowa_WdN14DPP_D (Haryana)', 'Kaithal_DC
 (Haryana)', 'Safidon_HatRDDPP_D (Haryana)', 'Hyderabad_Bownpilly_C (Telangana)',
 'Kotagiri_CroslySRT_D (Tamil Nadu)', 'BOM_Sakinaka_RP (Maharashtra)',
 'Raichur_LSRoad_DC (Karnataka)', 'Suratgarh_Central_DPP_2 (Rajasthan)',
 'Srividyanagar_BhwanDPP_D (Rajasthan)', 'Humnabad_EBroad_D (Karnataka)', 'Bidar
 (Karnataka)', 'Narayankhed_Datarya_D (Telangana)', 'Zahirabad_Mohim_D
 (Telangana)', 'Manmad_Malegaon_D (Maharashtra)', 'Malegaon_Rawlgaon_D
 (Maharashtra)', 'Pen_BljiMrkt_D (Maharashtra)', 'Roha_DataSagr_D (Maharashtra)',
 'Mahad_Govndsgr_D (Maharashtra)', 'Udupi (Karnataka)', 'Kundapura_DC
 (Karnataka)', 'Bhatkal_KmkshBul_D (Karnataka)', 'Honnavar_Prbbhtngr_D
 (Karnataka)', 'Kumta_Central_DPP_2 (Karnataka)', 'Ankola_Kakrmath_D
 (Karnataka)', 'Dudu_NrainaRD_D (Rajasthan)', 'Phulera_NarenaRD_D (Rajasthan)',

'Renwal_ChomuRD_D (Rajasthan)', 'Jaleswar_NaturDPP_D (Orissa)', 'Beed_JalnaRd_D (Maharashtra)', 'Georai_BazarRD_D (Maharashtra)', 'Shevgaon_VidyaNgr_D (Maharashtra)', 'Paithan_SantaNGR_D (Maharashtra)', 'CCU_DumDum_DPC (West Bengal)', 'Jabalpur_Adhartal_IP (Madhya Pradesh)', 'Chandigarh_Mohali (Chandigarh)', 'Agra_Central_D_3 (Uttar Pradesh)', 'Nilambur_StteHW28_D (Kerala)', 'Baharampur_Chuanpur_I (West Bengal)', 'Dabhoi_Central_DPP_3 (Gujarat)', 'Kanigiri_Tiglgndi_D (Andhra Pradesh)', 'Kandukur_LICOffice_D (Andhra Pradesh)', 'Warangal_HunterRd_I (Telangana)', 'Khanpur_Nrsampt_D (Telangana)', 'Mahbubabad_Yellanda_D (Telangana)', 'RoopNagar_ChotiHvl_DC (Punjab)', 'AnandprShb_PnjPiara_D (Punjab)', 'Angamaly_CivilStn_D (Kerala)', 'Chalakudy_SurbhiTh_D (Kerala)', 'Irinjlkuda_Greens_D (Kerala)', 'TalwandiSabo_Wardno3_D (Punjab)', 'Jhunir_BhaRDDPP_D (Punjab)', 'Pauri_Khndyusn_D (Uttarakhand)', 'Masaurhi_Blockrd_D (Bihar)', 'Jehanabad_Madarpur_D (Bihar)', 'Rajgir_PnditNGR_D (Bihar)', 'Sheohar_Ward9DPP_D (Bihar)', 'YamunaNagar_DC (Haryana)', 'PaontSahib_Gurudwar_D (Himachal Pradesh)', 'Morgram_Kntgorya_D (West Bengal)', 'Rampurhat_SrifoDPP_D (West Bengal)', 'Ghanpur_Palakrty_D (Telangana)', 'Jangaon_Hanmkond_D (Telangana)', 'Amalapuram_Vijdurg_D (Andhra Pradesh)', 'Draksharamam_Anaipeta_D (Andhra Pradesh)', 'Kamareddy_Devenply_I (Telangana)', 'Bodhan_SuryaDPP_D (Telangana)', 'Banswada_MenagrDN_D (Telangana)', 'Yellareddy_JKRoad_D (Telangana)', 'Medak_Dwaraka_D (Telangana)', 'Chennai_Chnglptu_DC (Tamil Nadu)', 'Malemruvathur_Achipkam_D (Tamil Nadu)', 'Dinara_Wardno7_D (Bihar)', 'Bikramgang_Dehtird_D (Bihar)', 'Bengaluru_Bagaluru_D (Karnataka)', 'Shajapur_MhpraRD_D (Madhya Pradesh)', 'Gauribidanur_Gurukrpa_D (Karnataka)', 'Amritsar_DPC (Punjab)', 'Janakpuri (Delhi)', 'Phagwara_Lovely_D (Punjab)', 'Vellore_GndhiNgr_IP (Tamil Nadu)', 'Arani_KrthiKyn_D (Tamil Nadu)', 'Polur_StationRD_D (Tamil Nadu)', 'Chetpet_Blmrgnst_D (Tamil Nadu)', 'Kusumnchi_SKRoad_D (Telangana)', 'Gulbarga_Nehrugn_I (Karnataka)', 'Chittapur_GlbrgaRD_D (Karnataka)', 'Khanna_DC (Punjab)', 'Ghaziabad_Central_L_8 (Uttar Pradesh)', 'Pune_Mundhawa_L (Maharashtra)', 'Satara_DC (Maharashtra)', 'Khandala_Satara_D (Maharashtra)', 'Konch_Central_D_2 (Uttar Pradesh)', 'Rath_Mughlpra_D (Uttar Pradesh)', 'Delhi_Shahdara (Delhi)', 'Mumbai_MhimWest_C (Maharashtra)', 'Rewari_YuktiDPP_D (Haryana)', 'Delhi_Lajpat_IP (Delhi)', 'Delhi_Bhogal (Delhi)', 'Naraingarh_Ward2DPP_D (Haryana)', 'Lalru_OnkarDPP_D (Punjab)', 'Hospet (Karnataka)', 'Gangavathi_PhrmPlza_D (Karnataka)', 'Koppal_Banikatt_D (Karnataka)', 'Mumbai_Kalyan (Maharashtra)', 'Motihari_RajaBzr_D (Bihar)', 'Raxaul_KairiyaT_D (Bihar)', 'Ramagundam_Pdmavati_D (Telangana)', 'Pupri_SngihiRD_D (Bihar)', 'Bardhaman_Bankura_D (West Bengal)', 'Rupnarayanpur_Salanpur_D (West Bengal)', 'Murbad_SnkunDPP_D (Maharashtra)', 'Asangaon_Shahapur_D (Maharashtra)', 'Bangalore_East_I_20 (Karnataka)', 'Mungaoli_AshkngRd_D (Madhya Pradesh)', 'Bina_Srvdycwk_D (Madhya Pradesh)', 'Khurai_Talaiya_D (Madhya Pradesh)', 'Kankavali_NrdawDPP_D (Maharashtra)', 'RaisingNgr_BisnolDPP_D (Rajasthan)', 'Manjhaul_Purbari_D (Bihar)', 'Jaipur_VarunCly_DC (Rajasthan)', 'Bijnor_NaginaRd_D (Uttar Pradesh)', 'Najibabad_KotdwrRD_D (Uttar Pradesh)', 'Dhampur_NaginaRD_D (Uttar Pradesh)', 'Kanth_Dayanand_D (Uttar Pradesh)', 'Thakurdwara_Fathuluh_D (Uttar Pradesh)', 'BiharSarif_Soghra_D (Bihar)', 'Nawada_Central_DPP_2 (Bihar)', 'Jayamkondan_Chithbrm_D (Tamil Nadu)',

'Srikakulam_Kuslpram_I (Andhra Pradesh)', 'Tiruchi (Tamil Nadu)',
 'Pattukotai_anthniyr_D (Tamil Nadu)', 'Peravurani_SH71_D (Tamil Nadu)',
 'Aranthangi_HsptlRod_D (Tamil Nadu)', 'Karaikudi_Sbrmnprm_D (Tamil Nadu)',
 'Ponnamaravathi_Puduvalvu_D (Tamil Nadu)', 'Khed_Mahad_D (Maharashtra)',
 'SrinagarUK_Srikot_D (Uttarakhand)', 'Karnaprayag_Umalodge_D (Uttarakhand)',
 'Chamoli_CGRoad_D (Uttarakhand)', 'Mysore_Yadvigiri_IP (Karnataka)',
 'Hunsur_RatnaDPP_D (Karnataka)', 'Gonikoppal_Thomas_D (Karnataka)',
 'HDKote_BegurRD_D (Karnataka)', 'Hyderabad_Uppal_L (Telangana)',
 'Noida_Sector63_L (Uttar Pradesh)', 'Jasai_JNPT_D (Maharashtra)',
 'Koraput_GhtimDPP_D (Orissa)', 'Jeypore_Kelasahi_D (Orissa)', 'Tirupur_Koliplm_I
 (Tamil Nadu)', 'Shrirampur_DavkharRd_D (Maharashtra)', 'Shirdi_SaiBansi_D
 (Maharashtra)', 'Kopargaon_NkshtRPz_D (Maharashtra)', 'Vaijiapur_YeolaRD_D
 (Maharashtra)', 'Kotdwara_Nzbard_D (Uttarakhand)', 'Barjora_Central_DPP_1 (West
 Bengal)', 'Bankura_KeranDPP_D (West Bengal)', 'Hiriyur_TahurDPP_D (Karnataka)',
 'Chomu_ShsmIDPP_D (Rajasthan)', 'Reengus_Shop2DPP_D (Rajasthan)',
 'Sikar_FatehpRd_I (Rajasthan)', 'Bikaner_ITICollg_L (Rajasthan)',
 'Didwana_KatlaDPP_D (Rajasthan)', 'Sujangarh_LdnunDPP_D (Rajasthan)',
 'Bhadrak_Central_I_2 (Orissa)', 'Kendujhar_Sirjudin_D (Orissa)',
 'Karanjia_Sarubali_D (Orissa)', 'Paota_SmClyDPP_D (Rajasthan)', 'Vizag_Gajuwaka
 (Andhra Pradesh)', 'Chodavaram_BaljiDPP_D (Andhra Pradesh)', 'Golaghat_BaruaRd_D
 (Assam)', 'Sivasagar_Babupaty_D (Assam)', 'Varanasi_MahmurGj_IP (Uttar
 Pradesh)', 'Warangal_Central_D_2 (Telangana)', 'Husnabad_Greenmkt_D
 (Telangana)', 'Jammikunta_ConduDPP_D (Telangana)', 'Hyderabad_Tolichwk_L
 (Telangana)', 'Thirthahalli_NadthiCx_D (Karnataka)', 'Koppa_Sangetha_D
 (Karnataka)', 'Kanti_Central_DPP_2 (Bihar)', 'Saraiya_Wardno4_D (Bihar)',
 'Vinukonda_Kothapet_D (Andhra Pradesh)', 'Banka_Wardno6_D (Bihar)',
 'Bhagalpur_Pbroad_DC (Bihar)', 'Kadthal_GndhiDPP_D (Telangana)',
 'Kalwakurthy_VidyaNGR_D (Telangana)', 'Devarakonda_DindiRD_D (Telangana)',
 'Haliya_PeroorRD_D (Telangana)', 'Bengaluru_Kadugodi_D (Karnataka)', 'Hoskote_DC
 (Karnataka)', 'Nalgonda_HydRoad_DC (Telangana)', 'Pune_North_D_3 (Maharashtra)',
 'Sindagi_KalyanNg_D (Karnataka)', 'Indi_SindgiRD_D (Karnataka)',
 'Aland_RazaviRd_D (Karnataka)', 'Katihar_Central_D_2 (Bihar)',
 'Gudivada_GvrCompX_D (Andhra Pradesh)', 'Lucknow_Hub (Uttar Pradesh)',
 'Sandur_WrdN1DPP_D (Karnataka)', 'Fatehpur_Kotwali_D (Uttar Pradesh)',
 'Banda_GayatriN_D (Uttar Pradesh)', 'Mahoba_Mlkpura_D (Uttar Pradesh)',
 'Ooty_Davisdle_D (Tamil Nadu)', 'Mahabubnagar_DC (Telangana)',
 'Bijnapally_nagar_D (Telangana)', 'Jadcherla_Badeplly_D (Telangana)',
 'Shindkheda_KakaCplx_D (Maharashtra)', 'Narnaul_DC (Haryana)',
 'Chhibramau_Bhainpura_D (Uttar Pradesh)', 'Aliganj_KaimgnjRD_D (Uttar Pradesh)',
 'Kishangarh_Central_D_2 (Rajasthan)', 'Parbatsar_AjmhwdPP_D (Rajasthan)',
 'Aurangabad_Prattpngr_D (Maharashtra)', 'Mumbai_Chndivli_D (Maharashtra)',
 'Naugchia_Vijayght_D (Bihar)', 'Chakia_Wardno10_D (Bihar)', 'Jalgaon_DC
 (Maharashtra)', 'Bhusawal_Samarth_D (Maharashtra)', 'Raver_Truptingr_D
 (Maharashtra)', 'Burhanpur_StRoad_D (Madhya Pradesh)', 'Sivaganga_Wardno3_D
 (Tamil Nadu)', 'Avinashi_Valluvar_D (Tamil Nadu)', 'Nashik_TgrniarD_I
 (Maharashtra)', 'PNQ_Pashan_DPC (Maharashtra)', 'Gomoh_KhsmiDPP_D (Jharkhand)',
 'Bilimora_DC (Gujarat)', 'Vansda_CikhliRD_D (Gujarat)', 'Bijapur_KirtiNgr_D
 (Karnataka)', 'Mokokchung_Central_D_1 (Nagaland)', 'Nandyal_SrnvsNgr_D (Andhra

Pradesh)', 'Tulsipur_Central_DPP_1 (Uttar Pradesh)', 'Navsari_DC (Gujarat)', 'Valsad_DC (Gujarat)', 'Manapparai_BypassRd_D (Tamil Nadu)', 'Melur_MduraiRD_D (Tamil Nadu)', 'Lakhnadon_Central_DPP_1 (Madhya Pradesh)', 'Seoni_Kidwai_D (Madhya Pradesh)', 'Chhindwara_NagpurRd_D (Madhya Pradesh)', 'Mandla_Mharajpr_D (Madhya Pradesh)', 'Coonoor_Fairybnk_D (Tamil Nadu)', 'Chhata_GvrndDPP_D (Uttar Pradesh)', 'Kaman_BsstdDPP_D (Rajasthan)', 'Khonsa_Central_D_1 (Arunachal Pradesh)', 'Khanapur_StatinRD_D (Karnataka)', 'Hisar_IndstlAr_I (Haryana)', 'Sirsa_AnprndDPP_D (Haryana)', 'Jammu_Central_I_1 (Jammu & Kashmir)', 'Mumbai_MiraRoad_M (Maharashtra)', 'Jath_Shivprasad_D (Maharashtra)', 'Bengaluru_Banshkri_DC (Karnataka)', 'Gurgaon_Bilaspur_RP (Haryana)', 'Satna_Central_I_2 (Madhya Pradesh)', 'Churhat_Central_DPP_1 (Madhya Pradesh)', 'Sidhi_Padra_D (Madhya Pradesh)', 'Bokaro_KSClny_DC (Jharkhand)', 'Dalkhola_DltprDPP_D (West Bengal)', 'Gandhidham_Sector1A_IP (Gujarat)', 'Halvad_CrossRD_D (Gujarat)', 'Dhrangadhra_NvygRDPP_D (Gujarat)', 'Kalpetta_Ward19_D (Kerala)', 'Mananthavady_Central_D_1 (Kerala)', 'Khurdha_JatniDPP_D (Orissa)', 'MughalSarai_Central_D_2 (Uttar Pradesh)', 'Chandauli_ShubsNGR_D (Uttar Pradesh)', 'Jagtial_Aravind_D (Telangana)', 'Luxettipet_ShivaDPP_D (Telangana)', 'Mansa_GreenVly_D (Punjab)', 'Chennai_AshokNagar_DC (Tamil Nadu)', 'Chotila_Central_D_2 (Gujarat)', 'Hathras (Uttar Pradesh)', 'Bishnupur_StnRdDPP_D (West Bengal)', 'Gurgaon_Kadipur (Haryana)', 'Modasa_Central_D_1 (Gujarat)', 'Khedbrahma_Patelfli_D (Gujarat)', 'Madakasira_RTCStand_D (Andhra Pradesh)', 'Pavagada_PnukndRD_D (Karnataka)', 'Kamarpukur_ChatiDPP_D (West Bengal)', 'Kavali_Kacheri_D (Andhra Pradesh)', 'Delhi_PunjabiB_L (Delhi)', 'Pappadahandi_Central_DPP_2 (Orissa)', 'Delhi_Nangli_L (Delhi)', 'Jhunjhunu_DC (Rajasthan)', 'Khetri_NagarDPP_D (Rajasthan)', 'NeemKaThana_War5DPP_D (Rajasthan)', 'Itahar_NatunDPP_D (West Bengal)', 'Kaliyaganj_FatprDPP_D (West Bengal)', 'Nellore_DC (Andhra Pradesh)', 'Sangola_Central_DPP_3 (Maharashtra)', 'Maihar_MngalDPP_D (Madhya Pradesh)', 'Achrol_BgwriDPP_D (Rajasthan)', 'CCU_Beleghta_CP (West Bengal)', 'Delhi_Palam (Delhi)', 'Rasipuram_Knrpati_D (Tamil Nadu)', 'Upleta_AdrshSt_DC (Gujarat)', 'Surat_Central_D_9 (Gujarat)', 'Dhanbad_Jharia_DC (Jharkhand)', 'Nokha_DeVDPP_D (Rajasthan)', 'Nagaur_KisanCo_D (Rajasthan)', 'Kittur_ColageRD_D (Karnataka)', 'HanumanJNC_VijywdRD_D (Andhra Pradesh)', 'Pandharpur_RajCmplx_D (Maharashtra)', 'Ambur_Central_D_2 (Tamil Nadu)', 'Lonavala_NngrgnRd_D (Maharashtra)', 'Rajam_SamathBv_D (Andhra Pradesh)', 'Bobbili_ColegRd_D (Andhra Pradesh)', 'Pithorgarh_Kumud_D (Uttarakhand)', 'Marakkanam_MJRDPP_D (Tamil Nadu)', 'Pratapgarh_Nimachrd_D (Rajasthan)', 'Mandsaur_YashDPP_D (Madhya Pradesh)', 'Sitamau_Central_DPP_1 (Madhya Pradesh)', 'Rangia_HosptlRd_D (Assam)', 'Kokrajhar_HplrdDPP_D (Assam)', 'Dhubri_Tetultol_D (Assam)', 'Bilasipara_Wardno5_D (Assam)', 'Tura_Sracmplx_D (Meghalaya)', 'Chennai_Alandur_C (Tamil Nadu)', 'Bhiwadi_DC (Rajasthan)', 'Metpally_GunjRDPP_D (Telangana)', 'Aligarh_Central_D_2 (Uttar Pradesh)', 'SikandraRao_JydevNGR_D (Uttar Pradesh)', 'Etah_CivlLine_D (Uttar Pradesh)', 'Jalesar_ChngiDPP_D (Uttar Pradesh)', 'Bahadurgarh_DC (Haryana)', 'Meham_GModDPP_D (Haryana)', 'Dausa_IndraCln_D (Rajasthan)', 'Hindaun_MndwrRod_D (Rajasthan)', 'Karauli_HnsChowk_D (Rajasthan)', 'Gangapur_Ward6DPP_D (Rajasthan)', 'Sirsi_Vidyagiri_D (Karnataka)', 'Sagara_Vardhard_D (Karnataka)', 'Tangi_SriDPP_D (Orissa)', 'Giridih_Shivalya_D (Jharkhand)', 'Bhatpara_TrengaRD_D

(Chhattisgarh)', 'Mungeli_Panderia_D (Chhattisgarh)', 'Kozhenchery_Cherukole_D (Kerala)', 'Gangarampr_FulbaDPP_D (West Bengal)', 'Nanjangud_RPRoad_D (Karnataka)', 'Gundlupet_Swamylyt_D (Karnataka)', 'Chamarjngr_BrDbbleRd_D (Karnataka)', 'Kollegala_NarsipuraRd_D (Karnataka)', 'Malavalli_SulthnRd_D (Karnataka)', 'Tirumakudalu_Narasipr_D (Karnataka)', 'Karimnagar_DC (Telangana)', 'Vemulawada_Central_DPP_2 (Telangana)', 'Ghatampur_StatinRD_D (Uttar Pradesh)', 'Bantwal_Trmltpl_D (Karnataka)', 'Puttur_Darbe_DC (Karnataka)', 'Sullia_Srirampt_D (Karnataka)', 'Kadaba_AnugrDPP_D (Karnataka)', 'Sambalpur_Central_H_2 (Orissa)', 'Bargarh_JJCpxDPP_D (Orissa)', 'Balangir_Rjndpara_D (Orissa)', 'Sonepur_BrezeDPP_D (Orissa)', 'Sagar_Bahreya_I (Madhya Pradesh)', 'Narsapur_Xroad_D (Telangana)', 'Buxar_Sarswati_D (Bihar)', 'Dumraon_Nishangr_D (Bihar)', 'Jagdishpur_Wardno13_D (Bihar)', 'Solan_MohanPrk_D (Himachal Pradesh)', 'Kharagpur_DC (West Bengal)', 'ChandroknaRD_Central_DPP_3 (West Bengal)', 'Chandigarh (Chandigarh)', 'Hyderabad_PndrgNgr_DC (Telangana)', 'Kakdwip_KlngRDP_D (West Bengal)', 'Krishnagiri_BnglorRd_D (Tamil Nadu)', 'Katihar_Shyndco_D (Bihar)', 'Guwahati_Jalukbari (Assam)', 'Kanpur_GovndNgr_DC (Uttar Pradesh)', 'Nalbari_Bhgtपुरा_D (Assam)', 'Barpeta_ShivBari_D (Assam)', 'Bongaigaon_Chpaguri_D (Assam)', 'Kokrajhar_PigonDPP_D (Assam)', 'Udala_NagplDPP_D (Orissa)', 'Kaghaznagar_Central_DPP_1 (Telangana)', 'Mancheria_Hitech_D (Telangana)', 'Parvathipuram_Central_D_2 (Andhra Pradesh)', 'Palakonda_VadaiDPP_D (Andhra Pradesh)', 'Vidisha_ShrprDPP_D (Madhya Pradesh)', 'GanjBasoda_MnRDDPP_D (Madhya Pradesh)', 'Betamcherla_CmtNgRod_D (Andhra Pradesh)', 'Junagadh_keshod_DC (Gujarat)', 'Mangrol_JilRDDPP_D (Gujarat)', 'Nawanshahr_DC (Punjab)', 'Machhiwara_MnBzrDPP_D (Punjab)', 'Madurai_Kappalur_H (Tamil Nadu)', 'Sivakasi_Msstreet_DC (Tamil Nadu)', 'Sankaran_Kovil_D (Tamil Nadu)', 'Malvan_BllvMarg_D (Maharashtra)', 'Mandi_Gobindgarh_DC (Punjab)', 'Ahmedabad_Mithakal_D (Gujarat)', 'Pilibanga_BsstdDPP_D (Rajasthan)', 'Anupgarh_PrmNrDPP_D (Rajasthan)', 'Hyderabad_South_R_11 (Telangana)', 'DhrmpuriTS_HanumDPP_D (Telangana)', 'Yellandu_Sudimala_D (Telangana)', 'Rayaparthi_Perkadrd_D (Telangana)', 'Nuzvid_Ward17_D (Andhra Pradesh)', 'Bassi_DmodrNGR_D (Rajasthan)', 'Lalsot_NWclyDPP_D (Rajasthan)', 'Nawalgarh_NavldiDPP_D (Rajasthan)', 'Rajgarh_SadulDPP_D (Rajasthan)', 'Taranagar_RajRdDPP_D (Rajasthan)', 'Malur_NharuExt_D (Karnataka)', 'Ratnagiri_MjgaonRd_D (Maharashtra)', 'Shirala_Central_DPP_3 (Maharashtra)', 'Khambhalia_JdswarRD_D (Gujarat)', 'Bhatiya_Kalyanpr_D (Gujarat)', 'Srirangapatna_Bbrynkp_D (Karnataka)', 'Mandya_Dc (Karnataka)', 'Ramanagara_BMRd_DC (Karnataka)', 'Kanakapura_VaniThtr_D (Karnataka)', 'Mumbai_Kalyan West _Dc (Maharashtra)', 'Surat_Brpc (Gujarat)', 'Pilani (Rajasthan)', 'Pangodu_Central_D_1 (Kerala)', 'Bngnpalle_Enkndla_D (Andhra Pradesh)', 'Paramakudi_VagaiNgr_D (Tamil Nadu)', 'Ramnthpurm_TnhbBlkC_D (Tamil Nadu)', 'Rameswram_Kdthdsttrt_D (Tamil Nadu)', 'Muthukulathur_VaikalSRT_D (Tamil Nadu)', 'Narikkudi_MukkuRD_D (Tamil Nadu)', 'Barbil_PunjbiPd_D (Orissa)', 'Goa_Margao_Dc (Goa)', 'Ghanashyampur_NditaDPP_D (West Bengal)', 'NOI_RPC (Delhi)', 'Baruipur_Bnsibtl_D (West Bengal)', 'Jaynagar_MjlprDPP_D (West Bengal)', 'Sultana_Central_DPP_1 (Rajasthan)', 'Choutuppal_Nagaram_D (Telangana)', 'Miryalguda_Ragvendr_D (Telangana)', 'Suryapet_Krishna_D (Telangana)', 'Blr_Domlur (Karnataka)', 'Allahabad_Central_D_5 (Uttar Pradesh)', 'Soraon_BypassRD_D (Uttar Pradesh)', 'Majalgaon_SmbjiCwk_D (Maharashtra)',

'Jamshedpur_Central_I_3 (Jharkhand)', 'Ghazipur_Kaithwal_D (Uttar Pradesh)',
 'Ghosi_Jamapur_D (Uttar Pradesh)', 'Dohrighat_AzmrdDPP_D (Uttar Pradesh)',
 'Eral_Busstand_D (Tamil Nadu)', 'Tirchchndr_Shnmgprn_D (Tamil Nadu)',
 'Thisayanvilai_UdnkdiRD_D (Tamil Nadu)', 'Jalna_BhgynaGr_D (Maharashtra)',
 'Karnal (Haryana)', 'Sankerko_AmbkaDPP_D (Orissa)', 'Delhi_Rohini_DPC (Delhi)',
 'Delhi_Barwala (Delhi)', 'Guna_Raghogr_D (Madhya Pradesh)',
 'Varanasi_Central_H_4 (Uttar Pradesh)', 'Agra_Idgah_P (Uttar Pradesh)',
 'Guna_HnumnDPP_D (Madhya Pradesh)', 'Ashokngr_Bypassrd_D (Madhya Pradesh)',
 'Chennai_Madhavaram_L (Tamil Nadu)', 'JoguGadwal_ColctrOf_D (Telangana)',
 'Ghaziabad_Patel Nagar (Uttar Pradesh)', 'Guwahati_UzanBazr_DC (Assam)',
 'Thoppur_HghsclRD_D (Tamil Nadu)', 'Dharmapuri_Central_D_2 (Tamil Nadu)',
 'Chandpur_NorprRD_D (Uttar Pradesh)', 'Sendhwa_VishnuVhr_D (Madhya Pradesh)',
 'Mumbai_Mumbra_DC (Maharashtra)', 'Banswara_KhandDPP_D (Rajasthan)',
 'Jassur_AadiDPP_D (Himachal Pradesh)', 'Dalhousie_Banikhet_D (Himachal
 Pradesh)', 'Chamba_Bangotu_D (Himachal Pradesh)', 'Hyderabad_Alwal_I
 (Telangana)', 'Delhi_Patparganj_DPC (Delhi)', 'Bhanvad_Mainroad_D (Gujarat)',
 'Mejia_Central_D_1 (West Bengal)', 'Rghunthpur_barkarRd_D (West Bengal)',
 'Hura_Central_D_1 (West Bengal)', 'Dola_ChainDPP_D (Madhya Pradesh)',
 'Jhajjar_DC (Haryana)', 'Mumbai_Jogeshwri_L (Maharashtra)', 'Surat_Central_D_3
 (Gujarat)', 'Korba_Tilknagr_DC (Chhattisgarh)', 'Baheri_HoliCDPP_D (Uttar
 Pradesh)', 'Pilibhit_ViksClny_D (Uttar Pradesh)', 'Tinuskia_Chwrpaty_D
 (Assam)', 'DoomDooma_Pthrgoan_D (Assam)', 'Namsai_HelipadRD_D (Arunachal
 Pradesh)', 'Tezu_Farmnala_D (Arunachal Pradesh)', 'Sujanpur_SainkSCL_D (Himachal
 Pradesh)', 'Bhubaneswar_BjbNgr_DC (Orissa)', 'Tarkeshwar_Naraynpr_D (West
 Bengal)', 'Chhaygaon_GwhRDDPP_D (Assam)', 'Chitradurga_DC (Karnataka)',
 'Salempur_Banjaria_D (Uttar Pradesh)', 'Naugarh_Central_D_1 (Uttar Pradesh)',
 'Usilampatti_MrutiNGR_D (Tamil Nadu)', 'Nandikotkr_UmarDPP_D (Andhra Pradesh)',
 'Jamtara_D (Jharkhand)', 'Dumka_Dudhani_D (Jharkhand)', 'Pakur_Hatpada_D
 (Jharkhand)', 'Morena_Prjapati_D (Madhya Pradesh)', 'Bhind_EtwahDPP_D (Madhya
 Pradesh)', 'Asansol_DC (West Bengal)', 'Salem_Kadtmtpty_H (Tamil Nadu)',
 'Changlang_Central_D_1 (Arunachal Pradesh)', 'Radhanpur_Santalpr_D (Gujarat)',
 'Jaipur_RIICO_L (Rajasthan)', 'Gudalur_kalmpuza_D (Tamil Nadu)',
 'Azamgarh_ChtwrDPP_D (Uttar Pradesh)', 'Saraimere_MsmcyDPP_D (Uttar Pradesh)',
 'Shahganj_KcharaRD_D (Uttar Pradesh)', 'Badlapur_Bhaluahi_D (Uttar Pradesh)',
 'Rewa_Dc (Madhya Pradesh)', 'Goa_Ponda_Dc (Goa)', 'Sihora_KtnRdDPP_D (Madhya
 Pradesh)', 'Haldia_Central_D_2 (West Bengal)', 'Puranpur_MdothdRD_D (Uttar
 Pradesh)', 'Asind_BsStdDPP_D (Rajasthan)', 'Ambasamdrn_Solaiprm_D (Tamil Nadu)',
 'Bamangola_Central_D_1 (West Bengal)', 'Badarpur_Konapara_D (Assam)',
 'Gokak_Bsavanr_D (Karnataka)', 'Ghaziabad_RjndrNgr_DC (Uttar Pradesh)',
 'Kapurthala_DC (Punjab)', 'Nakodar_ChowkDPP_D (Punjab)', 'Faridabad_MohnVRTL_D
 (Haryana)', 'Dhulian_RatanDPP_D (West Bengal)', 'Bhilad_Umargaon_DC (Gujarat)',
 'Vizag_NAD (Andhra Pradesh)', 'Sirohi_Ricco_D (Rajasthan)',
 'Sumerpur_BazarDPP_D (Rajasthan)', 'Falna_SbhRDDPP_D (Rajasthan)', 'OK_RPC
 (Delhi)', 'Kanpur_Rawatpur_D (Uttar Pradesh)', 'Chennai_Mylapore (Tamil Nadu)',
 'Jhansi_LVMColge_D (Uttar Pradesh)', 'Lalitpur_RjghatRd_D (Uttar Pradesh)',
 'Tikamgarh_MndiRoad_D (Madhya Pradesh)', 'Panipat (Haryana)', 'RampuraPhul_DC
 (Punjab)', 'Harraiya_MahuGDPP_D (Uttar Pradesh)', 'Tezpur_Mhbhirab_D (Assam)',
 'Pasighat_MissonRd_D (Arunachal Pradesh)', 'Gohpur_Central_D_1 (Assam)',

'Delhi_Kishangarh_DPC (Delhi)', 'Narasnpeta_HudcoDPP_D (Andhra Pradesh)',
 'Tekkali_AmvidiDPP_D (Andhra Pradesh)', 'Paralakhemundi_Ward14_D (Orissa)',
 'Balrampur_PBRDDPP_D (Uttar Pradesh)', 'Shujalpur_AstrdDPP_D (Madhya Pradesh)',
 'Palasa_Central_DPP_1 (Andhra Pradesh)', 'Khanakul_Ramnagar_D (West Bengal)',
 'Arambag_BalibDPP_D (West Bengal)', 'Bhopal_Indrapri_DC (Madhya Pradesh)',
 'Vrindavan_MathuraRD_D (Uttar Pradesh)', 'Dholpur_GtRoad_D (Rajasthan)',
 'Gondia_RamNgr_D (Maharashtra)', 'CCU_Lake Avenue_DPC (West Bengal)',
 'Amb_Adrshngr_D (Himachal Pradesh)', 'DehraGopipur_Central_D_1 (Himachal Pradesh)',
 'Dharamshala_GrudwrD_D (Himachal Pradesh)', 'Palampur_Cnsrvila_D (Himachal Pradesh)',
 'Mangaldoi_LNBRoad_D (Assam)', 'Dhekiajuli_Wardno5_D (Assam)',
 'Chennai_Potheri (Tamil Nadu)', 'Daurala_Sardhnrd_D (Uttar Pradesh)',
 'Kanpur_Central_D_5 (Uttar Pradesh)', 'Shillong (Meghalaya)', 'Jowai_Ldthlabh_D (Meghalaya)',
 'Hyd_Trimulgherry_Dc (Telangana)', 'Ambala (Haryana)',
 'Cochin_PanditRd_D (Kerala)', 'Erode (Tamil Nadu)', 'Bankura_NapitDPP_D (West Bengal)',
 'Surat_Central_D_12 (Gujarat)', 'Phulpur_Shekhpur_D (Uttar Pradesh)',
 'Maharajapuram_Krsnakcl_D (Tamil Nadu)', 'Jaunpur_Katghara_D (Uttar Pradesh)',
 'Sinnar_Central_D_1 (Maharashtra)', 'Dhone_RmNyrDPP_D (Andhra Pradesh)',
 'Bengaluru_Bomsndra_L (Karnataka)', 'Jagatsghpr_Markndpr_D (Orissa)',
 'Paradip_Udyabata_D (Orissa)', 'Dharmanagr_Ranakant_D (Tripura)',
 'Mahasamund_RajpurRD_D (Chhattisgarh)', 'Bhavnagar_ChtrGIDC_IP (Gujarat)',
 'Amreli_Rajula_DC (Gujarat)', 'Palitana_STRdDPP_D (Gujarat)',
 'Jairampur_Mdiclclly_D (Arunachal Pradesh)', 'Badnaur_BhmrdDPP_D (Rajasthan)',
 'Jalalabad_Muktsar_D (Punjab)', 'Fazilka_GndhiChk_D (Punjab)',
 'Kabuganj_Jantacldg_D (Assam)', 'Hajo_Sardala_D (Assam)', 'AmaDubi_Bulabeda_D (West Bengal)',
 'Rawatsar_ShivmDPP_D (Rajasthan)', 'Khurdha_MdhsnDPP_D (Orissa)',
 'Tamluk_Central_DPP_2 (West Bengal)', 'Nakhatrana_ClgRDDPP_D (Gujarat)',
 'Buldhana_Thsil3PL_D (Maharashtra)', 'Khamgaon_WamanDPP_D (Maharashtra)',
 'Chhatarpur_Busstand_D (Madhya Pradesh)', 'Airport (Tamil Nadu)',
 'Aizawl_HunthrVg_I (Mizoram)', 'Champhai_AwmpiVng_D (Mizoram)',
 'Umaria_Central_DPP_3 (Madhya Pradesh)', 'Dehradun (Uttarakhand)', 'Pathankot_DC (Punjab)',
 'Basta_Central_DPP_1 (Orissa)', 'Shahdol_Sohagpur_D (Madhya Pradesh)',
 'Sangola_Central_DPP_2 (Maharashtra)', 'Jetpur_DC (Gujarat)',
 'Dhoraji_JmnvadRd_DC (Gujarat)', 'Barh_Malahi_D (Bihar)', 'Anandnagar_LohiaDPP_D (Uttar Pradesh)',
 'Maharajganj_PakriDPP_D (Uttar Pradesh)', 'Asifabad_PaikjNGR_D (Telangana)',
 'Rajpalayam_AshkTalk_D (Tamil Nadu)', 'Joda_Central_D_1 (Orissa)',
 'DalsinghSarai_Wardno13_D (Bihar)', 'Rusera_Wardno4_D (Bihar)', 'Salur_ward9_D (Andhra Pradesh)',
 'Purulia_GariDPP_D (West Bengal)', 'Jhalda_GMukrDPP_D (West Bengal)',
 'Nabha_Sahni_D (Punjab)', 'Manvi_APMCYard_D (Karnataka)',
 'Sindhanur_VasaviNg_D (Karnataka)', 'Uchila_Busstand_D (Karnataka)',
 'Machilipatnam_DC (Andhra Pradesh)', 'Sonepur_Sabalpur_D (Bihar)',
 'Allahabad_Central_D_3 (Uttar Pradesh)', 'Sillod_ZebaTWR_D (Maharashtra)',
 'Bishwanath_ChrlidPP_D (Assam)', 'Phusro_RhmgjDPP_D (Jharkhand)',
 'Mirik_WardNo3_D (West Bengal)', 'Darjeeling_Hillcard_DC (West Bengal)',
 'Peikulam_SriVnktm_D (Tamil Nadu)', 'Sikandarpur_Central_D_3 (Uttar Pradesh)',
 'Hansi_DeIRdDPP_D (Haryana)', 'SawaiMadhopur_Central_DPP_1 (Rajasthan)',
 'Haldwani_PiliKoti_D (Uttarakhand)', 'Tirtol_Central_D_2 (Orissa)',
 'Katni_Bargawan_DC (Madhya Pradesh)', 'Bhilwara_DC (Rajasthan)',
 'Kirauli_AchneraRD_D (Uttar Pradesh)', 'Nedumangad_Arsprmbu_D (Kerala)',

'Tandur_SnthiNGR_D (Telangana)', 'Vikarabad_Central_DPP_2 (Telangana)',
 'Shadnagar_Central_D_1 (Telangana)', 'Kayamkulam_Bhrnikvu_D (Kerala)',
 'Manthuka_Central_D_1 (Kerala)', 'Rohtak (Haryana)', 'Surathkal_DC (Karnataka)',
 'Guwahati_Chandmari (Assam)', 'PNQ Rahatani DPC (Maharashtra)',
 'Garhshnker_Jagrata_D (Punjab)', 'Hyd_Uppal_Dc (Telangana)',
 'Ghatkesar_Central_D_1 (Telangana)', 'Amreli_MrktYrd_DC (Gujarat)',
 'Nagpur_Gondkhry_H (Maharashtra)', 'Chennai_Sholingallur_Dc (Tamil Nadu)',
 'Mehkar_SagarDPP_D (Maharashtra)', 'Chikhli_KKndrDPP_D (Maharashtra)',
 'Narsingpur_JrjoldDPP_D (Madhya Pradesh)', 'Bareli_SourvDPP_D (Madhya Pradesh)',
 'Ambah_MrenTirh_D (Madhya Pradesh)', 'Bhind_BhrolDPP_D (Madhya Pradesh)',
 'Kilimanoor_Krvnkuzy_D (Kerala)', 'Peterbar_GagiDPP_D (Jharkhand)', 'Meerut
 (Uttar Pradesh)', 'Barhi_Central_DPP_1 (Madhya Pradesh)', 'Jind_DC (Haryana)',
 'Hisar_AgrohDPP_D (Haryana)', 'Ratia_SchdvDPP_D (Haryana)', 'Addanki_Oilmilrd_D
 (Andhra Pradesh)', 'Tenkasi_RailwyRd_D (Tamil Nadu)', 'Naharlagun_JmpuCntn_D
 (Arunachal Pradesh)', 'Keshiary_MdnprDPP_D (West Bengal)',
 'Manglamaro_Bypassrd_D (West Bengal)', 'Contai_Kanakpur_D (West Bengal)',
 'Piparcity_BsstdDPP_D (Rajasthan)', 'Gotan_DKLogDPP_D (Rajasthan)',
 'SirhindFatehgarh_DC (Punjab)', 'Rajpura_DC (Punjab)', 'Hyd_Chandanagar_Dc
 (Telangana)', 'Sangareddy_Pothredy_D (Telangana)', 'Trivandrum_Mnanthla_D
 (Kerala)', 'Koratla_BhemuDPP_D (Telangana)', 'Silapathar_Hejunagr_D (Assam)',
 'Parwanoo_Central_D_1 (Himachal Pradesh)', 'Belgaum_Dc (Karnataka)',
 'Barwala_Central_DPP_1 (Haryana)', 'Dharwad_Dc (Karnataka)', 'Mumbai_Tejpal_M
 (Maharashtra)', 'Mumbai_Tejpal_I (Maharashtra)', 'Chalisgaon_BhadgDPP_D
 (Maharashtra)', 'Jabalpur (Madhya Pradesh)', 'Tadipatri_CBRoad_D (Andhra
 Pradesh)', 'Proddatur_Central_D_2 (Andhra Pradesh)', 'Cuddapah_DC (Andhra
 Pradesh)', 'Badvel_Sidrd_D (Andhra Pradesh)', 'Pune_East_D_8 (Maharashtra)',
 'Kushinagar_JiswlDPP_D (Uttar Pradesh)', 'Sujargarh_JngidDPP_D (Rajasthan)',
 'Unnao_VikasRam_D (Uttar Pradesh)', 'Sangamner_JawanChk_D (Maharashtra)',
 'Delhi_Jhilmil_L (Delhi)', 'Kaliyaganj_Central_DPP_1 (West Bengal)',
 'Panskura_Central_D_3 (West Bengal)', 'Dehradun_Nirjanpur_L (Uttarakhand)',
 'Pune Balaji Nagar (Maharashtra)', 'Kandi_DohaldDPP_D (West Bengal)',
 'Balugaon_Thikiri_D (Orissa)', 'Giddarbaha_DC (Punjab)',
 'Gadchiroli_Central_DPP_1 (Maharashtra)', 'Allahabad_Mirapati_L (Uttar
 Pradesh)', 'Faridabad_Old (Haryana)', 'Atapadi_Vidyangr_D (Maharashtra)',
 'Bhadoli_Rajpura_D (Uttar Pradesh)', 'Bomdila_CTRoad_D (Arunachal Pradesh)',
 'Nimbahera_MsjidDPP_D (Rajasthan)', 'Gopiganj_Wardno13_D (Uttar Pradesh)',
 'Kasganj_BnkrGate_D (Uttar Pradesh)', 'Abohar_DC (Punjab)', 'Malout_DC
 (Punjab)', 'Central Goa (Goa)', 'Vuyyuru_BhogdDPP_D (Andhra Pradesh)',
 'Latur_Srnwsngr_D (Maharashtra)', 'Udgir_NlgaonRd_D (Maharashtra)',
 'Baripada_KalikDPP_D (Orissa)', 'Vadodara_Karelibaug_DC (Gujarat)',
 'Palakollu_CroadDPP_D (Andhra Pradesh)', 'Jamui_Mehsouri_D (Bihar)',
 'KharagpurBR_Central_DPP_1 (Bihar)', 'Munger_Kaura_D (Bihar)',
 'Bhadaur_BChwkDPP_D (Punjab)', 'Kolhapur_Central_H_2 (Maharashtra)',
 'Balipara_EragndDPP_D (Assam)', 'Jharsuguda_MbRoad_D (Orissa)',
 'Manteswar_MemariRD_D (West Bengal)', 'Madnapalle_PngnrRd_D (Andhra Pradesh)',
 'Kothanalloor_Majoor_D (Kerala)', 'Hoshangabad_MnRDDPP_D (Madhya Pradesh)',
 'Bilaspur_GrmNgriya_D (Uttar Pradesh)', 'Nirjuli_BageDPP_D (Arunachal Pradesh)',
 'Nabarangpr_PhdoFDPP_D (Orissa)', 'Surat_Varachha_DC (Gujarat)', 'Bhiwani_DC

(Haryana)', 'Chabua_CollgeRD_D (Assam)', 'PaliBirsighpr_CtyLgDPP_D (Madhya Pradesh)', 'Mau_BaliaMod_D (Uttar Pradesh)', 'Bellmpalli_BasthDPP_D (Telangana)', 'Raiganj_SubrtdDPP_D (West Bengal)', 'Arsikere_HsnRdDPP_D (Karnataka)', 'Bengaluru_South_D_20 (Karnataka)', 'Gohana_DvldDPP_D (Haryana)', 'Kolasib_Diakawn_D (Mizoram)', 'Vadipatti_lalaNGR_D (Tamil Nadu)', 'Bhubaneswar_Patia (Orissa)', 'Tarnau_BsstdDPP_D (Rajasthan)', 'Khargram_BoiDPP_D (West Bengal)', 'Bhadra_GMndiDPP_D (Rajasthan)', 'Mulugu_LaxmiNGR_D (Telangana)', 'Ashti_SavtaHTL_D (Maharashtra)', 'Bareilly (Uttar Pradesh)', 'Islampur_ShbdnDPP_D (West Bengal)', 'Balurghat_AkhirDPP_D (West Bengal)', 'Anuppur_JthriDPP_DC (Madhya Pradesh)', 'Bargarh_GurpdDPP_D (Orissa)', 'Sonipat_Central_D_2 (Haryana)', 'Panna_Mohnprwa_D (Madhya Pradesh)', 'Panaji Goa (Goa)', 'Fatehabad_SirsaDPP_D (Haryana)', 'Fatehabad_BhunaDPP_D (Haryana)', 'Soro_UttarDPP_D (Orissa)', 'Raipur_ByrDDPP_D (Rajasthan)', 'Rajkot_Kothriya_DC (Gujarat)', 'Kapadvanj_Busstand_D (Gujarat)', 'Chennai_Vandalur_Dc (Tamil Nadu)', 'Bhupalpally_JwahrNGR_D (Telangana)', 'Mahadevpur_Kataram_D (Telangana)', 'Cochin_Kdvantra_D (Kerala)', 'Kozhikode_Feroke_H (Kerala)', 'Hajipur_ThaneDPP_D (Bihar)', 'Agra_Idgah_L (Uttar Pradesh)', 'Goa_Mapusa (Goa)', 'Lakhipur_WrdN4DPP_D (Assam)', 'Neemrana_Rcocmplx_D (Rajasthan)', 'Roing_DibngVly_D (Arunachal Pradesh)', 'Krishnanagar_AnadiDPP_D (West Bengal)', 'Bengaluru_Kothanur_L (Karnataka)', 'Malda_krshnPly_DC (West Bengal)', 'Angul_Central_I_2 (Orissa)', 'Phulbani_Krusphrma_D (Orissa)', 'Jaipur_Bhankrot_DC (Rajasthan)', 'Ludhiana_DC (Punjab)', 'Amalner_Murtingr_D (Maharashtra)', 'Erandol_BsStdDPP_D (Maharashtra)', 'Pachora_PcrrdDPP_D (Maharashtra)', 'Vapi_IndEstat_L (Gujarat)', 'Mumbai_Nerul_D (Maharashtra)', 'Tiruchi_Samyaprm_D (Tamil Nadu)', 'Delhi_Mangol_DC (Delhi)', 'Rampur_ThanaDPP_D (Uttar Pradesh)', 'Khurdha_MunplDPP_D (Orissa)', 'Godda_PushPlza_D (Jharkhand)', 'Islampur_Central_DPP_2 (West Bengal)', 'MirzapurWB_VidyaDPP_D (West Bengal)', 'Gobicheti_Ward25_D (Tamil Nadu)', 'Badkulla_Central_DPP_1 (West Bengal)', 'Gujiliam_Parai_D (Tamil Nadu)', 'Shahjhnpur_NavdaCln_D (Uttar Pradesh)', 'Razole_Shanthi_D (Andhra Pradesh)', 'Ambegaon_Manchar_D (Maharashtra)', 'Tonk_DC (Rajasthan)', 'Barasat_KrshnNgr_D (West Bengal)', 'Berhampur_Khajuria_I (Orissa)', 'Jaipur_Central_D_10 (Rajasthan)', 'Dhanbad_Central_D_4 (Jharkhand)', 'Gondal_DC (Gujarat)', 'Bilaspur_Torwa_DC (Chhattisgarh)', 'Sheikhpura_Bgwtichk_D (Bihar)', 'Karukachal_MnimlaRd_D (Kerala)', 'Bikaner_DC (Rajasthan)', 'Printhlmna_EmsPnmbl_D (Kerala)', 'Bokakhat_MlnprDPP_D (Assam)', 'Durg_Pulgaon_DC (Chhattisgarh)', 'Moranhat_TiloiDPP_D (Assam)', 'Degloor_Busstand_D (Maharashtra)', 'Hyd_LB-Nagar_Dc (Telangana)', 'Chanchal_BargaDPP_D (West Bengal)', 'Chennai_Selaiyur_DC (Tamil Nadu)', 'Wai_Central_DPP_3 (Maharashtra)', 'Jiyanpur_Central_DPP_1 (Uttar Pradesh)', 'Chiraiyakot_KamalDPP_D (Uttar Pradesh)', 'Mumbai_Mahim (Maharashtra)', 'Sidhmukh_MnbzrDPP_D (Rajasthan)', 'Nohar_Central_DPP_2 (Rajasthan)', 'Dwarka_StnRoad_DC (Gujarat)', 'Bengaluru_Nelmngla_L (Karnataka)', 'Kulithalai_AnnaNGR_D (Tamil Nadu)']

On Visual Inspection, source states are enclosed in brackets and available for all the rows But Different formats of city,place and code are available. following formats of source_names should be properly dealt using REGEX:

1. 'Anand_VUNagar_DC' : city_place_code (state)
2. 'LowerParel_CP' : place_code (state) LowerParel is a place in Mumbai
3. 'Jagraon_DC' : city_code (state) Jagraon is a city of Punjab
4. 'Ahmedabad_East_H_1' : city_place_code_code 3 'underscores' are present in some source_names
5. 'AMD_Memnagar' : city_place (state)
6. 'Darbhanga' : city (state)
7. 'Mumbai Hub' : city code
8. 'Mumbai Mahim' : city place
9. 'Ganga Nagar_DC' : (place)_code
10. 'Noida_Sec 02_DPC' : city_(place)_code
11. 'Bhopal_Old City' : city_(place)
12. 'Bhopal MP Nagar' : city (place)
13. 'HBR Layout PC' : city place code
14. 'Mumbai_Kalyan West_Dc' : city_(place)_code
15. 'PNQ Vadgaon Sheri DPC' : city (place) code
16. 'Bhubaneswar_Nayapalli' : city_place
17. 'GZB_Mohan_Nagar_DPC' : city_(place)_code
18. 'Bangalore_East_I_20' : city_place_(code)
19. 'Darbhanga' : city

2.1.2 Extract source_state from source_name and Subtract source_state from source_name

Extract source_state

```
[130]: #Extract state using regex : string inside brackets () and contains a-z,A-z,"
↳",&
delhivery["source_state"] = delhivery["source_name"].str.extract(pat =
↳"\(([a-zA-Z &]*)\)")
```

```
[131]: #checking all the unique states extracted
delhivery["source_state"].unique()
```

```
[131]: array(['Gujarat', 'Maharashtra', 'Karnataka', 'Punjab', 'Haryana',
'Uttarakhand', 'Tamil Nadu', 'Rajasthan', 'Telangana',
'Madhya Pradesh', 'Uttar Pradesh', 'Himachal Pradesh', 'Kerala',
'Andhra Pradesh', 'Bihar', 'Jharkhand', 'Assam', 'West Bengal',
'Orissa', 'Delhi', 'Jammu & Kashmir', 'Chandigarh', 'Chhattisgarh',
'Goa', 'Pondicherry', 'Dadra and Nagar Haveli',
'Arunachal Pradesh', 'Nagaland', 'Meghalaya', 'Tripura', 'Mizoram'],
dtype=object)
```

```
[132]: # No Null Values in Source states
delhivery["source_state"].isna().sum()
```

```
[132]: 0
```

Subtract source_state from source_name

```
[133]: #Extract state using regex : substring upto " ("
delhivery["source_name"] = delhivery["source_name"].str.extract(pat = "(.*) \(")
```

```
[134]: # No null values in reduced source_name
delhivery["source_name"].isna().sum()
```

```
[134]: 0
```

2.1.3 Extract city from reduced source_name

Extract city

```
[135]: # Extract starting first substring upto "_" or " "
def extract_city(df):
    if df.__contains__("_"):
        s = re.search(r"(.*)_", df)
        return s.group(1)
    else:
        return df.split(" ")[0]
```

```
[136]: delhivery["source_city"] = delhivery["source_name"].apply(lambda x:
↪extract_city(x))
```

```
[137]: print(list(delhivery["source_city"].unique()))
```

```
['Anand', 'Khambhat', 'Bhiwandi', 'LowerParel', 'Bangalore', 'Bengaluru',
'Ludhiana', 'Jagraon', 'Raikot', 'Junagadh', 'Veraval', 'Kodinar', 'Una',
'Talala', 'Sonipat', 'Roorkee', 'Haridwar', 'MAA', 'Jalandhar', 'Gurgaon',
'Jaipur', 'Ajmer', 'Pali', 'Jodhpur', 'Hyderabad', 'Bhopal', 'Kanpur',
'Auraiya', 'Etawah', 'Ahmedabad', 'Surat', 'Nanded', 'Loha', 'Gangakher',
'Parli', 'Ambajogai', 'Mumbai', 'Loharu', 'ChrkhiDdri', 'Boisar', 'Dahanu',
'Hapur', 'Bangana', 'Nadaun', 'Balotra', 'Pokhran', 'Phalodi', 'Mehsana',
'Unjha', 'Patan', 'Bhabhar', 'AMD', 'Aluva', 'Cochin', 'Pune', 'Solapur',
'Kakinada', 'Tuni', 'Purnia', 'Supaul', 'Saharsa', 'Madhepura', 'Triveninganj',
'Visakhapatnam', 'Anakapalle', 'Narsiptnm', 'Ranchi', 'Ramgarh', 'Hazaribag',
'JhumriTlya', 'Beawar', 'Bilara', 'Bijainagar', 'Kekri', 'Nasirabad',
'Bhuvanagiri', 'Mothkur', 'Thirumalagiri', 'Madhupur', 'Khammam', 'Kodad',
'Guwahati', 'Morbi', 'Wankaner', 'BLR', 'Kolkata', 'Bhubaneshwar', 'Alwar',
'Bharatpur', 'Weir', 'Kherli', 'Bagnan', 'Kolaghat', 'Delhi', 'Puttaprthi',
'Hindupur', 'GreaterThane', 'Patancheru', 'Del', 'Muzaffrpur', 'Darbhanga',
'Benipur', 'Jhanjharpur', 'Dhule', 'Sakri', 'Nandurbar', 'Shahada', 'Shirpur',
'Hooghly', 'Hoogly', 'GZB', 'Pilkhuwa', 'Sedam', 'Chincholi', 'Dindigul',
'Ooddncnchtram', 'Palani', 'Kodaikanal', 'Batlagundu', 'Villupuram', 'Panruti',
'Neyveli', 'Virudhchlm', 'Pennadam', 'Chinnasalem', 'Kazhakkoottam', 'Attingal',
'Kalluvathukal', 'Bheemunipatnam', 'Vizianagaram', 'Baddi', 'Faridabad',
'Hassan', 'Channarayana', 'Koppa', 'Madikeri', 'Ramanathapura', 'Tiptur',
'Mudigere', 'Sakleshpur', 'Pataudi', 'Sankari', 'Murshidabad', 'Lalgola',
```

'Ragunthgnj', 'Jangipur', 'Sagardighi', 'Thiruvadanai', 'Oriyur', 'Manamelkudi',
 'Hubli', 'Ramdurg', 'Bagalkot', 'Rona', 'Gadag', 'Chandigarh', 'Ganga Nagar',
 'Noida', 'Dhaka', 'Bettiah', 'Narktiganj', 'Coimbatore', 'Udumalpet',
 'Pollachi', 'Kathua', 'Jammu', 'Samba', 'DehriSone', 'AurngbadBR', 'Kendrpara',
 'Cuttack', 'Kunnathund', 'Salem', 'Tirchngode', 'Moga', 'Muktsar', 'GGN',
 'Tirunelveli', 'Vallior', 'Marthandam', 'CCU', 'Gorakhpur', 'Sahatwar',
 'Bariya', 'Ratanpura', 'Chandausi', 'Patiala', 'Malerkotla', 'Sunam',
 'Moradabad', 'Rudrapur', 'Dibrugarh', 'Digboi', 'Margherita', 'Itarsi', 'Betul',
 'Pandhurna', 'Kurnool', 'Wanaparthi', 'Amravati', 'Akola', 'Ghaziabad',
 'Kolhapur', 'Nipani', 'Chikodi', 'Athani', 'Bijapur', 'FBD', 'Palwal',
 'Narsinghpur', 'Gadarwara', 'Kalka', 'Nalagarh', 'Jorhat', 'Teok', 'Mariani',
 'Sitamari', 'Benipatti', 'Sitarganj', 'Trivandrum', 'Neyatinkra', 'Kallikkad',
 'Islampur', 'Karad', 'Chiplun', 'Chennai', 'Sehore', 'Ashta', 'Rajgurunagar',
 'Talegaon', 'Guskhara', 'Davangere', 'Ranebennur', 'Haveri', 'Allahabad',
 'Attur', 'BilaspurHP', 'SundarNgr', 'Mandi', 'Kullu', 'Kottayam', 'Haripad',
 'Alappuzha', 'Theni', 'Cumbum', 'Kattappana', 'Udaipur', 'Tumkur', 'Doddablpur',
 'Chikblapur', 'Bagepalli', 'Karur', 'Thrissur', 'Vadakkencherry', 'Pallakad',
 'AhmedNagar', 'Parner', 'Shirur', 'Pukhrayan', 'Orai', 'Bailhongal', 'Kanker',
 'Rampur', 'Bareilly', 'Faridpur', 'Tirupati', 'Puttur', 'Koduru', 'Rajampet',
 'Midnapore', 'Bangarapet', 'Bethamangala', 'Balasore', 'Betnoti', 'Ramnagar',
 'Kashipur', 'Baraut', 'Shamli', 'Budhana', 'Aurangabad', 'Patran', 'Vadodara',
 'Bellary', 'Molakalmuru', 'Challakere', 'Ranipet', 'Sholinghur', 'Manbazar',
 'Khatra', 'Simplal', 'Bhadrachalam', 'Manuguru', 'Cjb', 'Bhandara', 'PNQ',
 'Durgapur', 'Saundatti', 'Guruvayoor', 'Tirur', 'Kozhikode', 'Kotputli',
 'Panipat', 'Goa', 'Araria', 'Raniganj', 'Forbesganj', 'Simrahi', 'Narpatganj',
 'Dholi', 'Samastipur', 'HazratJandaha', 'Rajamundry', 'Mandapeta', 'Madhubani',
 'Jaynagar', 'Sathupally', 'Berhampore', 'Domkal', 'Nazirpur', 'Nowda', 'Bhuj',
 'Chikmagalur', 'Anjar', 'Osmanabad', 'Barshi', 'Khurja', 'Jewar', 'Pahasu',
 'Anupshahar', 'Raipur', 'Koyilandy', 'Vadakara', 'Kallachi', 'Sasaram',
 'Mohania', 'Kolar', 'Mulbagal', 'Chintamani', 'Kollam', 'Kottarakkara',
 'Punalur', 'Pthnmthitt', 'Adoor', 'Nichlaul', 'Atmakur', 'Srisailam', 'Godhra',
 'Dahod', 'Kanchipuram', 'Arakkonam', 'Gandhinagar', 'Brahmapuri', 'Chamorshi',
 'Canacona', 'Pondicherry', 'Kalpakkam', 'Guntakal', 'Rayadurgam', 'Kalyandurg',
 'Sriklahsti', 'Venktagiri', 'Gudur', 'Karimnagar', 'Cherthala', 'Bhavnagar',
 'Chittaurgarh', 'Rajsamand', 'Kadi', 'Vijayawada', 'Akhnoor', 'Kumbakonam',
 'Mylduthuri', 'Mannargudi', 'Ukkadagatri', 'Dadri', 'Panagarh', 'Bolpur',
 'Nanoor', 'Eluru', 'Kaikaluru', 'Anantapur', 'Dharmavram', 'Kadiri',
 'Rayachoti', 'Pulivendula', 'Shegaon', 'Chaksu', 'Ghatal', 'HBR', 'Chhapra',
 'Siwan', 'Sambhal', 'Aonla', 'Nainital', 'Ranikhet', 'Almora', 'Musiri',
 'Thuraiyur', 'Perambalur', 'Ariyalur', 'Lalpet', 'Bongaon', 'Helencha',
 'Gajraula', 'Amroha', 'Vizag', 'Ranaghat', 'Karwar', 'Mallapur', 'Dandeli',
 'Moodbidri', 'Karkala', 'Dhrmsthala', 'Tiruppattur', 'Uthangarai',
 'Thamarassery', 'SulthnBthry', 'Dinhata', 'Bewar', 'Silvassa', 'Sawantwadi',
 'Modinagar', 'Khatauli', 'Dhar', 'Ratlam', 'Jaora', 'Sonari', 'Mangalore',
 'Silchar', 'Manjeshwar', 'Kanhagad', 'Mainaguri', 'Mathabhang', 'Barmer',
 'Jaisalmer', 'Bihta', 'Arrah', 'Neemuch', 'BariSadri', 'Deoghar', 'Godda',
 'Sahebganj', 'Vadnagar', 'Palanpur', 'Deesa', 'Arimbur', 'Sankaramangalam',
 'Shoranur', 'Pazhayannur', 'Thiruvavarur', 'Thirthurpondi', 'Pushpavanam',

'Dhanbad', 'Chimkurthy', 'Markapur', 'Hamirpur', 'Faizabad', 'Gosainganj',
'Cuddalore', 'Chidambaram', 'Sirkazhi', 'Karaikal', 'Nagapattinam', 'Nandigama',
'Malda', 'Manikchak', 'Paranpur', 'Samsi', 'Biswan', 'Sitapur', 'Lakhimpur',
'Gola', 'Dehradun', 'Mussoorie', 'Gonda', 'Nadiad', 'Umreth', 'Nagamangala',
'Krishnarajpet', 'Tirurangadi', 'Malappuram', 'Shimoga', 'Rishikesh', 'Basti',
'Samana', 'Amd', 'Mainpuri', 'Farrukhbad', 'Shahabad', 'Tilhar', 'Jalalabad',
'Bhatinda', 'Brajrajnagar', 'Sundargarh', 'Narsinghgarh', 'Pachore', 'Ongole',
'Makrana', 'Degana', 'Merta', 'Firozabad', 'Chinnur', 'Manthani', 'Jamnagar',
'Goody', 'Duddhi', 'Renukoot', 'Anpara', 'Singrauli', 'Chopan', 'Himmatnagar',
'Lakhimpurn', 'Dhemaji', 'Likabali', 'Vapi', 'Katwa', 'Chapra', 'Nakashipara',
'Plassey', 'Surendranagar', 'Limbdi', 'Tiruvalla', 'Kuthuparamba', 'Ghumarwin',
'Jahu', 'JogenderNgr', 'Wardha', 'Deoli', 'Fatepur', 'Barnala', 'Muzaffarngr',
'Deoband', 'Deoria', 'Kushinagar', 'Padrauna', 'Kaptanganj', 'Gwalior',
'Tirpur', 'Dharapuram', 'Kangayam', 'Jalore', 'Bhinmal', 'Porbandar',
'Jamjodhpur', 'Aligarh', 'Shikohabad', 'Medchal', 'Bulndshahr', 'Hisar',
'Hanumangarh', 'Parakkdavu', 'Mundakayam', 'Hailakandi', 'Karimganj',
'Sathyamangalam', 'Anthiyur', 'Akbarpur', 'Kurukshetra', 'Pehowa', 'Kaithal',
'Safidon', 'Kotagiri', 'BOM', 'Raichur', 'Suratgarh', 'Srivijaynagar',
'Humnabad', 'Bidar', 'Narayankhed', 'Zahirabad', 'Manmad', 'Malegaon', 'Pen',
'Roha', 'Mahad', 'Udupi', 'Kundapura', 'Bhatkal', 'Honnabar', 'Kumta', 'Ankola',
'Dudu', 'Phulera', 'Renwal', 'Jaleswar', 'Beed', 'Georai', 'Shevgaon',
'Paithan', 'Jabalpur', 'Agra', 'Nilambur', 'Baharampur', 'Dabhoi', 'Kanigiri',
'Kandukur', 'Warangal', 'Khanpur', 'Mahbubabad', 'RoopNagar', 'AnandprShb',
'Angamaly', 'Chalakudy', 'Irinjalkuda', 'TalwandiSabo', 'Jhunir', 'Pauri',
'Masaurhi', 'Jehanabad', 'Rajgir', 'Sheohar', 'YamunaNagar', 'PaontSahib',
'Morgram', 'Rampurhat', 'Ghanpur', 'Jangaon', 'Amalapuram', 'Draksharamam',
'Kamareddy', 'Bodhan', 'Banswada', 'Yellareddy', 'Medak', 'Malemruvathur',
'Dinara', 'Bikramgang', 'Shajapur', 'Gauribidanur', 'Amritsar', 'Janakpuri',
'Phagwara', 'Vellore', 'Arani', 'Polur', 'Chetpet', 'Kusumnchi', 'Gulbarga',
'Chittapur', 'Khanna', 'Satara', 'Khandala', 'Konch', 'Rath', 'Rewari',
'Naraingarh', 'Lalru', 'Hospet', 'Gangavathi', 'Koppal', 'Motihari', 'Raxaul',
'Ramagundam', 'Pupri', 'Bardhaman', 'Rupnarayanpur', 'Murbad', 'Asangaon',
'Mungaoli', 'Bina', 'Khurai', 'Kankavali', 'RaisingNgr', 'Manjhaul', 'Bijnor',
'Najibabad', 'Dhampur', 'Kanth', 'Thakurdwara', 'BiharSarif', 'Nawada',
'Jayamkondan', 'Srikakulam', 'Tiruchi', 'Pattukotai', 'Peravurani',
'Aranthangi', 'Karaikudi', 'Ponnamaravathi', 'Khed', 'SrinagarUK',
'Karnaprayag', 'Chamoli', 'Mysore', 'Hunsur', 'Gonikoppal', 'HDKote', 'Jasai',
'Koraput', 'Jeypore', 'Tirupur', 'Shrirampur', 'Shirdi', 'Kopargaon',
'Vaijiapur', 'Kotdwara', 'Barjora', 'Bankura', 'Hiriyur', 'Chomu', 'Reengus',
'Sikar', 'Bikaner', 'Didwana', 'Sujargarh', 'Bhadrak', 'Kendujhar', 'Karanjia',
'Paota', 'Chodavaram', 'Golaghat', 'Sivasagar', 'Varanasi', 'Husnabad',
'Jammikunta', 'Thirthahalli', 'Kanti', 'Saraiya', 'Vinukonda', 'Banka',
'Bhagalpur', 'Kadthal', 'Kalwakurthy', 'Devarakonda', 'Haliya', 'Hoskote',
'Nalgonda', 'Sindagi', 'Indi', 'Aland', 'Katihar', 'Gudivada', 'Lucknow',
'Sandur', 'Fatehpur', 'Banda', 'Mahoba', 'Ooty', 'Mahabubnagar', 'Bijnapally',
'Jadcherla', 'Shindkheda', 'Narnaul', 'Chhibramau', 'Aliganj', 'Kishangarh',
'Parbatsar', 'Naugchia', 'Chakia', 'Jalgaon', 'Bhusawal', 'Raver', 'Burhanpur',
'Sivaganga', 'Avinashi', 'Nashik', 'Gomoh', 'Bilimora', 'Vansda', 'Mokokchung',

'Nandyal', 'Tulsipur', 'Navsari', 'Valsad', 'Manapparai', 'Melur', 'Lakhnadon',
 'Seoni', 'Chhindwara', 'Mandla', 'Coonor', 'Chhata', 'Kaman', 'Khonsa',
 'Khanapur', 'Sirsa', 'Jath', 'Satna', 'Churhat', 'Sidhi', 'Bokaro', 'Dalkhola',
 'Gandhidham', 'Halvad', 'Dhrangadhra', 'Kalpetta', 'Mananthavady', 'Khurdha',
 'MughalSarai', 'Chandauli', 'Jagtial', 'Luxettipet', 'Mansa', 'Chotila',
 'Hathras', 'Bishnupur', 'Modasa', 'Khedbrahma', 'Madakasira', 'Pavagada',
 'Kamarpukur', 'Kavali', 'Pappadahandi', 'Jhunjhunu', 'Khetri', 'NeemKaThana',
 'Itahar', 'Kaliyaganj', 'Nellore', 'Sangola', 'Maihar', 'Achrol', 'Rasipuram',
 'Upleta', 'Nokha', 'Nagaur', 'Kittur', 'HanumanJNC', 'Pandharpur', 'Ambur',
 'Lonavala', 'Rajam', 'Bobbili', 'Pithorgarh', 'Marakkanam', 'Pratapgarh',
 'Mandsaur', 'Sitamau', 'Rangia', 'Kokrajhar', 'Dhubri', 'Bilasipara', 'Tura',
 'Bhiwadi', 'Metpally', 'SikandraRao', 'Etah', 'Jalesar', 'Bahadurgarh', 'Meham',
 'Dausa', 'Hindaun', 'Karauli', 'Gangapur', 'Sirsi', 'Sagara', 'Tangi',
 'Giridih', 'Bhatpara', 'Mungeli', 'Kozhenchery', 'Gangarampr', 'Nanjangud',
 'Gundlupet', 'Chamarjngr', 'Kollegala', 'Malavalli', 'Tirumakudalu',
 'Vemulawada', 'Ghatampur', 'Bantwal', 'Sullia', 'Kadaba', 'Sambalpur',
 'Bargarh', 'Balangir', 'Sonepur', 'Sagar', 'Narsapur', 'Buxar', 'Dumraon',
 'Jagdishpur', 'Solan', 'Kharagpur', 'ChandroknaRD', 'Kakdwip', 'Krishnagiri',
 'Nalbari', 'Barpeta', 'Bongaigaon', 'Udala', 'Kaghasnagar', 'Mancherial',
 'Parvathipuram', 'Palakonda', 'Vidisha', 'GanjBasoda', 'Betamcherla', 'Mangrol',
 'Nawanshahr', 'Machhiwara', 'Madurai', 'Sivakasi', 'Sankaran', 'Malvan',
 'Pilibanga', 'Anupgarh', 'DhrmpuriTS', 'Yellandu', 'Rayaparthi', 'Nuzvid',
 'Bassi', 'Lalsot', 'Nawalgarh', 'Rajgarh', 'Taranagar', 'Malur', 'Ratnagiri',
 'Shirala', 'Khambhalia', 'Bhatiya', 'Srirangapatna', 'Mandya', 'Ramanagara',
 'Kanakapura', 'Pilani', 'Pangodu', 'Bngnpalle', 'Paramakudi', 'Ramnthpurn',
 'Rameswaram', 'Muthukulathur', 'Narikkudi', 'Barbil', 'Ghanashyampur', 'NOI',
 'Baruipur', 'Sultana', 'Choutuppal', 'Miryalguda', 'Suryapet', 'Blr', 'Soraon',
 'Majalgaon', 'Jamshedpur', 'Ghazipur', 'Ghosi', 'Dohrighat', 'Eral',
 'Tirchchndr', 'Thisayanvilai', 'Jalna', 'Karnal', 'Sankerko', 'Guna',
 'Ashokngr', 'JoguGadwal', 'Thoppur', 'Dharmapuri', 'Chandpur', 'Sendhwa',
 'Banswara', 'Jassur', 'Dalhousie', 'Chamba', 'Bhanvad', 'Mejia', 'Rghunthpur',
 'Hura', 'Dola', 'Jhajjar', 'Korba', 'Baheri', 'Pilibhit', 'Tinusukia',
 'DoomDooma', 'Namsai', 'Tezu', 'Sujanpur', 'Bhubaneswar', 'Tarkeshwar',
 'Chhaygaon', 'Chitradurga', 'Salempur', 'Naugarh', 'Usilampatti', 'Nandikotkr',
 'Jamtara', 'Dumka', 'Pakur', 'Morena', 'Bhind', 'Asansol', 'Changlang',
 'Radhanpur', 'Gudalur', 'Azamgarh', 'Saraimeer', 'Shahganj', 'Badlapur', 'Rewa',
 'Sihora', 'Haldia', 'Puranpur', 'Asind', 'Ambasamdrn', 'Bamangola', 'Badarpur',
 'Gokak', 'Kapurthala', 'Nakodar', 'Dhulian', 'Bhilad', 'Vizag', 'Sirohi',
 'Sumerpur', 'Falna', 'OK', 'Jhansi', 'Lalitpur', 'Tikamgarh', 'RampuraPhul',
 'Harraiya', 'Tezpur', 'Pasighat', 'Gohpur', 'Narasnpeta', 'Tekkali',
 'Paralakhemundi', 'Balrampur', 'Shujalpur', 'Palasa', 'Khanakul', 'Arambag',
 'Vrindavan', 'Dholpur', 'Gondia', 'Amb', 'DehraGopipur', 'Dharamshala',
 'Palampur', 'Mangaldoi', 'Dhekiajuli', 'Daurala', 'Shillong', 'Jowai', 'Hyd',
 'Ambala', 'Erode', 'Phulpur', 'Maharajapuram', 'Jaunpur', 'Sinnar', 'Dhone',
 'Jagatsghpr', 'Paradip', 'Dharmanagr', 'Mahasamund', 'Amreli', 'Palitana',
 'Jairampur', 'Badnaur', 'Fazilka', 'Kabuganj', 'Hajo', 'AmaDubai', 'Rawatsar',
 'Tamluk', 'Nakhatrana', 'Buldhana', 'Khamgaon', 'Chhatarpur', 'Airport',
 'Aizawl', 'Champhai', 'Umaria', 'Pathankot', 'Basta', 'Shahdol', 'Jetpur',

'Dhoraji', 'Barh', 'Anandnagar', 'Maharajganj', 'Asifabad', 'Rajpalayam',
 'Joda', 'DalsinghSarai', 'Rusera', 'Salur', 'Purulia', 'Jhalda', 'Nabha',
 'Manvi', 'Sindhanur', 'Uchila', 'Machilipatnam', 'Sillod', 'Bishwanath',
 'Phusro', 'Mirik', 'Darjeeling', 'Peikulam', 'Sikandarpur', 'Hansi',
 'SawaiMadhopur', 'Haldwani', 'Tirtol', 'Katni', 'Bhilwara', 'Kirauli',
 'Nedumangad', 'Tandur', 'Vikarabad', 'Shadnagar', 'Kayamkulam', 'Manthuka',
 'Rohtak', 'Surathkal', 'Garhshnker', 'Ghatkesar', 'Nagpur', 'Mehkar', 'Chikhli',
 'Narsingpur', 'Bareli', 'Ambah', 'Kilimanoor', 'Peterbar', 'Meerut', 'Barhi',
 'Jind', 'Ratia', 'Addanki', 'Tenkasi', 'Naharlagun', 'Keshiary', 'Manglamaro',
 'Contai', 'Piparcity', 'Gotan', 'SirhindFatehgarh', 'Rajpura', 'Sangareddy',
 'Koratla', 'Silapathar', 'Parwanoo', 'Belgaum', 'Barwala', 'Dharwad',
 'Chalisingaon', 'Tadipatri', 'Proddatur', 'Cuddapah', 'Badvel', 'Unnao',
 'Sangamner', 'Panskura', 'Kandi', 'Balugaon', 'Giddarbaha', 'Gadchiroli',
 'Atapadi', 'Bhadohi', 'Bomdila', 'Nimbahera', 'Gopiganj', 'Kasganj', 'Abohar',
 'Malout', 'Central', 'Vuyyuru', 'Latur', 'Udgir', 'Baripada', 'Palakollu',
 'Jamui', 'KharagpurBR', 'Munger', 'Bhadaur', 'Balipara', 'Jharsuguda',
 'Manteswar', 'Madnapalle', 'Kothanalloor', 'Hoshangabad', 'Bilaspur', 'Nirjuli',
 'Nabarangpr', 'Bhiwani', 'Chabua', 'PaliBirsighpr', 'Mau', 'Bellmpalli',
 'Raiganj', 'Arsikere', 'Gohana', 'Kolasib', 'Vadipatti', 'Tarnau', 'Khargram',
 'Bhadra', 'Mulugu', 'Ashti', 'Islampure', 'Balurghat', 'Anuppur', 'Panna',
 'Panaji', 'Fatehabad', 'Soro', 'Rajkot', 'Kapadvanj', 'Bhupalpally',
 'Mahadevpur', 'Hajipur', 'Lakhipur', 'Neemrana', 'Roing', 'Krishnanagar',
 'Angul', 'Phulbani', 'Amalner', 'Erandol', 'Pachora', 'MirzapurWB', 'Gobicheti',
 'Badkulla', 'Gujiliam', 'Shahjhnpur', 'Razole', 'Ambegaon', 'Tonk', 'Barasat',
 'Berhampur', 'Gondal', 'Sheikhpura', 'Karukachal', 'Printhlmna', 'Bokakhat',
 'Durg', 'Moranhat', 'Degloor', 'Chanchal', 'Wai', 'Jiyanpur', 'Chiraiyakot',
 'Sidhmukh', 'Nohar', 'Dwarka', 'Kulithalai']

```
[138]: delhivery["source_city"].isna().sum()
```

```
[138]: 0
```

Replace the 3 letter cities with original city names

```
[139]: delhivery[delhivery["source_city"].str.len()<=3]["source_city"].unique()
```

```
[139]: array(['Una', 'MAA', 'AMD', 'BLR', 'Del', 'GZB', 'GGN', 'CCU', 'FBD',  
            'Cjb', 'PNQ', 'Goa', 'HBR', 'Amd', 'BOM', 'Pen', 'NOI', 'Blr',  
            'OK', 'Amb', 'Hyd', 'Mau', 'Wai'], dtype=object)
```

Una, Goa, Pen, Amb, Mau and Wai are valid 3 letter cities

Remaining all should be modified with original names

```
[140]: delhivery[delhivery["source_city"].str.len()<=3]["source_name"].unique()
```

```
[140]: array(['Una_Mamlatdr_DC', 'MAA_Poonamallee_HB', 'AMD_Memnagar',  
            'BLR_JPNagar_Pc', 'Del_Okhla_PC', 'GZB_Mohan_Nagar_DPC',
```

```
'AMD_Rakhial', 'GGN_DPC', 'CCU_New Alipore_DPC',
'FBD_Balabgharh_DPC', 'Cjb_Kovaipudur_Dc', 'Cjb_West_Dc',
'PNQ Vadgaon Sheri DPC', 'Goa_ZuariNgr_IP', 'Goa_Hub',
'CCU_Beliaghata_DPC', 'HBR Layout PC', 'CCU_Hub',
'Amd_Chandkheda_Dc', 'BOM_Sakinaka_RP', 'Pen_BljiMrkt_D',
'CCU_DumDum_DPC', 'PNQ Pashan DPC', 'CCU_Beleghta_CP',
'Goa_Margao_Dc', 'NOI_RPC', 'Blr_Domlur', 'Goa_Ponda_Dc', 'OK_RPC',
'CCU_Lake Avenue_DPC', 'Amb_Adrshngr_D', 'Hyd_Trimulgherry_Dc',
'PNQ Rahatani DPC', 'Hyd_Uppal_Dc', 'Hyd_Chandanagar_Dc',
'Mau_BaliaMod_D', 'Goa_Mapusa', 'Hyd_LB-Nagar_Dc',
'Wai_Central_DPP_3'], dtype=object)
```

[141]: *# Frame the original city names using web browsing and inspecting source_names*

```
original_city_names = {
    "MAA" : "Chennai",
    "AMD" : "Ahmedabad",
    "BLR" : "Bengaluru",
    "Del" : "Delhi",
    "GZB" : "Ghaziabad",
    "GGN" : "Gurgaon",
    "CCU" : "Kolkata",
    "FBD" : "Faridabad",
    "Cjb" : "Coimbatore",
    "PNQ" : "Pune",
    "HBR" : "Bengaluru",
    "Amd" : "Ahmedabad",
    "BOM" : "Mumbai",
    "NOI" : "Delhi",
    "Blr" : "Bengaluru",
    "OK" : "Delhi",
    "Hyd" : "Hyderabad"
}
```

```
[142]: def replace_3letter_cities(df):
    if (len(df)<=3) and (df in original_city_names.keys()):
        return original_city_names[df]
    elif (df == "Bangalore"):
        return "Bengaluru" # Bangolore is modified to Bengalure
    elif (df == "LowerParel"):
        return "Mumbai" # LowerParel is a place in Mumbai
    else:
        return df
```

```
[143]: delhivery["source_city"] = delhivery["source_city"].apply(lambda x:
    ↪replace_3letter_cities(x))
```

```
[144]: delhivery[delhivery["source_city"].str.len()<=3]["source_city"].unique()
# All of these are valid 3 letter cities
```

```
[144]: array(['Una', 'Goa', 'Pen', 'Amb', 'Mau', 'Wai'], dtype=object)
```

2.1.4 Extract source_place and source_code

```
[145]: # Extract place and code from source name (should identify all different types
↳ of formats available)
def extract_place_code(df):
    if (" " in df):
        N = len(df.split(" "))
        if (N == 1): # format: Darbhanga
            return (df,"NULL")
        elif (N == 2):
            if ("_" not in df):
                if bool(re.match(r"^([a-zA-Z0-9]*) ([a-zA-Z0-9]{0,3})$",df)):
                    # format: Mumbai Hub
                    s = re.match(r"^([a-zA-Z0-9]*) ([a-zA-Z0-9]{0,3})$",df)
                    return (s.group(1),s.group(2))
                elif bool(re.match(r"^([a-zA-Z0-9]*) ([a-zA-Z0-9]{4,})$",df)):
                    # format: Mumbai Mahim
                    s = re.match(r"^([a-zA-Z0-9]*) ([a-zA-Z0-9]{4,})$",df)
                    return (s.group(2),"NULL")
            else:
                if bool(re.match(r"^([a-zA-Z0-9]*)_([a-zA-Z0-9]*)_([a-zA-Z0-9]{0,3})$",df)):
                    # format: Ganga Nagar_DC
                    s = re.match(r"^([a-zA-Z0-9]*)_([a-zA-Z0-9]*)_([a-zA-Z0-9]{0,3})$",df)
                    return (s.group(1)+"_"+s.group(2),s.group(3))
                elif bool(re.match(r"^([a-zA-Z0-9]*)_([a-zA-Z0-9]{0,3})$",df)):
                    # format: CCU_New Alipore_DPC, Noida_Sec 02_DPC
                    s = re.match(r"^([a-zA-Z0-9]*)_([a-zA-Z0-9]{0,3})$",df)
                    return (s.group(2)+"_"+s.group(3),s.group(4))
                elif bool(re.match(r"^([a-zA-Z0-9]*)_([a-zA-Z0-9]{4,})$",df)):
                    # format: Bhopal_Kolar Mandakni, Bhopal_Old City
                    s = re.match(r"^([a-zA-Z0-9]*)_([a-zA-Z0-9]{4,})$",df)
                    return (s.group(2)+"_"+s.group(3),"NULL")
        elif (N == 3):
            if ("_" not in df):
```

```

        if bool(re.match(r"^([a-zA-Z0-9]*) ([a-zA-Z0-9]*)\u
        \u([a-zA-Z0-9]{4,})$",df)):
            # format: Bhopal MP Nagar
            s = re.match(r"^([a-zA-Z0-9]*) ([a-zA-Z0-9]*)\u
            \u([a-zA-Z0-9]{4,})$",df)
            return (s.group(2)+"_"+s.group(3),"NULL")
        if bool(re.match(r"^([a-zA-Z0-9]*) ([a-zA-Z0-9]*)\u
        \u([a-zA-Z0-9]{0,3})$",df)):
            # format: HBR Layout PC
            s = re.match(r"^([a-zA-Z0-9]*) ([a-zA-Z0-9]*)\u
            \u([a-zA-Z0-9]{0,3})$",df)
            return (s.group(2),s.group(3))
    else:
        if bool(re.match(r"^([a-zA-Z0-9]*) _([a-zA-Z0-9]*)\u
        \u([a-zA-Z0-9]*)\s?_([a-zA-Z0-9]{0,3})$",df)):
            # format: Mumbai_Kalyan West _Dc
            s = re.match(r"^([a-zA-Z0-9]*) _([a-zA-Z0-9]*)\u
            \u([a-zA-Z0-9]*)\s?_([a-zA-Z0-9]{0,3})$",df)
            return (s.group(2)+"_"+s.group(3),s.group(4))
    elif (N == 4):
        if ("_" not in df):
            if bool(re.match(r"^([a-zA-Z0-9]*) ([a-zA-Z0-9]*)\u
            \u([a-zA-Z0-9]*) ([a-zA-Z0-9]*)$",df)):
                # format: PNQ Vadgaon Sheri DPC
                s = re.match(r"^([a-zA-Z0-9]*) ([a-zA-Z0-9]*)\u
                \u([a-zA-Z0-9]*) ([a-zA-Z0-9]*)$",df)
                return (s.group(2)+"_"+s.group(3),s.group(4))

    elif bool(re.
    \u\match(r"^([a-zA-Z0-9]*) _([a-zA-Z0-9]*) _([a-zA-Z0-9]{0,3})$",df)): # format:\u
    \uAnand_VUNagar_DC
        s = re.match(r"^([a-zA-Z0-9]*) _([a-zA-Z0-9]*) _([a-zA-Z0-9]{0,3})$",df)
        return (s.group(2),s.group(3))
    elif bool(re.match(r"^([a-zA-Z0-9]*) _([a-zA-Z0-9\-\-]{0,3})$",df)):
        # format: LowerParel_CP
        s = re.match(r"^([a-zA-Z0-9]*) _([a-zA-Z0-9\-\-]{0,3})$",df)
        return (s.group(1),s.group(2))
    elif bool(re.match(r"\b([a-zA-Z0-9]{0,3}) _([a-zA-Z0-9]*)\b",df)):
        # format: AMD_Memnagar
        s = re.match(r"\b([a-zA-Z0-9]{0,3}) _([a-zA-Z0-9]*)\b",df)
        return (s.group(2),"NULL")
    elif bool(re.match(r"\b([a-zA-Z0-9]*) _([a-zA-Z0-9]{4,})\b",df)):
        # format: Bhubaneshwar_Nayapalli
        s = re.match(r"\b([a-zA-Z0-9]*) _([a-zA-Z0-9]{4,})\b",df)
        return (s.group(2),"NULL")

```

```

elif bool(re.
↳match(r"^([a-zA-Z0-9]*)_([a-zA-Z0-9]*)_([a-zA-Z0-9]{4,})_([a-zA-Z0-9]{0,3})$",df)):
↳
    # format: GZB_Mohan_Nagar_DPC
    s = re.
↳match(r"^([a-zA-Z0-9]*)_([a-zA-Z0-9]*)_([a-zA-Z0-9]{4,})_([a-zA-Z0-9]{0,3})$",df)
    return (s.group(2)+"_"+s.group(3),s.group(4))
elif bool(re.
↳match(r"^([a-zA-Z0-9]*)_([a-zA-Z0-9]*)_([a-zA-Z0-9]{0,3})_([a-zA-Z0-9]{0,3})$",df)):
↳
    # format: Bangalore_East_I_20
    s = re.
↳match(r"^([a-zA-Z0-9]*)_([a-zA-Z0-9]*)_([a-zA-Z0-9]{0,3})_([a-zA-Z0-9]{0,3})$",df)
    return (s.group(2),s.group(3)+"_"+s.group(4))
elif (len(df.split(" ")) == 1): # format: Darbhanga
    return (df,"NULL")
return ("NULL","NULL")

```

```

[146]: s = delhivery["source_name"].apply(lambda x: extract_place_code(x))
delhivery[["source_place","source_code"]] = pd.DataFrame(s.tolist(),index =_
↳delhivery.index)

```

```

[147]: print(list(delhivery["source_place"].unique()))

```

```

['VUNagar', 'MotvdDPP', 'Mankoli', 'LowerParel', 'Nelmngla', 'Bomsndra',
'GillChwk', 'Jagraon', 'Raikot', 'Junagadh', 'Veraval', 'NCplxDPP', 'Mamlatdr',
'SsnRdDPP', 'Kundli', 'IOTCEnc', 'Haridwar', 'Poonamallee', 'MilrGanj',
'Jalandhar', 'Begumpur', 'Jaipur', 'FoySGRRD', 'Nayagaon', 'Basni', 'Chikdply',
'Trnsport', 'Central', 'AryaNagr', 'MhraChng', 'Bilaspur', 'East', 'Surat',
'Aswnngr', 'SivjiCWK', 'Busstand', 'JirgeNgr', 'BnslNgr', 'MaladWest',
'Hoodi', 'BstndDPP', 'PuranDPP', 'OstwlEmp', 'KetyDPP', 'Swargash', 'Bhaleti',
'Ward6', 'BsnoiHPL', 'SttinDPP', 'PalikDPP', 'Panchot', 'Unjha', 'TirupDPP',
'Memnagar', 'Peedika', 'Chtrpuza', 'Tathawde', 'Kakinada', 'Eaglvvari',
'SadrHsptl', 'Gangjala', 'Krishnpr', 'Gajuwaka', 'Kothuru', 'Wardno8', 'Ranchi',
'HotelPrk', 'BodomBzr', 'RadhaCpx', 'Beawar', 'LxmntDPP', 'Uppal', 'HBColny',
'Mainroad', 'Xroad', 'Sitarmrd', 'NSTRoad', 'VidyaNgr', 'Mumbai', 'Guwahati',
'Morbi', 'JivanDPP', 'JPNagar', 'KGAirprt', 'Dankuni', 'Bhubaneshwar',
'NraynDPP', 'Bharatpur', 'BsstdDPP', 'GodamDPP', 'North', 'Harop', 'Airport',
'Sanpada', 'Gokulam', 'Parigi', 'Anjur', 'Shamshbd', 'Ameenpur', 'Okhla',
'KHRoad', 'Bbganj', 'Darbhanga', 'Javahar', 'Nagar', 'MIDCAvdn', 'DhuleRoad',
'DhuleRd', 'Nandrbar', 'KrantiNgr', 'Hooghly', 'Bandel', 'Mohan_Nagar',
'HapurRD', 'Paldi', 'Peenya', 'DBRCmplx', 'Palani', 'RjndraRd', 'Athithnr',
'RTOoffice', 'Thirumtr', 'GandhiRd', 'NJVNgr', 'SelamRd', 'EastmnRD', 'VkotRoad',
'Rdiosttn', 'Pariply', 'Nayapalli', 'VislkNgr', 'SaiTempl', 'NcsRd', 'Rakhial',
'ByePass', 'Faridabad', 'Pandrng', 'patna', 'BMRd', 'MuthpTmp', 'YTRd',
'HesglDPP', 'RgvdrDPP', 'Pataudi', 'Trchngrd', 'Sirjudol', 'KrsprDPP',
'GopalDPP', 'UtBzrDPP', 'RamnadRD', 'Vllyaprm', 'TmpleSrt', 'Adargchi',

```

'GndhiNGR', 'Sector4', 'GadagRD', 'Cdosclrd', 'Mehmdpur', 'Ganga_Nagar',
 'Chukhndi', 'PchpkrRD', 'BypassRd', 'Karayam', 'Artclgrd', 'Venkatsa', 'BOB',
 'TrnptNgr', 'Wardno13', 'Nangli', 'Dillliyan', 'Mahindra', 'Kapleswr',
 'SliprDPP', 'Pringla', 'Gateway', 'Kapshera', 'Salem', 'Mhdhvpur', 'Moga',
 'Muktsar', 'GGN', 'VdkkuSrt', 'Radhaprm', 'Nallur', 'New_Alipore', 'Matrprmr',
 'PnchmDPP', 'BgnprDPP', 'MubardPP', 'Ganesh', 'GainMrkt', 'Malerkotla', 'Sunam',
 'Patiala', 'Moradabad', 'UdhamNgr', 'Bokule', 'JyotiNgr', 'CivilHPL',
 'DivrsnRd', 'PatelWrd', 'Mataward', 'AbbasNgr', 'VallaDPP', 'Amravati',
 'Gaurkshn', 'MohanNgr', 'Shivaji', 'AkkolRD', 'IndraNgr', 'VikrmMah',
 'Balabhgarh', 'Palwal', 'KndliDPP', 'MPward', 'Pinjore', 'RicMilRd', 'Wardno3',
 'Kengeri', 'Durma', 'WardNo1', 'SidculRd', 'Pettah', 'Arlumodu', 'Mutyvila',
 'Shantanu', 'Mundhe', 'LxmiNiws', 'TrtllarD', 'Mdhavram', 'Mangalam',
 'ShantiNg', 'Chakan', 'Itachnda', 'Porur', 'Vepmpttu', 'Thiruvlr', 'Raiprkln',
 'Chndivli', 'MiraRd', 'Vasai', 'SriRmNGR', 'GuttalRD', 'KaaduRd', 'Indsarea',
 'Bhogpur', 'PlaceCol', 'AkhraBzr', 'Kumpurm', 'Pazhvedu', 'Rathnam', 'LFRoad',
 'Palikval', 'Mangri', 'Veersagr', 'ChikaDPP', 'ShntiSgr', 'TBCross', 'Karur',
 'Ambernath', 'Poothole', 'Robinson', 'ChndrNgr', 'AhmedNagar', 'Hindcwk',
 'Arulimod', 'Ajnari', 'NamoNagr', 'KrisnKunj', 'Bnnrghta', 'RoshnBgh',
 'ShjnprRD', 'Chennai', 'Balajicly', 'Artmcly', 'MGRoad', 'RSRoad', 'Talkui',
 'KolarRd', 'FshryOFC', 'Ganeshwr', 'MhliadPP', 'BhwniGnj', 'Vaishali',
 'BajprDPP', 'SrnrHwy', 'KarnalRd', 'Ghansoli', 'MheshNGR', 'Vadodara',
 'Bellary', 'Knsgrard', 'Shivangr', 'Jogshwri', 'MBTRd', 'ArkonmRD', 'KoralDPP',
 'ITDARd', 'AskNagar', 'Kovaipudur', 'West', 'RjnaiDPP', 'KaremdPP', 'Sixmile',
 'Karelibaug', 'Vadgaon_Sheri', 'Noida_Sec-83_DC', 'ShanthiS', 'ManhrBld',
 'PmthuKlm', 'Panvel', 'LXngrDPP', 'Panipat', 'AmzonDev', 'Surajpur', 'Sector02',
 'ZuariNgr', 'Blbgarh', 'Wardn13', 'JhumanCk', 'Bazar', 'Egmore', 'Tolichwk',
 'WardNo4', 'Haripur', 'HajiprRD', 'Narynpur', 'AtoNgrRd', 'Mainrd', 'Bardivan',
 'Wardno6', 'VidyaNGR', 'ArhamDPP', 'AmtlaDPP', 'Bhuj', 'Chikmagalur', 'Anjar',
 'Kharar', 'Mullanpr', 'Pune', 'South', 'Kakdepot', 'Kurduwdi', 'Sec_02',
 'Pnjbiyon', 'SJRoad', 'Kanongyn', 'DcntCLY', 'Katora', 'MP_Nagar', 'Pshrikvu',
 'Mandodi', 'ZamQuatr', 'Bhabua', 'Ambedkar', 'Sunku', 'Amankovl', 'PostofJN',
 'Klskhrpt', 'Town', 'Sishumdr', 'Sodal_Road', 'Raiprvlg', 'Godhra', 'Dahod',
 'Kanchipuram', 'HousngBd', 'Gandhinagar', 'DhnliRth', 'Goa', 'CharRsta',
 'Chrompet', 'Vasanthm', 'Sadras', 'Pawane', 'Verpatem', 'RailGate', 'Shankrpa',
 'SDKNgr', 'TirupthiRd', 'Bngisheb', 'KamnHbRD', 'Mulapali', 'Beliaghata',
 'Mahuva', 'NgrNigam', 'Chittaurgarh', 'kankroli', 'KaranNGR', 'Rynapadu',
 'ThthiCwk', 'Mettu', 'Thiruviz', 'Vadasari', 'Tuminkte', 'ICDCant', 'Mthurard',
 'Mayapuri', 'WebelDPP', 'Wazirpur', 'Agraharm', 'Atapaka', 'KamaStrt', 'SaiNgr',
 'GVManu', 'Madnpali', 'RTCStand', 'SChwkDPP', 'TonkRoad', 'KrshDPP', 'Layout',
 'Prbhunth', 'HnmntNgr', 'Khwsrai', 'KdidmCLY', 'Sookhtal', 'Subhash',
 'SuzkiSrv', 'ThryrRD', 'Mthrapuri', 'goplurm', 'Kmrajngr', 'PriyrNGR',
 'SukntDPP', 'ColnyDPP', 'JawaharN', 'SamitiRd', 'Kolar_Mandakni', 'Ukkadam',
 'ArickDPP', 'ShtDRDPP', 'RKComplx', 'MrdiVlge', 'MarketRd', 'Beltnngdi', 'CCU',
 'Koilstrt', 'RgstrOFC', 'Chungam', 'Kollgpra', 'WrdN4DPP', 'BndhuTRH',
 'Samrvrni', 'Sarjapur', 'LaxmiNgr', 'SikriKla', 'TilakNgr', 'Trimurti',
 'Khjurwli', 'RtlamNka', 'Kuntikna', 'Sirikona', 'Vaghasi', 'Arangadi',
 'Mnanthla', 'MilpaDPP', 'Pshimpra', 'Nehru3PL', 'Gopa3PL', 'ShivNgar', 'Katira',
 'KarjuDPP', 'BhmpdrDPP', 'Barmasia', 'BaraLoha', 'Palanpur', 'HawaiPlr',

'Veluthur', 'KdrShrRd', 'AlathurRD', 'Bypasrd', 'Madaprum', 'Thmpulam',
 'Kalynpur', 'MSRClgRd', 'GutmgrCl', 'TrnspNgr', 'Pakrela', 'KtsiGrsm',
 'ARBNorth', 'Pngktgudi', 'Thalthru', 'Sttyapar', 'Alwal', 'Vijayawada',
 'Chndrlpd', 'Mhdiptnm', 'Enayetpr', 'Nijgan', 'RatuaDPP', 'PatelNGR', 'Chowk',
 'Maheva', 'BkgnRoad', 'Selakui', 'BrlwgDPP', 'Virar', 'KotwaliN', 'Nadiad',
 'Dakor', 'Kalol', 'MandyaRD', 'MuruPost', 'Kooriyad', 'Munduprm', 'Roorkee',
 'CottonGreen', 'Shimoga', 'Rishikesh', 'GndhiNgr', 'Chinchwad_DC', 'PODPP',
 'Chandkheda', 'Agraroad', 'Pnchlght', 'KDRoad', 'SingCLNY', 'farukngr',
 'Bhatinda', 'LamtiDPP', 'DiyodPP', 'Shop3DPP', 'SubhVRTL', 'Mwalibad',
 'BhukrdPP', 'Sudmpuri', 'AsnsdhRD', 'Chaitnya', 'Jamnagar', 'StatonRd',
 'MChwkDPP', 'Govind', 'Parasi', 'Waidhan', 'Ward8DPP', 'PreetDPP', 'Madhavaram',
 'Himmatnagar', 'SashPhkn', 'WardNo3', 'ZoomCDPP', 'IndEstat', 'BSarani',
 'NagarDPP', 'MaxDPP', 'BtaiRoad', 'Surendranagar', 'TKRoad', 'IdstrlAr',
 'Gndhichk', 'Sulgan', 'Dhelu', 'Panchkula', 'RamaNgr', 'NH117', 'Barnala',
 'MhmodNgr', 'Ramvlg', 'CCRoad', 'KasyaDPP', 'BawliDPPP', 'Subshngr', 'HrihrNgr',
 'Palladam', 'Techrcly', 'Thvlrsrt', 'Antop_Hill', 'RoopNgr', 'RwStnDPP',
 'Porbandar', 'Court', 'KhirByps', 'Katrmira', 'MR0offce', 'ElngoNgr',
 'Perungudi', 'Ymunpurm', 'Old_City', 'ModelTwn', 'Hanumangarh', 'CotnGren',
 'KeRoad', 'kalibari', 'Alngjuri', 'Mlydpthr', 'TherSRT', 'NehruNGR',
 'Kurukshetra', 'WdN14DPP', 'Kaithal', 'HatRDDPP', 'Bownpilly', 'CroslySRT',
 'Sakinaka', 'LSRoad', 'BhwanDPP', 'EBroad', 'Bidar', 'Datatrya', 'Mohim',
 'Malegaon', 'Rawlgaon', 'BljiMrkt', 'DataSagr', 'Govndsgr', 'Udupi',
 'Kundapura', 'KmkshBul', 'Prbhtngr', 'Kakrmath', 'NrainaRD', 'NarenaRD',
 'ChomuRD', 'NaturDPP', 'JalnaRd', 'Bazarrd', 'SantaNGR', 'DumDum', 'Adhartal',
 'Mohali', 'StteHW28', 'Chuanpur', 'Tiglgndi', 'LICOoffce', 'HunterRd', 'Nrsampt',
 'Yellanda', 'ChotiHvl', 'PnjPiara', 'CivilStn', 'SurbhiTh', 'Greens',
 'BharDDPP', 'Khndyusn', 'Blockrd', 'Madarpur', 'PnditNGR', 'Ward9DPP',
 'YamunaNagar', 'Gurudwar', 'Kntgorya', 'SrifoDPP', 'Palakrty', 'Hanmkond',
 'Vijdurg', 'Anaipeta', 'Devenply', 'SuryaDPP', 'Menagrnd', 'JKRoad', 'Dwaraka',
 'Chnglptu', 'Achipkam', 'Wardno7', 'DehriRD', 'Bagaluru', 'MhpraRD', 'Gurukrpa',
 'Amritsar', 'Janakpuri', 'Lovely', 'KrthiKyn', 'StationRD', 'Blmrgnst',
 'SKRoad', 'Nehrugn', 'Glbgrd', 'Khanna', 'Mundhawa', 'Satara', 'Mughlpra',
 'Shahdara', 'MhimWest', 'YuktiDPP', 'Lajpat', 'Bhogal', 'Ward2DPP', 'OnkarDPP',
 'Hospet', 'PhrmPlza', 'Banikatt', 'Kalyan', 'RajaBzr', 'KairiyaT', 'Pdmavati',
 'SngihiRD', 'Bankura', 'Salanpur', 'SnkunDPP', 'Shahapur', 'AshkngRd',
 'Srvdycwk', 'Talaiya', 'NrdawDPP', 'BisnoldPP', 'Purbari', 'VarunCly',
 'NaginaRd', 'KotdwrRD', 'NaginaRD', 'Dayanand', 'Fathuluh', 'Soghra',
 'Chithbrm', 'Kuslpram', 'Tiruchi', 'anthniyr', 'SH71', 'HsptlRod', 'Sbrmnprnm',
 'Puduvalvu', 'Mahad', 'Srikot', 'Umalodge', 'CGRoad', 'Yadvigiri', 'RatnaDPP',
 'Thomas', 'BegurRD', 'Sector63', 'JNPT', 'GhtimDPP', 'Kelasahi', 'Koliplm',
 'DavkharRd', 'SaiBansi', 'NkshtPrz', 'YeolaRD', 'Nzbadrd', 'KeranDPP',
 'TahurDPP', 'ShsmldPP', 'Shop2DPP', 'FatehpRd', 'ITICollg', 'KatlaDPP',
 'LdnunDPP', 'Sirjudin', 'Sarubali', 'SmClyDPP', 'BaljiDPP', 'BaruaRd',
 'Babupaty', 'MahmurGj', 'Greenmkt', 'ConduDPP', 'NadthiCx', 'Sangetha',
 'Wardno4', 'Kothapet', 'Pbroad', 'GndhiDPP', 'DindiRD', 'PeroorRD', 'Kadugodi',
 'Hoskote', 'HydRoad', 'KalyanNg', 'SindgiRD', 'RazaviRd', 'GvrComp', 'Lucknow',
 'WrdN1DPP', 'Kotwali', 'GayatriN', 'Mlkpura', 'Davisdle', 'Mahabubnagar',
 'nagar', 'Badeplly', 'KakaCplx', 'Narnaul', 'Bhainpura', 'KaimgnjRD',

'AjmhwdPP', 'Pratpngr', 'Vijayght', 'Wardno10', 'Jalgaon', 'Samarth',
 'Truptingr', 'StRoad', 'Valluvar', 'TgrniarD', 'Pashan', 'KhsmiDPP', 'Bilimora',
 'CikhliRD', 'KirtiNgr', 'SrnsNgr', 'Navsari', 'Valsad', 'MduraiRD', 'Kidwai',
 'NagpurRD', 'Mharajpr', 'Fairybnk', 'GvrndDPP', 'StatinRD', 'IndstlAr',
 'AnprnDPP', 'MiraRoad', 'Shivprasad', 'Banshkri', 'Padra', 'KSClny', 'DltprDPP',
 'Sector1A', 'CrossRD', 'NvygRDPP', 'Ward19', 'JatniDPP', 'ShubsNGR', 'Aravind',
 'ShivaDPP', 'GreenVly', 'AshokNagar', 'Hathras', 'StnRdDPP', 'Kadipur',
 'Patelfli', 'PnukndRD', 'ChatiDPP', 'Kacheri', 'PunjabiB', 'Jhunjhunu',
 'War5DPP', 'NatunDPP', 'FatprDPP', 'Nellore', 'MngalDPP', 'BgwriDPP',
 'Beleghta', 'Palam', 'Knrpati', 'AdrshSt', 'Jharia', 'DeVDPP', 'KisanCo',
 'ColageRD', 'VijywdRD', 'RajCmplx', 'NngrgnRd', 'SamathBv', 'ColegRd', 'Kumud',
 'MJRDPP', 'Nimachrd', 'YashDPP', 'HosptlRd', 'HplrdDPP', 'Tetultol', 'Wardno5',
 'Sracmplx', 'Alandur', 'Bhiwadi', 'GunjRDPP', 'JydevNGR', 'CivlLine',
 'ChngiDPP', 'Bahadurgarh', 'GModDPP', 'IndraCln', 'MndwrRod', 'HnsChowk',
 'Ward6DPP', 'Vidygiri', 'Vardhard', 'SriDPP', 'Shivalya', 'TrengarD',
 'Panderia', 'Cherukole', 'FulbaDPP', 'RPRoad', 'Swamylyt', 'BrDbleRd',
 'NarsipuraRd', 'SulthnRd', 'Narasipr', 'Karimnagar', 'Trmltpl', 'Darbe',
 'Srirampt', 'AnugrDPP', 'JJCpxDPP', 'Rjndpara', 'BrezeDPP', 'Bahreya',
 'Sarswati', 'Nishangr', 'MohanPrk', 'Kharagpur', 'Chandigarh', 'PndrgNgr',
 'KlngrDPP', 'BnglorRd', 'Shyndco', 'Jalukbari', 'GovndNgr', 'Bhgtpura',
 'ShivBari', 'Chpaguri', 'PigonDPP', 'NagplDPP', 'Hitech', 'VadaiDPP',
 'ShrprDPP', 'MnRDDPP', 'CmtNgRod', 'keshod', 'JilRDDPP', 'Nawanshahr',
 'MnBzrDPP', 'Kappalur', 'Msstreet', 'Kovil', 'BllvMarg', 'Gobindgarh',
 'Mithakal', 'PrmNrDPP', 'HanumDPP', 'Sudimala', 'Perkadrd', 'Ward17',
 'DmodrNGR', 'NWclyDPP', 'NavldiDPP', 'SadulDPP', 'RajRdDPP', 'NharuExt',
 'MjgaonRd', 'JdswarRD', 'Kalyanpr', 'Bburynkpl', 'Mandya', 'VaniThtr',
 'Kalyan_West', 'Brpc', 'Pilani', 'Enknkla', 'VagaiNgr', 'TnhbBlkC', 'Kdthdstrt',
 'VaiklSRT', 'MukkuRD', 'PunjbiPd', 'Margao', 'NditaDPP', 'NOI', 'Bnsibtla',
 'MjlprDPP', 'Nagaram', 'Ragvendr', 'Krishna', 'Domlur', 'BypassRD', 'SmbjiCwk',
 'Kaithwal', 'Jamalpur', 'AzmrDPP', 'Shnmgprm', 'UdnkdiRD', 'BhgyaNgr',
 'Karnal', 'AmbkaDPP', 'Rohini', 'Barwala', 'Raghogr', 'Idgah', 'HnumDPP',
 'Bypassrd', 'ColctrOf', 'Patel_Nagar', 'UzanBazr', 'HghsclRD', 'NorprRD',
 'VishnuVhr', 'Mumbra', 'KhandDPP', 'AadiDPP', 'Banikhet', 'Bangotu',
 'Patparganj', 'barkarRd', 'ChainDPP', 'Jhajjar', 'Jogeshwri', 'Tilknagr',
 'HoliCDPP', 'ViksClny', 'Chrwpaty', 'Pthrgoan', 'HelipadRD', 'Farmnala',
 'SainkSCL', 'BjbNgr', 'Naraynpr', 'GwhRDDPP', 'Chitradurga', 'Banjaria',
 'MrutiNGR', 'UmarDPP', 'Jamtara', 'Dudhani', 'Hatpada', 'Prjapati', 'EtwahDPP',
 'Asansol', 'Kadtmtpty', 'Santalpr', 'RIICO', 'kalmpuza', 'ChtwrDPP', 'MsmcyDPP',
 'KcharaRD', 'Bhaluahi', 'Rewa', 'Ponda', 'KtnRdDPP', 'MdothdRD', 'BsStdDPP',
 'Solaiprm', 'Konapara', 'Bsavangr', 'RjndrNgr', 'Kapurthala', 'ChowkDPP',
 'MohnVRTL', 'RatanDPP', 'Umargaon', 'Vizag_', 'Ricco', 'BazarDPP', 'SbhrDDPP',
 'OK', 'Rawatpur', 'Mylapore', 'LVMColge', 'RjghatRd', 'MndiRoad', 'RampuraPhul',
 'MahuGDPP', 'Mhbhirab', 'MissonRd', 'Kishangarh', 'HudcoDPP', 'AmvdiDPP',
 'Ward14', 'PBRDDPP', 'AstrdDPP', 'Ramnagar', 'BalibDPP', 'Indrapri',
 'MathuraRD', 'GtRoad', 'RamNgr', 'Lake_Avenue', 'Adrshngr', 'GrudwrRd',
 'Cnsrvila', 'LNBRoad', 'Potheri', 'Sardhnrd', 'Shillong', 'Ldthlabh',
 'Trimulgherry', 'Ambala', 'PanditRd', 'Erode', 'NapitDPP', 'Shekhpur',
 'Krsnakcl', 'Katghara', 'RmNyrDPP', 'Markndpr', 'Udyabata', 'Ranakant',

```
'RajpurRD', 'ChtrGIDC', 'Rajula', 'STRdDPP', 'Mdiclcly', 'BhmrdDPP', 'GndhiChk',
'Jantaclg', 'Sardala', 'Bulabeda', 'ShivmDPP', 'MdhsnDPP', 'ClgRDDPP',
'Thsil3PL', 'WamanDPP', 'HunthrVg', 'AwmpiVng', 'Dehradun', 'Pathankot',
'Sohagpur', 'Jetpur', 'JmnvadRd', 'Malahi', 'LohiaDPP', 'PakriDPP', 'PaikjNGR',
'AshkTalk', 'ward9', 'GariDPP', 'GMukrDPP', 'Sahni', 'APMCYard', 'VasaviNg',
'Machilipatnam', 'Sabalpur', 'ZebaTWR', 'ChrliDPP', 'RhmgiDPP', 'Hillcard',
'SriVnktpm', 'DelRdDPP', 'PiliKoti', 'Bargawan', 'Bhilwara', 'AchneraRD',
'Arsprmbu', 'SnthiNGR', 'Bhrnikvu', 'Rohtak', 'Surathkal', 'Chandmari',
'Rahatani', 'Jagrata', 'MrktYrd', 'Gondkhry', 'Sholingnanallur', 'SagarDPP',
'KKndrDPP', 'JrjoldDPP', 'SourvDPP', 'MrenTirh', 'BhrolDPP', 'Krvnkuzy',
'GagiDPP', 'Meerut', 'Jind', 'AgrohDPP', 'SchdvDPP', 'Oilmilrd', 'RailwyRd',
'JmpuCntr', 'MdnprDPP', 'Kanakpur', 'DKLogDPP', 'SirhindFatehgarh', 'Rajpura',
'Chandanagar', 'Pothredy', 'BhemuDPP', 'Hejunagr', 'Belgaum', 'Dharwad',
'Tejpal', 'BhadgDPP', 'Jabalpur', 'CBRoad', 'Cuddapah', 'Sidrd', 'JiswldDPP',
'JngidDPP', 'VikasRam', 'JawanChk', 'Jhilmil', 'Nirjanpur', 'Balaji_Nagar',
'DohalDPP', 'Thikiri', 'Giddarbaha', 'Mirapati', 'Vidyangr', 'CTRoad',
'MsjidDPP', 'BnkrGate', 'Abohar', 'Malout', 'BhogdDPP', 'Srwnsngr', 'NlgaonRd',
'KalikDPP', 'CroadDPP', 'Mehsouri', 'Kaura', 'BChwkDPP', 'EragnDPP', 'MbRoad',
'MemariRD', 'PngnrRd', 'Majoor', 'GrnNgriya', 'BageDPP', 'PhdofDPP', 'Varachha',
'Bhiwani', 'CollgeRD', 'CtyLgDPP', 'Baliamod', 'BasthDPP', 'SubrtDPP',
'HsnRdDPP', 'DvlalDPP', 'Diakkawn', 'lalaNGR', 'Patia', 'BoiDPP', 'GMndiDPP',
'LaxmiNGR', 'SavtaHTL', 'Bareilly', 'ShbdnDPP', 'AkhirDPP', 'JthriDPP',
'GurpdDPP', 'Mohnprwa', 'Panaji', 'SirsaDPP', 'BhunaDPP', 'UttarDPP',
'ByprDDPP', 'Kothriya', 'Vandalur', 'JwahrNGR', 'Kataram', 'Kdvantra', 'Feroke',
'ThaneDPP', 'Mapusa', 'Rcocmplx', 'DibngVly', 'AnadiDPP', '_Kothanur',
'krshnPly', 'Krusphrma', 'Bhankrot', 'Ludhiana', 'Murtinrg', 'PcrrdDPP',
'Nerul', 'Samyaprm', 'Mangol', 'ThanaDPP', 'MunplDPP', 'PushPlza', 'VidyaDPP',
'Ward25', 'Parai', 'NavdaCln', 'Shanthi', 'Manchar', 'Tonk', 'KrshnNgr',
'Khajuria', 'Gondal', 'Torwa', 'Bgwtichk', 'MnimlaRd', 'Bikaner', 'EmsPnmmbi',
'MlnprDPP', 'Pulgaon', 'TiloiDPP', 'LB', 'BargaDPP', 'Selaiyur', 'KamalDPP',
'Mahim', 'MnbzrDPP', 'StnRoad', 'AnnaNGR']
```

```
[148]: # source_code with less than 5 letters are considered as VALID
print(list(delhivery["source_code"].unique()))
```

```
['DC', 'D', 'HB', 'CP', 'H', 'DPC', 'L', 'NULL', 'Hub', 'I', 'C', 'H_6', 'H_1',
'HUB', 'IP', 'D_2', 'I_2', 'H_2', 'D_1', 'DPP_2', 'DPP_1', 'I_7', 'Pc', 'I_1',
'I_4', 'R_8', 'PC', 'I_21', 'D_15', 'DPP_4', 'Dc', 'DPP_3', 'H_4', 'V', 'D_4',
'D_7', 'I_3', 'P', 'M', 'RP', 'D_3', 'L_8', 'I_20', 'D_9', 'R_11', 'RPC', 'D_5',
'NAD', 'D_12', 'D_8', 'Old', 'Goa', 'D_20', 'D_10']
```

```
[149]: delhivery["source_code"].value_counts().iloc[:10]
```

```
[149]: HB      41097
D       29962
H       26863
I       8420
```

```

Hub      6315
DC       4261
DPC      2860
IP       2768
H_1     2536
HUB      2189
Name: source_code, dtype: int64

```

```
[150]: delhivery.head()
```

```

[150]:      trip_creation_time \
0 2018-09-20 02:35:36.476840
1 2018-09-20 02:35:36.476840
2 2018-09-20 02:35:36.476840
3 2018-09-20 02:35:36.476840
4 2018-09-20 02:35:36.476840

      route_schedule_uuid route_type \
0  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...  Carting
1  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...  Carting
2  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...  Carting
3  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...  Carting
4  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...  Carting

      trip_uuid source_center      source_name destination_center \
0  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC      IND388620AAB
1  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC      IND388620AAB
2  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC      IND388620AAB
3  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC      IND388620AAB
4  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC      IND388620AAB

      destination_name      od_start_time \
0  Khambhat_MotvdDPP_D (Gujarat) 2018-09-20 03:21:32.418600
1  Khambhat_MotvdDPP_D (Gujarat) 2018-09-20 03:21:32.418600
2  Khambhat_MotvdDPP_D (Gujarat) 2018-09-20 03:21:32.418600
3  Khambhat_MotvdDPP_D (Gujarat) 2018-09-20 03:21:32.418600
4  Khambhat_MotvdDPP_D (Gujarat) 2018-09-20 03:21:32.418600

      od_end_time  start_scan_to_end_scan \
0 2018-09-20 04:47:45.236797      86.0
1 2018-09-20 04:47:45.236797      86.0
2 2018-09-20 04:47:45.236797      86.0
3 2018-09-20 04:47:45.236797      86.0
4 2018-09-20 04:47:45.236797      86.0

      actual_distance_to_destination  actual_time  osrm_time  osrm_distance \
0      10.435660      14.0      11.0      11.9653

```

1	18.936842	24.0	20.0	21.7243
2	27.637279	40.0	28.0	32.5395
3	36.118028	62.0	40.0	45.5620
4	39.386040	68.0	44.0	54.2181

	segment_actual_time	segment_osrm_time	segment_osrm_distance	source_state \
0	14.0	11.0	11.9653	Gujarat
1	10.0	9.0	9.7590	Gujarat
2	16.0	7.0	10.8152	Gujarat
3	21.0	12.0	13.0224	Gujarat
4	6.0	5.0	3.9153	Gujarat

	source_city	source_place	source_code
0	Anand	VUNagar	DC
1	Anand	VUNagar	DC
2	Anand	VUNagar	DC
3	Anand	VUNagar	DC
4	Anand	VUNagar	DC

2.2 Extraction of City, Place, Code and State from destination_name column

2.2.1 Visual Inspection of destination_name column to find its different formats

```
[151]: delhivery["destination_name"].nunique()
```

```
[151]: 1466
```

```
[152]: #list of all unique destination names. Open in text editor to view all the
↪destination_names
print(list(delhivery["destination_name"].unique()))
```

```
['Khambhat_MotvdDPP_D (Gujarat)', 'Anand_Vaghasi_IP (Gujarat)', 'Pune_Tathawde_H
(Maharashtra)', 'Mumbai_Chndivli_PC (Maharashtra)', 'Bengaluru_Bomsndra_HB
(Karnataka)', 'Aluva_Peedika_H (Kerala)', 'Jagraon_DC (Punjab)', 'Raikot_DC
(Punjab)', 'Ludhiana_MilrGanj_HB (Punjab)', 'Bengaluru_Bnnrgha_L (Karnataka)',
'Junagadh_keshod_DC (Gujarat)', 'Kodinar_NCplxDPP_D (Gujarat)', 'Una_Mamlatdr_DC
(Gujarat)', 'Talala_SsnRdDPP_D (Gujarat)', 'Junagadh_DPC (Gujarat)',
'Roorkee_IOTCEncl_L (Uttarakhand)', 'Haridwar (Uttarakhand)', 'Rishikesh_DC
(Uttarakhand)', 'Chennai_Hub (Tamil Nadu)', 'Jalandhar_DPC (Punjab)',
'Amritsar_DPC (Punjab)', 'Gurgaon_Bilaspur_P (Haryana)', 'Ajmer_FoySGRRD_I
(Rajasthan)', 'Pali_Nayagaon_I (Rajasthan)', 'Jodhpur_Basni_I (Rajasthan)',
'Piparcity_BsstDPP_D (Rajasthan)', 'Hyderabad_Shamshbd_P (Telangana)',
'Kanpur_Central_H_6 (Uttar Pradesh)', 'Auraiya_AryaNagr_D (Uttar Pradesh)',
'Etawah_MhraChng_D (Uttar Pradesh)', 'Gurgaon_Bilaspur_HB (Haryana)',
'Bengaluru_Hoodi_IP (Karnataka)', 'Delhi_Wazirpur_L (Delhi)', 'Surat_HUB
(Gujarat)', 'Loha_SivjiCWK_D (Maharashtra)', 'Gangakher_Busstand_D
(Maharashtra)', 'Parli_JirgeNgr_D (Maharashtra)', 'Ambajogai_BnsllNgr_D
```

(Maharashtra)', 'Delhi_Mayapuri_PC (Delhi)', 'Jhajjar_DC (Haryana)',
 'ChrkhiDdri_PuranDPP_D (Haryana)', 'Dahanu_KetyDPP_D (Maharashtra)',
 'Boisar_OstwlEmp_D (Maharashtra)', 'GZB_Mohan_Nagar_DPC (Uttar Pradesh)',
 'Bhota_BpassDPP_D (Himachal Pradesh)', 'Chandigarh_Mehmdpur_H (Punjab)',
 'Bengaluru_Peenya_IP (Karnataka)', 'Barmer_Nehru3PL_D (Rajasthan)',
 'Phalodi_PalikDPP_D (Rajasthan)', 'Unjha_DC (Gujarat)', 'Patan_Central_D_2
 (Gujarat)', 'Bhabhar_TirupDPP_D (Gujarat)', 'Radhanpur_Santalpr_D (Gujarat)',
 'Mumbai_Hub (Maharashtra)', 'AMD_Memnagar (Gujarat)', 'Ahmedabad_East_H_1
 (Gujarat)', 'Cochin_Chtrpuza_D (Kerala)', 'Kunnathund_Pringla_D (Kerala)',
 'Solapur_Central_I_2 (Maharashtra)', 'Hyderabad_Shamshbd_H (Telangana)',
 'Tuni_Eaglvari_D (Andhra Pradesh)', 'Rajamundry_AtoNgrRd_I (Andhra Pradesh)',
 'Supaul_SadrHsptl_D (Bihar)', 'Saharsa_Gangjala_D (Bihar)',
 'Madhepura_Krishnpr_D (Bihar)', 'Triveninganj_Central_D_1 (Bihar)',
 'Purnia_Central_H_2 (Bihar)', 'Anakapalle_Kothuru_D (Andhra Pradesh)',
 'Narsiptnm_Wardno8_D (Andhra Pradesh)', 'Visakhapatnam_Gajuwaka_IP (Andhra
 Pradesh)', 'Ramgarh_HotelPrk_D (Jharkhand)', 'Hazaribag_BodomBzr_DC
 (Jharkhand)', 'JhumriTlya_RadhaCpx_D (Jharkhand)', 'Beawar_DC (Rajasthan)',
 'Bilara_Central_DPP_2 (Rajasthan)', 'Badnaur_BhmrdDPP_D (Rajasthan)',
 'Kekri_LxmntDPP_D (Rajasthan)', 'Nasirabad_Central_DPP_2 (Rajasthan)',
 'Bhuvanagiri_HBColny_D (Telangana)', 'Mothkur_Mainroad_D (Telangana)',
 'Thirumalagiri_Xroad_D (Telangana)', 'Hyderabad_Uppal_I (Telangana)',
 'Dhanbad_Kalynpur_I (Jharkhand)', 'Kodad_VidyaNgr_D (Telangana)',
 'Kusumnchi_SKRoad_D (Telangana)', 'Bhiwandi_Mankoli_HB (Maharashtra)',
 'Ambabadi_DC (Rajasthan)', 'Guwahati_Sixmile (Assam)', 'Wankaner_JivanDPP_D
 (Gujarat)', 'Rajkot_PedakRd_P (Gujarat)', 'Mumbai_Sanpada_I (Maharashtra)',
 'Bangalore_Nelmngla_H (Karnataka)', 'Bengaluru_Banshkri_DC (Karnataka)',
 'Bhubaneshwar_Hub (Orissa)', 'Bengaluru_Kengeri_IP (Karnataka)',
 'Bharatpur_NraynDPP_D (Rajasthan)', 'Bharatpur_DC (Rajasthan)',
 'Bayana_LalBagh_D (Rajasthan)', 'Kherli_GodamDPP_D (Rajasthan)',
 'Alwar_Central_I_1 (Rajasthan)', 'Bagnan_Harop_D (West Bengal)',
 'Kolaghat_Central_DPP_2 (West Bengal)', 'Panskura_Central_D_3 (West Bengal)',
 'Delhi_Lajpat_IP (Delhi)', 'Guwahati_Hub (Assam)', 'Delhi_North_R_8 (Delhi)',
 'Delhi_Airport_H (Delhi)', 'CCU_Beliaghata_DPC (West Bengal)',
 'Hindupur_Parigi_D (Andhra Pradesh)', 'Puttaprthi_Gokulam_D (Andhra Pradesh)',
 'Bengaluru_KGAirprt_HB (Karnataka)', 'Mumbai_CottonGreen_DPC (Maharashtra)',
 'Mumbai_Tejpal_I (Maharashtra)', 'Hyderabad_Uppal_L (Telangana)', 'PNQ Pashan
 DPC (Maharashtra)', 'Patancheru_Ameenpur_I (Telangana)', 'Shamshabad_Lnrgguda_D
 (Telangana)', 'Sonipat_Kundli_H (Haryana)', 'Kolkata_TrtilaRD_L (West Bengal)',
 'Darbhanga (Bihar)', 'Benipur_Javahar_D (Bihar)', 'Jhanjharpur_Nagar_D (Bihar)',
 'Muzaffrpur_Bbganj_I (Bihar)', 'Sakri_DhuleRoad_D (Maharashtra)',
 'Nandurbar_DhuleRd_D (Maharashtra)', 'Shahada_Nandrbar_D (Maharashtra)',
 'Shindkheda_KakaCplx_D (Maharashtra)', 'Dhule_MIDCAvdn_I (Maharashtra)',
 'Hooghly_DC (West Bengal)', 'Hoogly_Bandel_D (West Bengal)', 'Kolkata_North_I_4
 (West Bengal)', 'Pilkhuwa_HapurRD_D (Uttar Pradesh)', 'Hapur_Swargash_D (Uttar
 Pradesh)', 'Chennai_Perungudi_DPC (Tamil Nadu)', 'Chincholi_Mainroad_D
 (Karnataka)', 'Gulbarga_Nehrugn_I (Karnataka)', 'Oddnchtram_Palani_D (Tamil
 Nadu)', 'Palani_RjndraRd_D (Tamil Nadu)', 'Kodaikanal_Athithnr_DC (Tamil Nadu)',
 'Batlagundu_RTOffice_D (Tamil Nadu)', 'Vadipatti_lalaNGR_D (Tamil Nadu)',

'Panruti_GandhiRd_D (Tamil Nadu)', 'Neyveli_NJVNGr_D (Tamil Nadu)',
 'Virudhchlm_SelamRd_D (Tamil Nadu)', 'Pennadam_EastmnRD_D (Tamil Nadu)',
 'Chinnasalem_VkotRoad_D (Tamil Nadu)', 'Villupuram_Thirumtr_IP (Tamil Nadu)',
 'Attingal_Central_D_2 (Kerala)', 'Kalluvathukal_Pariplly_D (Kerala)',
 'Kilimanoor_Krvnkuzy_D (Kerala)', 'Khurdha_MdhsnDPP_D (Orissa)', 'OK_RPC
 (Delhi)', 'Hyderabad_Alwal_L (Telangana)', 'Visakhapatnam_VislkNgr_DC (Andhra
 Pradesh)', 'Bheemunipatnam_SaiTempl_D (Andhra Pradesh)', 'Vizianagaram_NcsRd_DC
 (Andhra Pradesh)', 'Amdavad_East (Gujarat)', 'FBD_Balabhgarh_DPC (Haryana)',
 'Bhiwandi_Mankoli_GW (Maharashtra)', 'Delhi_Kishangarh_DPC (Delhi)',
 'Channarayana_patna_D (Karnataka)', 'Nagamangala_MandyaRD_D (Karnataka)',
 'Madikeri_MuthpTmp_D (Karnataka)', 'Ramanathapura_Central_D_2 (Karnataka)',
 'Hassan_Pandrnga_I (Karnataka)', 'Tiptur_YTRd_D (Karnataka)',
 'Arsikere_HsnRdDPP_D (Karnataka)', 'Sakleshpur_RgvdrDPP_D (Karnataka)',
 'BLR_JPNagar_Pc (Karnataka)', 'Mumbai_Ulhasngr_DC (Maharashtra)', 'Pataudi_DC
 (Haryana)', 'GGN_DPC (Haryana)', 'Erode (Tamil Nadu)', 'Lalgola_KrsprDPP_D (West
 Bengal)', 'Ragunthgnj_GopalDPP_D (West Bengal)', 'Jangipur_Central_D_1 (West
 Bengal)', 'Sagardighi_UtBzrDPP_D (West Bengal)', 'Berhampore_Central_I_2 (West
 Bengal)', 'Oriyur_Vllyaprm_D (Tamil Nadu)', 'Manamelkudi_TmpleSrt_D (Tamil
 Nadu)', 'Sivaganga_Wardno3_D (Tamil Nadu)', 'Ramdurg_GndhiNGR_D (Karnataka)',
 'Bagalkot_Sector4_D (Karnataka)', 'Rona_GadagRD_D (Karnataka)',
 'Gadag_Cdosclrd_D (Karnataka)', 'Hubli_Adargchi_IP (Karnataka)',
 'Sirsa_AnprnDPP_D (Haryana)', 'Dadri_ICDCant_D (Uttar Pradesh)',
 'Dhaka_PchpkrRD_D (Bihar)', 'Bettiah_BypassRd_D (Bihar)',
 'Narktiganj_Central_DPP_2 (Bihar)', 'Udumalpet_Artclgrd_D (Tamil Nadu)',
 'Pollachi_Venkatsa_DC (Tamil Nadu)', 'Coimbatore_Karayam_H (Tamil Nadu)',
 'Kathua_BOB_D (Jammu & Kashmir)', 'Jammu_Central_I_1 (Jammu & Kashmir)',
 'Samba_Wardno13_D (Jammu & Kashmir)', 'Janakpuri (Delhi)', 'Unnao_VikasRam_D
 (Uttar Pradesh)', 'AurngbadBR_Mahindra_D (Bihar)', 'Sasaram_Central_I_2
 (Bihar)', 'Cuttack_SliprDPP_DC (Orissa)', 'Tirchnode_Mhdhvpur_D (Tamil Nadu)',
 'Mettur_RTOroad_D (Tamil Nadu)', 'Moga_DPC (Punjab)', 'Muktsar_DPC (Punjab)',
 'Gurgaon_SohnaRd_D (Haryana)', 'Vallior_Radhprn_D (Tamil Nadu)',
 'Nagarcoil_AsrplmRd_DC (Tamil Nadu)', 'Tirunelveli_VdkkuSrt_I (Tamil Nadu)',
 'Mumbai_Pawane_L (Maharashtra)', 'Kolkata_Dankuni_HB (West Bengal)',
 'Sikandarpur_Central_D_3 (Uttar Pradesh)', 'Bariya_BgnprDPP_D (Uttar Pradesh)',
 'Ratanpura_MubarDPP_D (Uttar Pradesh)', 'Gorakhpur_Matriprn_IP (Uttar Pradesh)',
 'Rampur_RoshnBgh_I (Uttar Pradesh)', 'Patiala (Punjab)', 'Malerkotla_DC
 (Punjab)', 'Sangrur_DC (Punjab)', 'Moradabad_DC (Uttar Pradesh)',
 'Rudrapur_UdhamNgr_H (Uttarakhand)', 'Chennai_Madhavaram_L (Tamil Nadu)',
 'Digboi_JyotiNgr_D (Assam)', 'Margherita_CivilHPL_D (Assam)',
 'Dibrugarh_Bokule_H (Assam)', 'Betul_PatelWrd_D (Madhya Pradesh)',
 'Pandhurna_Mataward_D (Madhya Pradesh)', 'Sausar_Central_DPP_1 (Madhya
 Pradesh)', 'Raichur_LSRoad_DC (Karnataka)', 'Kurnool_AbbasNgr_I (Andhra
 Pradesh)', 'Akola_Gaurkshn_I (Maharashtra)', 'Del_Okhla_PC (Delhi)',
 'Nipani_AkkoIRD_D (Karnataka)', 'Chikodi_IndraNgr_D (Karnataka)',
 'Athani_VikrmMah_D (Karnataka)', 'Bijapur_Central_D_2 (Karnataka)',
 'Jath_Shivprasad_D (Maharashtra)', 'Palwal (Haryana)', 'Gadarwara_MPward_D
 (Madhya Pradesh)', 'Bareli_SourvDPP_D (Madhya Pradesh)', 'CCU_DumDum_DPC (West
 Bengal)', 'Solan_MohanPrk_D (Himachal Pradesh)', 'Baddi_ByePass_D (Himachal

Pradesh)', 'Teok_Wardno3_D (Assam)', 'Mariani_Mainroad_D (Assam)',
 'Jorhat_RicMilRd_D (Assam)', 'Faridabad_Mthurard_L (Haryana)', 'Bhatinda_DPC
 (Punjab)', 'Sheohar_Ward9DPP_D (Bihar)', 'Pupri_SngihiRD_D (Bihar)',
 'Neyatinkra_Arlumodu_D (Kerala)', 'Kallikkad_Mutyvila_D (Kerala)',
 'Nedumangad_Arsprmbu_D (Kerala)', 'Karad_Mundhe_D (Maharashtra)',
 'Chiplun_LxmiNiws_D (Maharashtra)', 'Khed_Mahad_D (Maharashtra)',
 'Mumbai_Jogshwri_I (Maharashtra)', 'Kamareddy_Devenply_I (Telangana)',
 'Chennai_Chrompet_PC (Tamil Nadu)', 'Jaipur_Central_I_7 (Rajasthan)',
 'Sehore_Mangalam_D (Madhya Pradesh)', 'Ashta_ShantiNg_D (Madhya Pradesh)',
 'Bhopal_Trnsport_H (Madhya Pradesh)', 'Rajgurunagar_Chakan_D (Maharashtra)',
 'Talegaon_Central_DPP_4 (Maharashtra)', 'Bolpur_WebelDPP_D (West Bengal)',
 'Chennai_Vepmpttu_DC (Tamil Nadu)', 'Chennai_Thiruvlr_DC (Tamil Nadu)',
 'Chennai_Porur_DPC (Tamil Nadu)', 'Nalasopara (Maharashtra)', 'Mumbai_MiraRd_IP
 (Maharashtra)', 'Ranebennur_SriRmNGR_D (Karnataka)', 'Haveri_GuttalRD_D
 (Karnataka)', 'Davangere_Central_I_1 (Karnataka)', 'MAA_Poonamallee_HB (Tamil
 Nadu)', 'CCU_Lake Avenue_DPC (West Bengal)', 'BilaspurHP_Indsarea_D (Himachal
 Pradesh)', 'SundarNgr_Bhogpur_D (Himachal Pradesh)', 'Mandi_PlaceCol_D (Himachal
 Pradesh)', 'Kullu_AkhraBzr_D (Himachal Pradesh)', 'Tiruvalla_TKRoad_D (Kerala)',
 'Alappuzha_Pazhvedu_D (Kerala)', 'Kottayam_Central_H_1 (Kerala)',
 'Cumbum_LFRoad_D (Tamil Nadu)', 'Kattappana_Palikval_D (Kerala)',
 'Madurai_Kappalur_H (Tamil Nadu)', 'Udaipur_Mangri_I (Rajasthan)',
 'Doddablpur_ChikaDPP_D (Karnataka)', 'Chikblapur_ShntiSgr_D (Karnataka)',
 'Bagepalli_TBCross_D (Karnataka)', 'Gauribidanur_Gurukrpa_D (Karnataka)',
 'Aurangabad_Central_H_1 (Maharashtra)', 'Dindigul_Central_D_1 (Tamil Nadu)',
 'Chandigarh_Raiprvlg_L (Chandigarh)', 'Mumbai_East_I_21 (Maharashtra)',
 'Delhi_Rohini_DPC (Delhi)', 'Surat_Central_D_9 (Gujarat)', 'Thrissur_Pothole_D
 (Kerala)', 'Vadakkencherry_Robinson_D (Kerala)', 'Pallakad_ChndrNgr_D (Kerala)',
 'Parner_Hindcwk_D (Maharashtra)', 'Shirur_Central_DPP_3 (Maharashtra)',
 'Orai_Ajnari_D (Uttar Pradesh)', 'Konch_Central_D_2 (Uttar Pradesh)',
 'Dharwad_Dc (Karnataka)', 'Gokak_Bsavanr_D (Karnataka)', 'Mahasamund_RajpurRD_D
 (Chhattisgarh)', 'PNQ_Vadgaon_Sheri_DPC (Maharashtra)', 'Bareilly (Uttar
 Pradesh)', 'Faridpur_ShjnprRD_D (Uttar Pradesh)', 'Chennai_Chrompet_DPC (Tamil
 Nadu)', 'Puttur_Artmclny_D (Andhra Pradesh)', 'Koduru_MGRoad_D (Andhra
 Pradesh)', 'Rajampet_RSroad_D (Andhra Pradesh)', 'Tirupati_Balajicly_I (Andhra
 Pradesh)', 'Kharagpur_DC (West Bengal)', 'Bethamangala_FshryOFC_D (Karnataka)',
 'Bangarapet_KolarRd_D (Karnataka)', 'Betnoti_MhliadPP_D (Orissa)',
 'Baripada_KalikDPP_D (Orissa)', 'Ramnagar_BhwniGnj_D (Uttarakhand)',
 'Kashipur_Vaishali_D (Uttarakhand)', 'Kashipur_BajprDPP_D (Uttarakhand)',
 'Shamli_KarnalRd_D (Uttar Pradesh)', 'Budhana_Busstand_D (Uttar Pradesh)',
 'Delhi_Nangli_IP (Delhi)', 'Jasai_JNPT_D (Maharashtra)', 'Chalisgaon_BhadgDPP_D
 (Maharashtra)', 'Jalna_BhgyaNgr_D (Maharashtra)', 'Dabhoi_Central_DPP_3
 (Gujarat)', 'Bellary_Dc (Karnataka)', 'Molakalmuru_KnsgraRD_D (Karnataka)',
 'Challakere_Shivangr_D (Karnataka)', 'Vellore_GndhiNgr_IP (Tamil Nadu)',
 'Sholinghur_ArkonnRD_D (Tamil Nadu)', 'Khatra_KoralDPP_D (West Bengal)',
 'Simlapal_Central_D_1 (West Bengal)', 'Hura_Central_D_1 (West Bengal)',
 'Manuguru_AskNagar_D (Telangana)', 'Sathupally_VidyaNGR_D (Telangana)',
 'Amd_Chandkheda_Dc (Gujarat)', 'Coimbatore_Ukkadam_D (Tamil Nadu)',
 'Berhampur_Khajuria_I (Orissa)', 'Bhandara_KaremDPP_D (Maharashtra)',

'Savner_Wagodha_D (Maharashtra)', 'Vadodara_Karelibaug_DPC (Gujarat)',
 'Noida_Sec 02_DPC (Uttar Pradesh)', 'Bailhongal_NamoNagr_D (Karnataka)',
 'Guruvayoor_ManhrBld_D (Kerala)', 'Edappal_PonaniRD_D (Kerala)',
 'Kozhikode_Central_H_4 (Kerala)', 'Kanti_Central_DPP_2 (Bihar)',
 'Mumbai_Khandeshwar_Dc (Maharashtra)', 'Paota_SmClyDPP_D (Rajasthan)', 'Karnal
 (Haryana)', 'Sonipat_Kundli_P (Haryana)', 'Jaipur_RIICO_L (Rajasthan)',
 'Delhi_Jhilmil_L (Delhi)', 'Noida_Sector02_C (Uttar Pradesh)', 'Goa_Margao_Dc
 (Goa)', 'Faridabad_Blbgarh_DC (Haryana)', 'Araria_Wardn13_D (Bihar)',
 'Raniganj_Central_DPP_1 (Bihar)', 'Forbesganj_JhumanCk_D (Bihar)',
 'Simrahi_Bazar_D (Bihar)', 'Narpatganj_Central_DPP_1 (Bihar)',
 'Chennai_Sriperumbudur_Dc (Tamil Nadu)', 'Chennai_Egmore_DPC (Tamil Nadu)',
 'Pune_Mundhawa_L (Maharashtra)', 'Hyderabad_Chikdply_I (Telangana)',
 'Dholi_WardNo4_D (Bihar)', 'Samastipur_Haripur_D (Bihar)',
 'HazratJandaha_HajiprRD_D (Bihar)', 'Kolkata_Dankuni_P (West Bengal)',
 'Mandapeta_Mainrd_D (Andhra Pradesh)', 'Kakinada_DC (Andhra Pradesh)',
 'Bokaro_KSClly_DC (Jharkhand)', 'Madhubani_Bardivan_D (Bihar)',
 'Jaynagar_Wardno6_D (Bihar)', 'Bengaluru_Peenya_L (Karnataka)',
 'Khammam_NSTRoad_I (Telangana)', 'Domkal_Central_D_2 (West Bengal)',
 'Nazirpur_Central_D_1 (West Bengal)', 'Nowda_ArhamDPP_D (West Bengal)',
 'Nowda_AmtlaDPP_D (West Bengal)', 'Anjar_DC (Gujarat)', 'Jaipur_Hub
 (Rajasthan)', 'Mudigere_HesglDPP_D (Karnataka)', 'Bhuj_DC (Gujarat)',
 'Chandigarh_Mullanpr_DC (Chandigarh)', 'Osmanabad_Kakdepot_D (Maharashtra)',
 'Barshi_Kurduwdi_D (Maharashtra)', 'Sikandrabd_GTRoad_D (Uttar Pradesh)',
 'Jewar_SJRoad_D (Uttar Pradesh)', 'Pahasu_Kanongyn_D (Uttar Pradesh)',
 'Anupshahar_DcntCLY_D (Uttar Pradesh)', 'Baraut_SrnprHwy_D (Uttar Pradesh)',
 'Raipur_Central_D_5 (Chhattisgarh)', 'Bhopal_MP_Nagar (Madhya Pradesh)',
 'Vijayawada_Rynapadu_H (Andhra Pradesh)', 'Vadakara_Mandodi_D (Kerala)',
 'Kallachi_ZamQuatr_D (Kerala)', 'Kuthuparamba_IdstrlAr_D (Kerala)',
 'Mohania_Bhabua_D (Bihar)', 'Dinara_Wardno7_D (Bihar)', 'Kolar_Ambedkar_D
 (Karnataka)', 'Mulbagal_Sunku_D (Karnataka)', 'Chintamani_Central_D_2
 (Karnataka)', 'Kottarakkara_Amankovl_D (Kerala)', 'Punalur_PostofJN_D (Kerala)',
 'Pthnmthitt_Klskhrpt_D (Kerala)', 'Adoor_Town_D (Kerala)', 'Kollam_Central_H_1
 (Kerala)', 'Hyderabad_South_D_12 (Telangana)', 'Srisailam_Sishumdr_D (Andhra
 Pradesh)', 'Mumbai_Jogeshwri_L (Maharashtra)', 'Godhra_DC (Gujarat)', 'Dahod_DC
 (Gujarat)', 'Jhabua_Ward11_D (Madhya Pradesh)', 'Kanchipuram_DC (Tamil Nadu)',
 'Arakkonam_HousngBd_D (Tamil Nadu)', 'Chamorshi_Central_DPP_1 (Maharashtra)',
 'Gadchiroli_Central_DPP_1 (Maharashtra)', 'Canacona_CharRsta_D (Goa)',
 'Mangalore_Kuntikna_H (Karnataka)', 'Pondicherry_Vasanthm_I (Pondicherry)',
 'Marakkanam_MJRDPP_D (Tamil Nadu)', 'Rayadurgam_RailGate_D (Andhra Pradesh)',
 'Kalyandurg_Shankrpa_D (Andhra Pradesh)', 'Anantapur_KamaStrt_I (Andhra
 Pradesh)', 'Goa_Hub (Goa)', 'Sriklahsti_SDKNgr_D (Andhra Pradesh)',
 'Venktagiri_TirupthiRd_D (Andhra Pradesh)', 'Gudur_Bngisheb_D (Andhra Pradesh)',
 'Chennai_Vandalur_Dc (Tamil Nadu)', 'Ramagundam_Pdmavati_D (Telangana)',
 'Amreli_Rajula_DC (Gujarat)', 'Patiala_GainMrkt_L (Punjab)', 'Jaipur_NgrNigam_DC
 (Rajasthan)', 'Chittaurgarh_DC (Rajasthan)', 'Bhilwara_DC (Rajasthan)',
 'Kadi_KaranNGR_D (Gujarat)', 'Mumbai_Tejpal_M (Maharashtra)',
 'Chennai_Chrompet_L (Tamil Nadu)', 'Mylduthuri_Thiruviz_D (Tamil Nadu)',
 'Mannargudi_Vadasari_D (Tamil Nadu)', 'Thirukkatupli_Poondi_D (Tamil Nadu)',

'Ukkadagatri_Tuminkte_D (Karnataka)', 'Ghaziabad_Central_L_8 (Uttar Pradesh)',
 'Guskhara_Itachnda_D (West Bengal)', 'Nanoor_Central_DPP_1 (West Bengal)',
 'Durgapur_Central_I_1 (West Bengal)', 'Nuzvid_Ward17_D (Andhra Pradesh)',
 'Kaikaluru_Atapaka_D (Andhra Pradesh)', 'Dharmavram_SaiNgr_D (Andhra Pradesh)',
 'Kadiri_GVManu_D (Andhra Pradesh)', 'Rayachoti_Madnpali_D (Andhra Pradesh)',
 'Pulivendula_RTCStand_D (Andhra Pradesh)', 'Mehkar_SagarDPP_D (Maharashtra)',
 'Jaipur (Rajasthan)', 'Chaksu_TonkRoad_D (Rajasthan)', 'Tonk_DC (Rajasthan)',
 'Jaipur_Central_D_10 (Rajasthan)', 'Siwan_HnmntNgr_D (Bihar)',
 'Gopalganj_GopalDPP_D (Bihar)', 'HBR Layout PC (Karnataka)', 'Sambhal_Khwssrai_D
 (Uttar Pradesh)', 'Chandausi_Ganesh_D (Uttar Pradesh)', 'Aonla_KdidmCLY_D (Uttar
 Pradesh)', 'Nainital_Sookhtal_D (Uttarakhand)', 'Ranikhet_Subhash_D
 (Uttarakhand)', 'Almora_SuzkiSrv_D (Uttarakhand)', 'Pithorgarh_Kumud_D
 (Uttarakhand)', 'Thuraiyur_Mthrapuri_D (Tamil Nadu)', 'Perambalur_goplurm_D
 (Tamil Nadu)', 'Ariyalur_Kmrajngr_D (Tamil Nadu)', 'Jayamkondan_Chithbrm_D
 (Tamil Nadu)', 'Kulithalai_AnnaNGR_D (Tamil Nadu)', 'Helencha_ColnyDPP_D (West
 Bengal)', 'Gajraula_JawaharN_D (Uttar Pradesh)', 'Amroha_SamitiRd_D (Uttar
 Pradesh)', 'Bhopal_Kolar Mandakni (Madhya Pradesh)', 'Karwar_Central_D_1
 (Karnataka)', 'Mallapur_ShtDRDPP_D (Karnataka)', 'Dandeli_RKComplx_D
 (Karnataka)', 'Karkala_MarketRd_D (Karnataka)', 'Dhrmsthala_Beltngdi_D
 (Karnataka)', 'Bengaluru_KHRoad_I (Karnataka)', 'Uthangarai_RgstrOFC_D (Tamil
 Nadu)', 'Ambur_Central_D_2 (Tamil Nadu)', 'Bhavnagar_ChtrGIDC_IP (Gujarat)',
 'SultnBthry_Kollgpra_D (Kerala)', 'Chennai_Madhavaram_DPC (Tamil Nadu)',
 'Kothanalloor_Majoor_D (Kerala)', 'Pundibari_StatonRD_D (West Bengal)',
 'Kolhapur_Shivaji_I (Maharashtra)', 'Ghatampur_StatinRD_D (Uttar Pradesh)',
 'Vapi_IndEstat_I (Gujarat)', 'BLR_HSR_Layout_PC (Karnataka)', 'Malvan_BllvMarg_D
 (Maharashtra)', 'Modinagar_SikriKla_DC (Uttar Pradesh)', 'Meerut (Uttar
 Pradesh)', 'Ratlam_Khjurwli_DC (Madhya Pradesh)', 'Jaora_RtlamNka_D (Madhya
 Pradesh)', 'Sivasagar_Babupaty_D (Assam)', 'Kanpur_Central_D_7 (Uttar Pradesh)',
 'Manjeshwar_Central_D_1 (Kerala)', 'Kasaragod_Nullipad_D (Kerala)',
 'Mathabhang_Pshimpra_D (West Bengal)', 'Dinhata_WrdN4DPP_D (West Bengal)',
 'CoochBehar_Psthrjhr_D (West Bengal)', 'Jaisalmer_Gopa3PL_D (Rajasthan)',
 'Pokhran_SttinDPP_D (Rajasthan)', 'Arrah_Katira_D (Bihar)', 'Arwal_Rozapar_D
 (Bihar)', 'BariSadri_BhmprDPP_D (Rajasthan)', 'Godda_Central_D_2 (Jharkhand)',
 'Sahebganj_BaraLoha_D (Jharkhand)', 'Vadnagar_BsstdDPP_D (Gujarat)',
 'Palanpur_DC (Gujarat)', 'Deesa_HawaiPlr_DC (Gujarat)', 'Mehsana_Panchot_IP
 (Gujarat)', 'Arimbur_Veluthur_D (Kerala)', 'Sankaramangalam_Central_D_1
 (Kerala)', 'Shoranur_KdrShrRd_D (Kerala)', 'Pazhayannur_AlathurRD_D (Kerala)',
 'Thirthurpondi_Madaprum_D (Tamil Nadu)', 'Pushpavanam_Thmpulam_D (Tamil Nadu)',
 'Thiruvarur_Bypasrd_D (Tamil Nadu)', 'Deoghar_Barmasia_D (Jharkhand)',
 'Markapur_VidyaNgr_D (Andhra Pradesh)', 'Vinukonda_Kothapet_D (Andhra Pradesh)',
 'Lucknow_Pandriba_L (Uttar Pradesh)', 'Bangana_Bhaleti_D (Himachal Pradesh)',
 'Sujanpur_SainkSCL_D (Himachal Pradesh)', 'Gosainganj_Pakrela_D (Uttar
 Pradesh)', 'Akbarpur_Auliyapr_D (Uttar Pradesh)', 'Cuddalore_KtsiGrsm_D (Tamil
 Nadu)', 'Chidambaram_ARBNorth_DC (Tamil Nadu)', 'Sirkazhi_Pngktgudi_D (Tamil
 Nadu)', 'Karaikal_Thalthru_DC (Pondicherry)', 'Nagapttinm_Sttyapar_D (Tamil
 Nadu)', 'Nandigama_Chndrlpd_D (Andhra Pradesh)', 'Manikchak_Enayetpr_D (West
 Bengal)', 'Paranpur_Nijgan_D (West Bengal)', 'Samsi_RatuaDPP_D (West Bengal)',
 'Malda_Central_I_3 (West Bengal)', 'Chanchal_BargaDPP_D (West Bengal)',

'Sitapur_Chowk_D (Uttar Pradesh)', 'Lakhimpur_Maheva_D (Uttar Pradesh)',
 'Gola_BkgnRoad_D (Uttar Pradesh)', 'Dhaurahara_TahsilRD_D (Uttar Pradesh)',
 'Mussoorie_BrlwgDPP_D (Uttarakhand)', 'Dehradun (Uttarakhand)',
 'Balrampur_PBRDDPP_D (Uttar Pradesh)', 'Umreth_Dakor_DC (Gujarat)',
 'Krishnarajpet_MuruPost_D (Karnataka)', 'Koppa_BMRd_D (Karnataka)',
 'Malappuram_Munduprm_D (Kerala)', 'Printhlmna_EmsPnmbi_D (Kerala)',
 'Jabalpur_Adhartal_IP (Madhya Pradesh)', 'Sirsi_Vidyagiri_D (Karnataka)',
 'Delhi_PunjabiB_L (Delhi)', 'Pune_East_D_7 (Maharashtra)', 'Samana_PODPP_D
 (Punjab)', 'Patran_MheshNGR_D (Punjab)', 'Gandhinagar_DC (Gujarat)',
 'Gandhinagar_Kalol_DC (Gujarat)', 'Farrukhbad_Pnchlght_D (Uttar Pradesh)',
 'Shahabad_KDRoad_D (Uttar Pradesh)', 'Shahjhnpur_NavdaCln_D (Uttar Pradesh)',
 'Jalalabad_farukngr_D (Uttar Pradesh)', 'Aliganj_KaimgnjRD_D (Uttar Pradesh)',
 'Guwahati_North (Assam)', 'RampuraPhul_DC (Punjab)', 'Sundargarh_DiyoDPP_D
 (Orissa)', 'Rajgangpur_Central_D_2 (Orissa)', 'Narsinghgarh_Central_D_1 (Madhya
 Pradesh)', 'Pachore_Shop3DPP_D (Madhya Pradesh)', 'Shajapur_MhpraRD_D (Madhya
 Pradesh)', 'Surat_Varachha_DC (Gujarat)', 'Ongole_SubhVRTL_I (Andhra Pradesh)',
 'Degana_BhukrdPP_D (Rajasthan)', 'Merta_Central_DPP_1 (Rajasthan)',
 'Firozabad_Sudmpuri_D (Uttar Pradesh)', 'Manthani_Chaitnya_D (Telangana)',
 'Karimnagar_KamHbRD_I (Telangana)', 'Khambhalia_JdswarRD_D (Gujarat)',
 'Gooty_StatonRd_D (Andhra Pradesh)', 'Guntakal_Verpatem_D (Andhra Pradesh)',
 'Ranchi_Hub (Jharkhand)', 'Renukoot_Govind_D (Uttar Pradesh)', 'Anpara_Parasi_D
 (Uttar Pradesh)', 'Singrauli_Waidhan_D (Madhya Pradesh)', 'Singrauli_Ward8DPP_D
 (Madhya Pradesh)', 'Chopan_PreetDPP_D (Uttar Pradesh)', 'Robertsganj_ArtoDPP_D
 (Uttar Pradesh)', 'Modasa_Central_D_1 (Gujarat)', 'Jalore_RoopNgr_D
 (Rajasthan)', 'Tezpur_Mhbhirab_D (Assam)', 'Dhemaji_WardNo3_D (Assam)',
 'Silapathar_Hejunagr_D (Assam)', 'Pasighat_MissonRd_D (Arunachal Pradesh)',
 'Silvassa_Samrvrni_D (Dadra and Nagar Haveli)', 'Bengaluru_Whitefld_L
 (Karnataka)', 'Katwa_BSarani_D (West Bengal)', 'Chapra_NagarDPP_D (West
 Bengal)', 'Nakashipara_MaxDPP_D (West Bengal)', 'Plassey_BtaiRoad_D (West
 Bengal)', 'Limbd_Busstand_D (Gujarat)', 'Botad_DC (Gujarat)',
 'Haripad_Kumrpurm_D (Kerala)', 'Bantwal_Trmltpl_D (Karnataka)', 'Jahu_Sulgwan_D
 (Himachal Pradesh)', 'JognderNgr_Dhelu_D (Himachal Pradesh)', 'Zirakpur_DC
 (Punjab)', 'Deoli_Central_DPP_2 (Maharashtra)', 'Yavatmal_JajuDPP_D
 (Maharashtra)', 'Fatepur_NH117_D (West Bengal)', 'Kakdwip_KlngRDPP_D (West
 Bengal)', 'Barnala_DC (Punjab)', 'Bhadaur_BChwkDPP_D (Punjab)',
 'Deoband_Ramvlg_D (Uttar Pradesh)', 'Deoria_CCRoad_D (Uttar Pradesh)',
 'Salempur_Banjaria_D (Uttar Pradesh)', 'Padrauna_BawliDPPP_D (Uttar Pradesh)',
 'Kaptanganj_Subshngr_D (Uttar Pradesh)', 'Baharampur_Chuanpur_I (West Bengal)',
 'Dharapuram_Techrcly_D (Tamil Nadu)', 'Kangayam_Thvlrsrt_D (Tamil Nadu)',
 'Tirupur_Koliplm_I (Tamil Nadu)', 'Bhinmal_RwStnDPP_D (Rajasthan)',
 'Sirohi_Ricco_D (Rajasthan)', 'Porbandar_DC (Gujarat)', 'Bhanvad_Mainroad_D
 (Gujarat)', 'Aligarh_KhirByps_I (Uttar Pradesh)', 'Mainpuri_Agraroad_I (Uttar
 Pradesh)', 'Shikohabad_Katrmira_D (Uttar Pradesh)', 'Delhi_Kapshera_L (Delhi)',
 'Hoshangabad_MnRDDPP_D (Madhya Pradesh)', 'Medchal_MR0offce_D (Telangana)',
 'Hyderabad_Alwal_I (Telangana)', 'Nakodar_ChowkDPP_D (Punjab)',
 'Chennai_Sholinganallur_Dc (Tamil Nadu)', 'Khurja_Pnjbiyon_D (Uttar Pradesh)',
 'Hanumangarh_DC (Rajasthan)', 'Ganga_Nagar_DC (Rajasthan)',
 'Mundakayam_Central_D_1 (Kerala)', 'Karukachal_MnimlaRd_D (Kerala)',

'Hailakandi_kalibari_D (Assam)', 'Karimganj_Alngjuri_D (Assam)',
 'Badarpur_Konapara_D (Assam)', 'Sathyamangalam_Mlydpthr_D (Tamil Nadu)',
 'Gobicheti_Ward25_D (Tamil Nadu)', 'Akbarpur_NehruNGR_D (Uttar Pradesh)',
 'Pukhrayan_Arulimod_D (Uttar Pradesh)', 'Kurukshetra_DC (Haryana)',
 'Pehowa_WdN14DPP_D (Haryana)', 'Kaithal_DC (Haryana)', 'Assandh_MhrjaDPP_D
 (Haryana)', 'Coonoor_Fairybnk_D (Tamil Nadu)', 'Ooty_Davisdle_D (Tamil Nadu)',
 'LowerParel_CP (Maharashtra)', 'Tallada_PtrlBunk_D (Telangana)',
 'Cjb_Kovaipudur_Dc (Tamil Nadu)', 'Manvi_APMCYard_D (Karnataka)',
 'Srivijaynagar_BhwanDPP_D (Rajasthan)', 'Anupgarh_PrmNrDPP_D (Rajasthan)',
 'Bidar (Karnataka)', 'Narayankhed_Datatrya_D (Telangana)', 'Zahirabad_Mohim_D
 (Telangana)', 'Manmad_Malegaon_D (Maharashtra)', 'Malegaon_Rawlgaon_D
 (Maharashtra)', 'Satana_ThrbadRD_D (Maharashtra)', 'Hisar_ModelTwn_P (Haryana)',
 'Roha_DataSagr_D (Maharashtra)', 'Mahad_Govndsgr_D (Maharashtra)',
 'Pen_BljiMrkt_D (Maharashtra)', 'Uchila_Busstand_D (Karnataka)', 'Kundapura_DC
 (Karnataka)', 'Bhatkal_KmkshBul_D (Karnataka)', 'Honnavar_Prbbhtngr_D
 (Karnataka)', 'Kumta_Central_DPP_2 (Karnataka)', 'Ankola_Kakrmath_D
 (Karnataka)', 'Dudu_NrainaRD_D (Rajasthan)', 'Phulera_NarenaRD_D (Rajasthan)',
 'Renwal_ChomuRD_D (Rajasthan)', 'Bhadrak_Central_I_2 (Orissa)', 'Beed_JalnaRD_D
 (Maharashtra)', 'Georai_BazarRD_D (Maharashtra)', 'Shevgaon_VidyaNgr_D
 (Maharashtra)', 'Paithan_SantaNGR_D (Maharashtra)', 'Jabalpur (Madhya Pradesh)',
 'Chandigarh_Mohali (Chandigarh)', 'Kirauli_AchneraRD_D (Uttar Pradesh)',
 'Areacode_Puthalam_D (Kerala)', 'Vadodara (Gujarat)', 'Kanigiri_Tiglgndi_D
 (Andhra Pradesh)', 'Kandukur_LICOffce_D (Andhra Pradesh)', 'Kavali_Kacheri_D
 (Andhra Pradesh)', 'Tumkur_Veersagr_I (Karnataka)', 'Khanpur_Nrsampt_D
 (Telangana)', 'Mahbubabad_Yellanda_D (Telangana)', 'Yellandu_Sudimala_D
 (Telangana)', 'Chandigarh_Kharar_DC (Chandigarh)', 'RoopNagar_ChotiHvl_DC
 (Punjab)', 'AnandprShb_PnjPiara_D (Punjab)', 'Chalakudy_SurbhiTh_D (Kerala)',
 'Irinjlkuda_Greens_D (Kerala)', 'TalwandiSabo_Wardno3_D (Punjab)',
 'Mansa_GreenVly_D (Punjab)', 'SrinagarUK_Srikot_D (Uttarakhand)',
 'Jehanabad_Madarpur_D (Bihar)', 'BiharSarif_Soghra_D (Bihar)', 'Chandi_SH78_D
 (Bihar)', 'Pune_PC (Maharashtra)', 'Sitamari_Durma_D (Bihar)', 'YamunaNagar_DC
 (Haryana)', 'PaontSahib_Gurudwar_D (Himachal Pradesh)', 'Morgram_Kntgorya_D
 (West Bengal)', 'Rampurhat_SrifoDPP_D (West Bengal)', 'Khargram_BoiDPP_D (West
 Bengal)', 'Warangal_HunterRd_I (Telangana)', 'Ghanpur_Palakrty_D (Telangana)',
 'Jangaon_Hammkond_D (Telangana)', 'Palakollu_CroadDPP_D (Andhra Pradesh)',
 'Draksharamam_Anaipeta_D (Andhra Pradesh)', 'Bodhan_SuryaDPP_D (Telangana)',
 'Banswada_Menagrndn_D (Telangana)', 'Yellareddy_JKRoad_D (Telangana)',
 'Medak_Dwaraka_D (Telangana)', 'Narsapur_Xroad_D (Telangana)',
 'Chennai_Chnglptu_DC (Tamil Nadu)', 'Malemruvathur_Achipkam_D (Tamil Nadu)',
 'Bikramgang_Dehtird_D (Bihar)', 'Bengaluru_NwYlhnka_DC (Karnataka)',
 'Phagwara_Lovely_D (Punjab)', 'Arani_KrthiKyn_D (Tamil Nadu)',
 'Polur_StationRD_D (Tamil Nadu)', 'Chetpet_Blmrgnst_D (Tamil Nadu)',
 'Surat_Central_D_3 (Gujarat)', 'Surathkal_DC (Karnataka)', 'Chittapur_GlbrgaRD_D
 (Karnataka)', 'Sedam_DBRCmplx_D (Karnataka)', 'Khanna_DC (Punjab)', 'Satara_DC
 (Maharashtra)', 'Wai_Central_DPP_3 (Maharashtra)', 'Rath_Mughlpra_D (Uttar
 Pradesh)', 'Delhi_Patparganj_DPC (Delhi)', 'Noida_Sector63_L (Uttar Pradesh)',
 'Mumbai_Khar West _Dc (Maharashtra)', 'CCU_New Alipore_DPC (West Bengal)',
 'Attur_KaaduRd_D (Tamil Nadu)', 'Delhi_Bhogal (Delhi)', 'Lalru_OnkarDPP_D

(Punjab)', 'Gangavathi_PhrmPlza_D (Karnataka)', 'Koppal_Banikatt_D (Karnataka)',
 'Hospet (Karnataka)', 'Raxaul_KairiyaT_D (Bihar)', 'Chinnur_AsnsdhrD_D
 (Telangana)', 'Benipatti_WardNo1_D (Bihar)', 'Hyderabad_Tolichwk_I (Telangana)',
 'Duliajan_StatonRd_D (Assam)', 'Bardhaman_Bankura_D (West Bengal)',
 'Asangaon_Shahapur_D (Maharashtra)', 'Bangalore_East_I_20 (Karnataka)',
 'Bina_Srvdyck_D (Madhya Pradesh)', 'Khurai_Talaiya_D (Madhya Pradesh)',
 'Rehli_Ward7DPP_D (Madhya Pradesh)', 'Sawantwadi_LaxmiNgr_D (Maharashtra)',
 'Kankavali_NrdawDPP_D (Maharashtra)', 'Pilibanga_BsstdDPP_D (Rajasthan)',
 'Barauni_Wardno10_D (Bihar)', 'Jaipur_Bhankrot_DC (Rajasthan)',
 'Najibabad_KotdwrRD_D (Uttar Pradesh)', 'Dhampur_NaginaRD_D (Uttar Pradesh)',
 'Kanth_Dayanand_D (Uttar Pradesh)', 'Thakurdwara_Fathuluh_D (Uttar Pradesh)',
 'Nawada_Central_DPP_2 (Bihar)', 'Rajgir_PnditNGR_D (Bihar)', 'Lalpet_PriyrNGR_D
 (Tamil Nadu)', 'Varanasi_Central_H_4 (Uttar Pradesh)', 'Srikakulam_Kuslpram_I
 (Andhra Pradesh)', 'Tiruchi_Samyaprm_D (Tamil Nadu)', 'Peravurani_SH71_D (Tamil
 Nadu)', 'Aranthangi_HsptlRod_D (Tamil Nadu)', 'Karaikudi_Sbrmnprmd_D (Tamil
 Nadu)', 'Ponnamaravathi_Puduvalvu_D (Tamil Nadu)', 'Pudukkotti_Mrthndpr_D (Tamil
 Nadu)', 'Karnaprayag_Umalodge_D (Uttarakhand)', 'Chamoli_CGRoad_D
 (Uttarakhand)', 'Krishnarajngr_JublieRD_D (Karnataka)', 'Gonikoppal_Thomas_D
 (Karnataka)', 'HDKote_BegurRD_D (Karnataka)', 'Mysore_Yadvgiri_IP (Karnataka)',
 'Allahabad_Central_H_1 (Uttar Pradesh)', 'Jeypore_Kelasahi_D (Orissa)',
 'Nabarangpr_PhdoDPP_D (Orissa)', 'Jagatsghpr_Markndpr_D (Orissa)',
 'Shirdi_SaiBansi_D (Maharashtra)', 'Kopargaon_NkshtPrz_D (Maharashtra)',
 'Vaijiapur_YeolaRD_D (Maharashtra)', 'Nashik_TgrniRD_I (Maharashtra)',
 'Godda_PushPlza_D (Jharkhand)', 'Kotdwara_Nzbardr_D (Uttarakhand)',
 'Barjora_Central_DPP_1 (West Bengal)', 'Bankura_BhowmDPP_D (West Bengal)',
 'Bishnupur_StnRdDPP_D (West Bengal)', 'Hiriyur_TahurDPP_D (Karnataka)',
 'Chitradurga_DC (Karnataka)', 'Chomu_ShsmldPP_D (Rajasthan)',
 'Reengus_Shop2DPP_D (Rajasthan)', 'Sikar_FatehpRd_I (Rajasthan)', 'Bikaner_DC
 (Rajasthan)', 'Nokha_DeVDPP_D (Rajasthan)', 'Sujangarh_LdnunDPP_D (Rajasthan)',
 'Joda_Central_D_1 (Orissa)', 'Karanja_Sarubali_D (Orissa)',
 'Chodavaram_BaljiDPP_D (Andhra Pradesh)', 'Nadiad_DC (Gujarat)',
 'Moranhat_TiloiDPP_D (Assam)', 'Ghazipur_Kaithwal_D (Uttar Pradesh)',
 'Husnabad_Greenmkt_D (Telangana)', 'Jammikunta_ConduDPP_D (Telangana)',
 'Thirthahalli_NadthiCx_D (Karnataka)', 'Koppa_Sangetha_D (Karnataka)',
 'Shimoga_DC (Karnataka)', 'Saraiya_Wardno4_D (Bihar)', 'Addanki_Oilmilrd_D
 (Andhra Pradesh)', 'Shillong (Meghalaya)', 'Bhagalpur_Pbroad_DC (Bihar)',
 'Kahalgau_NdiaTola_D (Bihar)', 'Kadthal_GndhiDPP_D (Telangana)',
 'Kalwakurthy_VidyaNGR_D (Telangana)', 'Devarakonda_DindiRD_D (Telangana)',
 'Haliya_PeroorRD_D (Telangana)', 'Hoskote_DC (Karnataka)', 'Bengaluru_Kadugodi_D
 (Karnataka)', 'Nalgonda_HydRoad_DC (Telangana)', 'PNQ_Rahatani_DPC
 (Maharashtra)', 'Humnabad_EBroad_D (Karnataka)', 'Mumbai_Panvel_D
 (Maharashtra)', 'Sindagi_KalyanNg_D (Karnataka)', 'Indi_SindgiRD_D (Karnataka)',
 'Aland_RazaviRd_D (Karnataka)', 'Katihar_Central_D_2 (Bihar)',
 'Khagaria_GodamDPP_D (Bihar)', 'Gudivada_GvrCompD_D (Andhra Pradesh)',
 'Machilipatnam_DC (Andhra Pradesh)', 'Allahabad_Phaphamu_DC (Uttar Pradesh)',
 'Lucknow_Indira_Nagar (Uttar Pradesh)', 'Sandur_WrdN1DPP_D (Karnataka)',
 'Fatehpur_Kotwali_D (Uttar Pradesh)', 'Banda_GayatriN_D (Uttar Pradesh)',
 'Mahoba_Mlkpura_D (Uttar Pradesh)', 'Gudalur_kalmpuza_D (Tamil Nadu)',

'Mahabubnagar_DC (Telangana)', 'Bijnapally_nagar_D (Telangana)',
 'Jadcherla_Badeplly_D (Telangana)', 'Mumbai_MiraRoad_M (Maharashtra)',
 'Shirpur_KrantiNgr_D (Maharashtra)', 'Rewari_YuktiDPP_D (Haryana)',
 'Chhibramau_Bhainpura_D (Uttar Pradesh)', 'AMD_Satellite (Gujarat)',
 'Kishangarh_Central_D_2 (Rajasthan)', 'Parbatsar_AjmhwdPP_D (Rajasthan)',
 'Makrana_Mwalibad_D (Rajasthan)', 'Aurangabad (Maharashtra)', 'Vishakhapatnam
 (Andhra Pradesh)', 'Mumbai_Skynet_INT (Maharashtra)', 'Naugchia_Vijayght_D
 (Bihar)', 'Chakia_Wardno10_D (Bihar)', 'Motihari_RajaBzr_D (Bihar)',
 'Bhusawal_Samarth_D (Maharashtra)', 'Raver_Truptingr_D (Maharashtra)',
 'Burhanpur_StRoad_D (Madhya Pradesh)', 'Jalgaon_DC (Maharashtra)',
 'Thiruvadanai_RamnadrD_D (Tamil Nadu)', 'Avinashi_Valluvar_D (Tamil Nadu)',
 'Tirpur_Palladam_DC (Tamil Nadu)', 'Shrirampur_DavkharRd_D (Maharashtra)',
 'Anand_VUNagar_DC (Gujarat)', 'Vansda_CikhliRD_D (Gujarat)', 'Bilimora_DC
 (Gujarat)', 'Bijapur_KirtiNgr_D (Karnataka)', 'Nandyal_SrnvsNgr_D (Andhra
 Pradesh)', 'Bngnpalle_Enkndla_D (Andhra Pradesh)', 'Gonda_KotwaliN_D (Uttar
 Pradesh)', 'Navsari_DC (Gujarat)', 'Valsad_DC (Gujarat)', 'Surat_Central_I_4
 (Gujarat)', 'Melur_MduraiRD_D (Tamil Nadu)', 'Lakhnadon_Central_DPP_1 (Madhya
 Pradesh)', 'Seoni_Kidwai_D (Madhya Pradesh)', 'Chhindwara_NagpurRd_D (Madhya
 Pradesh)', 'Mandla_Mharajpr_D (Madhya Pradesh)', 'Kotagiri_CroslySRT_D (Tamil
 Nadu)', 'Kaman_BsstDPP_D (Rajasthan)', 'Belgaum_Dc (Karnataka)',
 'Hisar_IndstlAr_I (Haryana)', 'KN_RPC (Delhi)', 'Satna_Central_I_2 (Madhya
 Pradesh)', 'Rewa_Dc (Madhya Pradesh)', 'Sidhi_Padra_D (Madhya Pradesh)',
 'Peterbar_GagiDPP_D (Jharkhand)', 'Islampur_ShbdnDPP_D (West Bengal)',
 'Mumbai_CotnGren_M (Maharashtra)', 'Chimkurthy_MSRClgRd_D (Andhra Pradesh)',
 'Halvad_CrossRD_D (Gujarat)', 'Dhrangadhra_NvygrDPP_D (Gujarat)',
 'Kalpetta_Ward19_D (Kerala)', 'Mananthavady_Central_D_1 (Kerala)',
 'Khurdha_MunplDPP_D (Orissa)', 'Chandauli_ShubsNGR_D (Uttar Pradesh)',
 'Gahmar_Wardnor4_D (Uttar Pradesh)', 'Vemulawada_Central_DPP_2 (Telangana)',
 'DhrmpuriTS_HanumDPP_D (Telangana)', 'Jhunir_BharDDPP_D (Punjab)',
 'Surendranagar_DC (Gujarat)', 'Gurgaon_Manesar (Haryana)', 'Himmatnagar_DC
 (Gujarat)', 'Khedbrahma_Patelfli_D (Gujarat)', 'Jammu_TrnptNgr_L (Jammu &
 Kashmir)', 'Madakasira_RTCStand_D (Andhra Pradesh)', 'Pavagada_PnukndRD_D
 (Karnataka)', 'Mumbai_Mumbra_DC (Maharashtra)', 'Mangaldoi_LNBRoad_D (Assam)',
 'MirzapurWB_VidyaDPP_D (West Bengal)', 'Jhunjhunu_DC (Rajasthan)',
 'Sultana_Central_DPP_1 (Rajasthan)', 'NeemKaThana_War5DPP_D (Rajasthan)',
 'Shrimadhapur_RLSTNDPP_D (Rajasthan)', 'Kaliyaganj_Central_DPP_1 (West Bengal)',
 'Nellore_DC (Andhra Pradesh)', 'Jaipur_VarunCly_DC (Rajasthan)',
 'Maihar_MngalDPP_D (Madhya Pradesh)', 'Churhat_Central_DPP_1 (Madhya Pradesh)',
 'Achrol_BgwriDPP_D (Rajasthan)', 'Mumbai_Kalyan West _Dc (Maharashtra)',
 'Faridabad (Haryana)', 'Nakhatrana_ClgRDDPP_D (Gujarat)', 'Namakkal_Rkcomplx_DC
 (Tamil Nadu)', 'Jetpur_DC (Gujarat)', 'Nanded_Aswningr_I (Maharashtra)',
 'Tirurangadi_Kooriyad_D (Kerala)', 'Thachnttukra_Nattukal_D (Kerala)',
 'Nagaur_KisanCo_D (Rajasthan)', 'Didwana_KatlaDPP_D (Rajasthan)',
 'Kittur_ColageRD_D (Karnataka)', 'Eluru_Agraharm_DC (Andhra Pradesh)',
 'Pandharpur_RajCmplx_D (Maharashtra)', 'Atapadi_Vidyangr_D (Maharashtra)',
 'Moodbidri_MrdiVlge_D (Karnataka)', 'Lonavala_NngrnRd_D (Maharashtra)',
 'Rajam_SamathBv_D (Andhra Pradesh)', 'Salur_ward9_D (Andhra Pradesh)',
 'Parvathipuram_Central_D_2 (Andhra Pradesh)', 'Kalpakkam_Sadras_D (Tamil Nadu)',

'Mandsaur_YashDPP_D (Madhya Pradesh)', 'Sitamau_Central_DPP_1 (Madhya Pradesh)',
 'Pratapgarh_Nimachrd_D (Rajasthan)', 'Rangia_HosptlRd_D (Assam)',
 'Nalbari_Bhgtpura_D (Assam)', 'Dhubri_Tetultol_D (Assam)', 'Bilasipara_Wardno5_D
 (Assam)', 'Lakhipur_WrdN4DPP_D (Assam)', 'Neemrana_Rcocmplx_D (Rajasthan)',
 'Dharuhera_Central_DPP_2 (Haryana)', 'Jagtial_Aravind_D (Telangana)',
 'SikandraRao_JydevNGR_D (Uttar Pradesh)', 'Etah_CivlLine_D (Uttar Pradesh)',
 'Jalesar_ChngiDPP_D (Uttar Pradesh)', 'Bahadurgarh_DC (Haryana)',
 'Meham_GModDPP_D (Haryana)', 'Gandhidham_Sector1A_IP (Gujarat)',
 'Hindaun_MndwrRod_D (Rajasthan)', 'Karauli_HnsChowk_D (Rajasthan)',
 'Gangapur_Ward6DPP_D (Rajasthan)', 'Faridabad_MohnVRTL_D (Haryana)',
 'Agra_Idgah_P (Uttar Pradesh)', 'Sagara_Vardhard_D (Karnataka)',
 'Giridih_Shivalya_D (Jharkhand)', 'Haldwani_PiliKoti_D (Uttarakhand)',
 'Mungeli_Panderia_D (Chhattisgarh)', 'Kawardha_TrnsptNGR_D (Chhattisgarh)',
 'Kozhenchery_Cherukole_D (Kerala)', 'Balurghat_AkhirDPP_D (West Bengal)',
 'Nanjangud_RPRoad_D (Karnataka)', 'Gundlupet_Swamylyt_D (Karnataka)',
 'Chamarjngr_BrDbleRd_D (Karnataka)', 'Kollegala_NarsipuraRd_D (Karnataka)',
 'Malavalli_SulthnRd_D (Karnataka)', 'Tirumakudalu_Narasipr_D (Karnataka)',
 'Metpally_GunjRDPP_D (Telangana)', 'Hamirpur_KanpurRd_D (Uttar Pradesh)',
 'Puttur_Darbe_DC (Karnataka)', 'Sullia_Srirampt_D (Karnataka)',
 'Kadaba_AnugrDPP_D (Karnataka)', 'Bargarh_JJCpxDPP_D (Orissa)',
 'Balangir_Rjndpara_D (Orissa)', 'Sonepur_BrezeDPP_D (Orissa)',
 'Sambalpur_Central_H_2 (Orissa)', 'Bargarh_GurpdDPP_D (Orissa)',
 'Gotan_DKLogDPP_D (Rajasthan)', 'Dumraon_Nishangr_D (Bihar)',
 'Jagdishpur_Wardno13_D (Bihar)', 'Parwanoo_Central_D_1 (Himachal Pradesh)',
 'Jhargram_UBamdDPP_D (West Bengal)', 'Kozhikode_Feroke_H (Kerala)',
 'Dharmapuri_Central_D_2 (Tamil Nadu)', 'Katihar_Shyndco_D (Bihar)',
 'Noida_Chukhndi_D (Uttar Pradesh)', 'Hajo_Sardala_D (Assam)',
 'Kanpur_GovndNgr_DC (Uttar Pradesh)', 'Barpeta_ShivBari_D (Assam)',
 'Bongaigaon_Chpaguri_D (Assam)', 'Kokrajhar_PigonDPP_D (Assam)',
 'Balasore_Ganeshwr_D (Orissa)', 'Mancherial_Hitech_D (Telangana)',
 'Palakonda_VadaiDPP_D (Andhra Pradesh)', 'GanjBasoda_MnRDDPP_D (Madhya
 Pradesh)', 'Sagar_Bahreya_I (Madhya Pradesh)', 'Ghaziabad_Patel Nagar (Uttar
 Pradesh)', 'Mumbai_Kharghar_D (Maharashtra)', 'Narsinghpur_KndliDPP_D (Madhya
 Pradesh)', 'Mangrol_JilRDDPP_D (Gujarat)', 'Veraval_DC (Gujarat)',
 'Machhiwara_MnBzrDPP_D (Punjab)', 'Sivakasi_Msstreet_DC (Tamil Nadu)',
 'Sankaran_Kovil_D (Tamil Nadu)', 'Rajpalayam_AshkTalk_D (Tamil Nadu)',
 'Guwahati_Chandmari (Assam)', 'Rajpura_DC (Punjab)', 'Surat_Central_D_12
 (Gujarat)', 'Suratgarh_Central_DPP_2 (Rajasthan)', 'RaisingNgr_BisnoldDPP_D
 (Rajasthan)', 'Hyderabad_Mhdiptnm_C (Telangana)', 'Luxettipet_ShivaDPP_D
 (Telangana)', 'Rayaparthi_Perkadrd_D (Telangana)', 'HanumanJNC_VijywdRD_D
 (Andhra Pradesh)', 'Bassi_DmodrNGR_D (Rajasthan)', 'Dausa_IndraCln_D
 (Rajasthan)', 'Lalsot_NWclyDPP_D (Rajasthan)', 'Pilani (Rajasthan)',
 'Taranagar_RajRdDPP_D (Rajasthan)', 'Kalka_Pinjore_DC (Haryana)',
 'Malur_NharuExt_D (Karnataka)', 'Del_B_RPC (Delhi)', 'Ratnagiri_MjgaonRd_D
 (Maharashtra)', 'Shirala_Central_DPP_3 (Maharashtra)', 'Bhatiya_Kalyanpr_D
 (Gujarat)', 'Dwarka_StnRoad_DC (Gujarat)', 'Chennai_Royapuram (Tamil Nadu)',
 'Mandya_Dc (Karnataka)', 'Chanapatna_Central_D_2 (Karnataka)',
 'Kanakapura_VaniThtr_D (Karnataka)', 'Khalilabad_MrgnjDPP_D (Uttar Pradesh)',

'Nawalgarh_NavldiDPP_D (Rajasthan)', 'Rajgarh_SadulDPP_D (Rajasthan)',
 'Trivandrum_Mnanthla_H (Kerala)', 'Betamcherla_CmtNgRod_D (Andhra Pradesh)',
 'Roorkee_Dc (Uttarakhand)', 'Paramakudi_VagaiNgr_D (Tamil Nadu)',
 'Ramnthpurm_TnhbBlkC_D (Tamil Nadu)', 'Rameswram_Kdthdstirt_D (Tamil Nadu)',
 'Muthukulathur_VaikalSRT_D (Tamil Nadu)', 'Narikkudi_MukkuRD_D (Tamil Nadu)',
 'Kendujhar_Sirjudin_D (Orissa)', 'Goa_ZuariNgr_IP (Goa)',
 'Tiruppattur_KoilStrt_D (Tamil Nadu)', 'Delhi_Nangli_L (Delhi)', 'NOI_RPC
 (Delhi)', 'Baruipur_Bnsibtla_D (West Bengal)', 'Jaynagar_MjlprDPP_D (West
 Bengal)', 'Khetri_NagarDPP_D (Rajasthan)', 'Khandela_PlsrcDPP_D (Rajasthan)',
 'Choutuppal_Nagaram_D (Telangana)', 'Miryalguda_Ragvendr_D (Telangana)',
 'Suryapet_Krishna_D (Telangana)', 'Bengaluru_Bomsndra_PC (Karnataka)',
 'Allahabad_Central_D_5 (Uttar Pradesh)', 'Soraon_BypassRD_D (Uttar Pradesh)',
 'Phulpur_Shekhpur_D (Uttar Pradesh)', 'Parbhani_Rjndrngr_D (Maharashtra)',
 'Mau_BaliaMod_D (Uttar Pradesh)', 'Dohrighat_AzmrdDPP_D (Uttar Pradesh)',
 'Jiyanpur_Central_DPP_1 (Uttar Pradesh)', 'Eral_Busstand_D (Tamil Nadu)',
 'Tirchchnr_Shmngprm_D (Tamil Nadu)', 'Thisayanvilai_UdnkdiRD_D (Tamil Nadu)',
 'Peikulam_SriVnktpm_D (Tamil Nadu)', 'Delhi_Barwala (Delhi)',
 'Anandnagar_LohiaDPP_D (Uttar Pradesh)', 'Gwalior_HrihrNgr_I (Madhya Pradesh)',
 'Guna_HnumnDPP_D (Madhya Pradesh)', 'Ashokngr_Bypassrd_D (Madhya Pradesh)',
 'Guna_Raghogr_D (Madhya Pradesh)', 'JoguGadwal_ColctrOf_D (Telangana)',
 'Wanaparthi_VallaDPP_D (Telangana)', 'Koyilandy_Pshriku_D (Kerala)',
 'Chandpur_NorprRD_D (Uttar Pradesh)', 'Bijnor_NaginaRd_D (Uttar Pradesh)',
 'Banswara_KhandDPP_D (Rajasthan)', 'Nawanshahr_DC (Punjab)',
 'Dalhousie_Banikhet_D (Himachal Pradesh)', 'Chamba_Bangotu_D (Himachal
 Pradesh)', 'Pathankot_DC (Punjab)', 'Amalapuram_Vijdurg_D (Andhra Pradesh)',
 'Hyd_Trimulgherry_Dc (Telangana)', 'Jamshedpur_Central_I_3 (Jharkhand)',
 'Jamjodhpur_Court_D (Gujarat)', 'Mejia_Central_D_1 (West Bengal)',
 'Rghunthpur_barkarRd_D (West Bengal)', 'Purulia_GariDPP_D (West Bengal)',
 'Mumbai_East_L_23 (Maharashtra)', 'Madhupur_Sitarmrd_D (Jharkhand)', 'Bhiwani_DC
 (Haryana)', 'Raigarh_MithmdRd_D (Chhattisgarh)', 'Baheri_HoliCDPP_D (Uttar
 Pradesh)', 'Pilibhit_ViksClny_D (Uttar Pradesh)', 'Puranpur_MdothdRD_D (Uttar
 Pradesh)', 'DoomDooma_Pthrgoan_D (Assam)', 'Namsai_HelipadRD_D (Arunachal
 Pradesh)', 'Tezu_Farmnala_D (Arunachal Pradesh)', 'Roing_DibngVly_D (Arunachal
 Pradesh)', 'Nadaun_Ward6_D (Himachal Pradesh)', 'Tarkeshwar_Naraynpr_D (West
 Bengal)', 'Khanakul_Ramnagar_D (West Bengal)', 'Islampur_Shantanu_D
 (Maharashtra)', 'Murbad_SnkunDPP_D (Maharashtra)', 'Chhaygaon_GwhRDDPP_D
 (Assam)', 'Kushinagar_KasyaDPP_D (Uttar Pradesh)', 'Bansi_GangDPP_D (Uttar
 Pradesh)', 'Theni_Rathnam_D (Tamil Nadu)', 'Nandikotkr_UmarDPP_D (Andhra
 Pradesh)', 'Atmakur_IndraNgr_D (Andhra Pradesh)', 'Dumka_Dudhani_D (Jharkhand)',
 'Pakur_Hatpada_D (Jharkhand)', 'Manbazar_Central_DPP_1 (West Bengal)',
 'Morena_Prjapati_D (Madhya Pradesh)', 'Ambah_MrenTirh_D (Madhya Pradesh)',
 'Rupnarayanpur_Salanpur_D (West Bengal)', 'Salem (Tamil Nadu)',
 'Changlang_Central_D_1 (Arunachal Pradesh)', 'Jalalpur_Mhimapur_D (Uttar
 Pradesh)', 'Saraimaer_MsmcyDPP_D (Uttar Pradesh)', 'Shahganj_KcharaRD_D (Uttar
 Pradesh)', 'Badlapur_Bhaluahi_D (Uttar Pradesh)', 'Jaunpur_Katghara_D (Uttar
 Pradesh)', 'Goa_Ponda_Dc (Goa)', 'Sihora_KtnRdDPP_D (Madhya Pradesh)',
 'Katni_Bargawan_DC (Madhya Pradesh)', 'Bilaspur_GrmNgriya_D (Uttar Pradesh)',
 'Bijainagar_Central_DPP_1 (Rajasthan)', 'Krishnagiri_BnglorRd_D (Tamil Nadu)',

'Malda_krshnPly_DC (West Bengal)', 'Varanasi (Uttar Pradesh)',
 'Silchar_Sirikona_H (Assam)', 'Ghaziabad_RjndrNgr_DC (Uttar Pradesh)',
 'Kapurthala_DC (Punjab)', 'Jalandhar_DC (Punjab)', 'Razole_Shanthi_D (Andhra Pradesh)', 'Kanpur_Rawatpur_D (Uttar Pradesh)', 'Bhilad_Umargaon_DC (Gujarat)',
 'Sumerpur_BazarDPP_D (Rajasthan)', 'Falna_SbhRDDPP_D (Rajasthan)',
 'MarwarJn_SndbrDPP_D (Rajasthan)', 'Bellmpalli_BasthDPP_D (Telangana)',
 'Bengaluru_Kothanur_L (Karnataka)', 'Lalitpur_RjghatRd_D (Uttar Pradesh)',
 'Tikamgarh_MndiRoad_D (Madhya Pradesh)', 'Basti_GndhiNgr_D (Uttar Pradesh)',
 'Itanagar_WageDPP_D (Arunachal Pradesh)', 'Gohpur_Central_D_1 (Assam)',
 'Bishwanath_ChrlidPP_D (Assam)', 'Narasnpeta_HudcoDPP_D (Andhra Pradesh)',
 'Tekkali_AmvidDPP_D (Andhra Pradesh)', 'Paralakhemundi_Ward14_D (Orissa)',
 'Tulsipur_Central_DPP_1 (Uttar Pradesh)', 'Shujalpur_AstrdDPP_D (Madhya Pradesh)', 'Palasa_Central_DPP_1 (Andhra Pradesh)', 'Arambag_BalibDPP_D (West Bengal)', 'Bhopal_Old City (Madhya Pradesh)', 'Gujilam_Parai_D (Tamil Nadu)',
 'Dholpur_GtRoad_D (Rajasthan)', 'Balaghat_Kosmi_D (Madhya Pradesh)', 'Pune Balaji Nagar (Maharashtra)', 'Chabua_CollgeRD_D (Assam)',
 'DehraGopipur_Central_D_1 (Himachal Pradesh)', 'Kangra_Central_D_2 (Himachal Pradesh)', 'Palampur_Cnsrvila_D (Himachal Pradesh)', 'Dhekiajuli_Wardno5_D (Assam)', 'Khatauli_TilakNgr_D (Uttar Pradesh)', 'Jowai_Ldthlabh_D (Meghalaya)',
 'Noida_Sec-83_DC (Uttar Pradesh)', 'Cochin_Kdvantra_D (Kerala)',
 'Perundurai_Viveka_DC (Tamil Nadu)', 'Dhone_RmNyrDPP_D (Andhra Pradesh)',
 'Sinnar_Central_D_1 (Maharashtra)', 'Panagarh_Central_D_1 (West Bengal)',
 'Paradip_Udyabata_D (Orissa)', 'Kendrpara_Kapleswr_D (Orissa)',
 'Dharmanagr_Ranakant_D (Tripura)', 'Agartala_Chmpmura_I (Tripura)',
 'Durg_Bhilai_DC (Chhattisgarh)', 'Amreli_MrktYrd_DC (Gujarat)',
 'Bhavnagar_Mahuva_DC (Gujarat)', 'Bhavnagar_Dc (Gujarat)', 'Jalalabad_Muktsar_D (Punjab)', 'Fazilka_GndhiChk_D (Punjab)', 'Kolasib_Diakkawn_D (Mizoram)',
 'ChandroknaRD_Central_DPP_3 (West Bengal)', 'Rawatsar_ShivmDPP_D (Rajasthan)',
 'Nohar_Central_DPP_2 (Rajasthan)', 'Haldia_Central_D_2 (West Bengal)',
 'Khamgaon_WamanDPP_D (Maharashtra)', 'Shegaon_SchwKDPP_D (Maharashtra)',
 'Champhai_AwmpiVng_D (Mizoram)', 'Aizawl_HunthrVg_I (Mizoram)',
 'Shahdol_Sohagpur_D (Madhya Pradesh)', 'Chennai_Potheri (Tamil Nadu)',
 'Bongaon_SukntDPP_D (West Bengal)', 'Daman_DC (Daman & Diu)', 'Jassur_AadiDPP_D (Himachal Pradesh)', 'Basta_Central_DPP_1 (Orissa)', 'Dola_ChainDPP_D (Madhya Pradesh)', 'Dhoraji_JmnvadRd_DC (Gujarat)', 'Upleta_AdrshSt_DC (Gujarat)',
 'Bakhtiarpur_BypassRD_D (Bihar)', 'Maharajganj_PakriDPP_D (Uttar Pradesh)',
 'Nichlaul_Wardno13_D (Uttar Pradesh)', 'Ranipet_MBTRd_DC (Tamil Nadu)',
 'Akhnoor_ThthiCwk_D (Jammu & Kashmir)', 'Maharajapuram_Krsnakcl_D (Tamil Nadu)',
 'Barbil_PunjbiPd_D (Orissa)', 'DalsinghSarai_Wardno13_D (Bihar)',
 'Rusera_Wardno4_D (Bihar)', 'Manjhaul_Purbari_D (Bihar)', 'Bobbili_ColegRd_D (Andhra Pradesh)', 'Jhalda_GMukrDPP_D (West Bengal)', 'Nabha_Sahni_D (Punjab)',
 'Sindhanur_VasaviNg_D (Karnataka)', 'Siruguppa_Wrd12DPP_D (Karnataka)',
 'Lucknow_Aliganj (Uttar Pradesh)', 'Udupi (Karnataka)', 'Dighwara_SadarHPL_D (Bihar)', 'Sillod_ZebaTWR_D (Maharashtra)', 'Mokokchung_Central_D_1 (Nagaland)',
 'Phusro_RhmgjDPP_D (Jharkhand)', 'Darjeeling_Hillcard_DC (West Bengal)',
 'Kurseong_ABPath_D (West Bengal)', 'Udgir_NlgaonRd_D (Maharashtra)',
 'Rampur_ThanaDPP_D (Uttar Pradesh)', 'Sahatwar_PnchmDPP_D (Uttar Pradesh)',
 'Hansi_DelRdDPP_D (Haryana)', 'Barhi_Central_DPP_1 (Madhya Pradesh)', 'Jamtara_D

(Jharkhand)', 'Jairampur_Mdiclcly_D (Arunachal Pradesh)', 'Golaghat_BaruaRd_D (Assam)', 'Rajsamand_kankroli_D (Rajasthan)', 'Asansol_DC (West Bengal)', 'Trivandrum_Pettah_D (Kerala)', 'Tandur_SnthiNGR_D (Telangana)', 'Vikarabad_Central_DPP_2 (Telangana)', 'Shadnagar_Central_D_1 (Telangana)', 'Karungaply_Mrtrklgr_D (Kerala)', 'Manthuka_Central_D_1 (Kerala)', 'Jind_DC (Haryana)', 'Gurgaon_Kadipur (Haryana)', 'Pune_North_D_3 (Maharashtra)', 'Midnapore_Talkui_D (West Bengal)', 'Ghatkesar_Central_D_1 (Telangana)', 'Delhi_Todapur_DC (Delhi)', 'Sheikhpura_Bgwtichk_D (Bihar)', 'Nagpur_Jaripatk_DC (Maharashtra)', 'Chandigarh (Chandigarh)', 'Chikhli_KKndrDPP_D (Maharashtra)', 'Buldhana_Thsil3PL_D (Maharashtra)', 'Baghpat_Barout_D (Uttar Pradesh)', 'Bhind_BhrolDPP_D (Madhya Pradesh)', 'DehriSone_Dilliyan_D (Bihar)', 'Pangodu_Central_D_1 (Kerala)', 'Bhind_EtwahDPP_D (Madhya Pradesh)', 'Azamgarh_ChtwrDPP_D (Uttar Pradesh)', 'Gangarmpur_KhdimDPP_D (West Bengal)', 'Ambegaon_Manchar_D (Maharashtra)', 'Panaji Goa (Goa)', 'Kasganj_BnkrGate_D (Uttar Pradesh)', 'Rohtak (Haryana)', 'Gohana_DvlalDPP_D (Haryana)', 'Hisar_AgrohDPP_D (Haryana)', 'Ratia_SchdvDPP_D (Haryana)', 'Fatehabad_BhunaDPP_D (Haryana)', 'Tenkasi_RailwyRd_D (Tamil Nadu)', 'Ambasamdrn_Solaiprm_D (Tamil Nadu)', 'Itahar_NatunDPP_D (West Bengal)', 'Raiganj_SubrtDPP_D (West Bengal)', 'LakhimpurN_SashPhkn_D (Assam)', 'Keshiary_MdnprDPP_D (West Bengal)', 'Manglamaro_Bypassrd_D (West Bengal)', 'Contai_Kanakpur_D (West Bengal)', 'Sonari_Central_DPP_1 (Assam)', 'Hubli_Dc (Karnataka)', 'Gomoh_KhsmiDPP_D (Jharkhand)', 'Sangareddy_Pothredy_D (Telangana)', 'Narnaul_DC (Haryana)', 'Chikmagalur_DC (Karnataka)', 'Khanapur_StatinRD_D (Karnataka)', 'Chhatarpur_Busstand_D (Madhya Pradesh)', 'Pune_East_D_8 (Maharashtra)', 'Bankura_KeranDPP_D (West Bengal)', 'Mumbai Antop Hill (Maharashtra)', 'Kannad_KolheDPP_D (Maharashtra)', 'Chandigarh_Mehmdpur_P (Punjab)', 'Tadipatri_CBRoad_D (Andhra Pradesh)', 'Proddatur_Central_D_2 (Andhra Pradesh)', 'Cuddapah_DC (Andhra Pradesh)', 'Badvel_Sidrd_D (Andhra Pradesh)', 'Sangola_Central_DPP_3 (Maharashtra)', 'Bikaner_ITICollg_L (Rajasthan)', 'Sangamner_JawanChk_D (Maharashtra)', 'Muzaffrngr_MhmodNgr_D (Uttar Pradesh)', 'Kaliyaganj_FatprDPP_D (West Bengal)', 'Ghanashyampur_NditaDPP_D (West Bengal)', 'Tangi_SriDPP_D (Orissa)', 'Malout_DC (Punjab)', 'Tamluk_Central_DPP_2 (West Bengal)', 'MughalSarai_Central_D_2 (Uttar Pradesh)', 'Aunrihar_Central_D_1 (Uttar Pradesh)', 'Faridabad_Old (Haryana)', 'Sangola_Central_DPP_2 (Maharashtra)', 'Gopiganj_Wardno13_D (Uttar Pradesh)', 'Bhalukpong_Khenewa_D (Arunachal Pradesh)', 'Nimbahera_MsjidDPP_D (Rajasthan)', 'Neemuch_KarjuDPP_D (Madhya Pradesh)', 'Narsingpur_JrjoldDPP_D (Madhya Pradesh)', 'Umaria_Central_DPP_3 (Madhya Pradesh)', 'Anuppur_JthriDPP_DC (Madhya Pradesh)', 'Mirzapur_JangiRd_D (Uttar Pradesh)', 'Abohar_DC (Punjab)', 'Central Goa (Goa)', 'Vuyyuru_BhogdDPP_D (Andhra Pradesh)', 'Umerkote_Central_DPP_1 (Orissa)', 'Delhi_Paschim_DC (Delhi)', 'Chennai_Poonamallee (Tamil Nadu)', 'Dhanbad_Jharia_DC (Jharkhand)', 'Latur_Srnwsngr_D (Maharashtra)', 'Udala_NagplDPP_D (Orissa)', 'Panipat (Haryana)', 'KharagpurBR_Central_DPP_1 (Bihar)', 'Munger_Kaura_D (Bihar)', 'Sultanganj_Wardno3_D (Bihar)', 'Mungaoli_AshkngRd_D (Madhya Pradesh)', 'Vijayawada (Andhra Pradesh)', 'Balipara_EragndDPP_D (Assam)', 'Mumbai_Virar_DC (Maharashtra)', 'Manteswar_MemariRD_D (West Bengal)', 'Nabadwip_Srirampur_D (West Bengal)', 'Dehradun_Nirjanpur_L (Uttarakhand)', 'Mandi_Gobindgarh_DC (Punjab)',

'Palamaner_Lakshmi_D (Andhra Pradesh)', 'Vaikom_KotiyamRD_D (Kerala)',
 'Hyderabad_Kondapur_D (Telangana)', 'Itarsi_DivrsnRd_D (Madhya Pradesh)',
 'Koraput_GhtimDPP_D (Orissa)', 'Pappadahandi_Central_DPP_2 (Orissa)',
 'Mumbai_Nerul_D (Maharashtra)', 'Agra (Uttar Pradesh)', 'Delhi_Mangol_DC
 (Delhi)', 'Loharu_BstndDPP_D (Haryana)', 'Tinusukia_Chwrpaty_D (Assam)',
 'Kangra_Gurkhari_D (Himachal Pradesh)', 'PaliBirsighpr_CtyLgDPP_D (Madhya
 Pradesh)', 'Ghosi_Jamalpur_D (Uttar Pradesh)', 'Dhuri_DMComDPP_D (Punjab)',
 'Asifabad_PaikjNGR_D (Telangana)', 'Bengaluru_Sarjapur_D (Karnataka)',
 'Shivpuri_BypassRD_D (Madhya Pradesh)', 'Chennai_Poonamallee_L (Tamil Nadu)',
 'Sonipat_Central_D_2 (Haryana)', 'Kabuganj_JantacLg_D (Assam)',
 'Kandi_DohalDPP_D (West Bengal)', 'Sidhmukh_MnbzrDPP_D (Rajasthan)',
 'Gangarampr_FulbaDPP_D (West Bengal)', 'Mulugu_LaxmiNGR_D (Telangana)',
 'Bhupalpally_JwahrNGR_D (Telangana)', 'AhmedNagar_DC (Maharashtra)',
 'Ashti_SavtaHTL_D (Maharashtra)', 'Balotra_BsnoiHPL_D (Rajasthan)',
 'Lodhan_GoalpDPP_D (West Bengal)', 'Bankura_NapitDPP_D (West Bengal)',
 'Tarnau_BsstdDPP_D (Rajasthan)', 'Vadodara_Karelibaug_DC (Gujarat)',
 'Panna_Mohnprwa_D (Madhya Pradesh)', 'Kushinagar_JiswDPP_D (Uttar Pradesh)',
 'Fatehabad_SirsaDPP_D (Haryana)', 'Barwala_Central_DPP_1 (Haryana)',
 'Soro_UttarDPP_D (Orissa)', 'Jaleswar_NaturDPP_D (Orissa)', 'Raipur_ByrDDPP_D
 (Rajasthan)', 'Gondal_DC (Gujarat)', 'Kapadvanj_Busstand_D (Gujarat)',
 'Lunawada_VrdhriRD_D (Gujarat)', 'Mahadevpur_Kataram_D (Telangana)',
 'Parkal_AmbedDPP_D (Telangana)', 'CCU_Hub (West Bengal)', 'Agra_Idgah_L (Uttar
 Pradesh)', 'Goa_Mapusa (Goa)', 'Tura_Sracmplx_D (Meghalaya)', 'Buxar_Sarswati_D
 (Bihar)', 'Hanskhali_Central_D_1 (West Bengal)', 'Ghaziabad_MohanNgr_C (Uttar
 Pradesh)', 'Mumbai_Bhandup West_Dc (Maharashtra)', 'Peddapalli_UdaynDPP_D
 (Telangana)', 'Bamangola_Central_D_1 (West Bengal)', 'Phulbani_Krusphrma_D
 (Orissa)', 'Angul_Central_I_2 (Orissa)', 'Amalner_Murtingr_D (Maharashtra)',
 'Erandol_BsStdDPP_D (Maharashtra)', 'Pachora_PcrrdDPP_D (Maharashtra)',
 'Tiruchi_Manikndm_H (Tamil Nadu)', 'Hyd_LB-Nagar_Dc (Telangana)',
 'Dhulian_RatanDPP_D (West Bengal)', 'Kamarpukur_ChatiDPP_D (West Bengal)',
 'Anthiyour_TherSRT_D (Tamil Nadu)', 'Krishnanagar_AnadiDPP_D (West Bengal)',
 'Ranaghat_ArickDPP_D (West Bengal)', 'Tilhar_SingCLNY_D (Uttar Pradesh)',
 'Panipat_PC (Haryana)', 'Salem_Kadtmpty_D (Tamil Nadu)', 'SirhindFatehgarh_DC
 (Punjab)', 'Surat_Pandesra_Gateway (Gujarat)', 'SawaiMadhopur_Central_DPP_1
 (Rajasthan)', 'Parakkdavu_KeRoad_D (Kerala)', 'Howrah_Salap_DC (West Bengal)',
 'Berhampur_Chatrpr_DC (Orissa)', 'Bokakhat_MlnprDPP_D (Assam)',
 'Jasdan_MotiDPP_D (Gujarat)', 'Champa_Brplicwk_D (Chhattisgarh)',
 'Bhadohi_Rajpura_D (Uttar Pradesh)', 'Cjb_West_Dc (Tamil Nadu)',
 'Kanker_KrisnKunj_D (Chhattisgarh)', 'Datia_TownDPP_D (Madhya Pradesh)',
 'Degloor_Busstand_D (Maharashtra)', 'Mumbai_Sanpada_CP (Maharashtra)',
 'Delhi_Lajwanti (Delhi)', 'Nirsa_ShantiDPP_D (Jharkhand)',
 'Kaghaznagar_Central_DPP_1 (Telangana)', 'Giddarbaha_DC (Punjab)',
 'Khurdha_JatniDPP_D (Orissa)', 'Khandala_Satara_D (Maharashtra)',
 'Delhi_Shahdara (Delhi)', 'Varanasi_MahmurGj_IP (Uttar Pradesh)',
 'Chiraiyakot_KamalDPP_D (Uttar Pradesh)', 'Mumbai_Kalyan (Maharashtra)',
 'Buhana_CourtDPP_D (Rajasthan)', 'Bhadra_GMndiDPP_D (Rajasthan)', 'North Delhi
 (Delhi)', 'Kerala_Cochin_L (Kerala)', 'Jaipur_Central_D_1 (Rajasthan)',
 'Kolhapur_Central_H_2 (Maharashtra)', 'AmaDubi_Bulabeda_D (West Bengal)',

```
'Chennai_Mylapore (Tamil Nadu)', 'Naraingarh_Ward2DPP_D (Haryana)',  
'Mumbai_Ghansoli_DC (Maharashtra)']
```

2.2.2 Extract destination_state from destination_name and Subtract destination_state from destination_name

Extract destination_state

```
[153]: #Extract state using regex : string inside brackets () and contains a-z,A-z,"  
        ↪",&  
delhivery["destination_state"] = delhivery["destination_name"].str.extract(pat=  
        ↪= "\\(([a-zA-Z &]*)\\)")
```

```
[154]: #checking all the unique states extracted  
delhivery["destination_state"].unique()
```

```
[154]: array(['Gujarat', 'Maharashtra', 'Karnataka', 'Kerala', 'Punjab',  
            'Uttarakhand', 'Tamil Nadu', 'Haryana', 'Rajasthan', 'Telangana',  
            'Uttar Pradesh', 'Delhi', 'Himachal Pradesh', 'Andhra Pradesh',  
            'Bihar', 'Jharkhand', 'Assam', 'Orissa', 'West Bengal',  
            'Jammu & Kashmir', 'Madhya Pradesh', 'Chandigarh', 'Chhattisgarh',  
            'Goa', 'Pondicherry', 'Arunachal Pradesh',  
            'Dadra and Nagar Haveli', 'Meghalaya', 'Tripura', 'Mizoram',  
            'Daman & Diu', 'Nagaland'], dtype=object)
```

```
[155]: # No Null Values in destination states  
delhivery["destination_state"].isna().sum()
```

```
[155]: 0
```

Subtract destination_state from destination_name

```
[156]: #Extract state using regex : substring upto " ("  
delhivery["destination_name"] = delhivery["destination_name"].str.extract(pat =  
        ↪"(.*) \(")
```

```
[157]: # No null values in reduced destination_name  
delhivery["destination_name"].isna().sum()
```

```
[157]: 0
```

2.2.3 Extract city from reduced destination_name

Extract city

```
[158]: delhivery["destination_city"] = delhivery["destination_name"].apply(lambda x:  
        ↪extract_city(x))
```

```
[159]: print(list(delhivery["destination_city"].unique()))
```

['Khambhat', 'Anand', 'Pune', 'Mumbai', 'Bengaluru', 'Aluva', 'Jagraon',
 'Raikot', 'Ludhiana', 'Junagadh', 'Kodinar', 'Una', 'Talala', 'Roorkee',
 'Haridwar', 'Rishikesh', 'Chennai', 'Jalandhar', 'Amritsar', 'Gurgaon', 'Ajmer',
 'Pali', 'Jodhpur', 'Piparcity', 'Hyderabad', 'Kanpur', 'Auraiya', 'Etawah',
 'Delhi', 'Surat', 'Loha', 'Gangakher', 'Parli', 'Ambajogai', 'Jhajjar',
 'ChrkhiDdri', 'Dahanu', 'Boisar', 'GZB', 'Bhota', 'Chandigarh', 'Barmer',
 'Phalodi', 'Unjha', 'Patan', 'Bhabhar', 'Radhanpur', 'AMD', 'Ahmedabad',
 'Cochin', 'Kunnathund', 'Solapur', 'Tuni', 'Rajamundry', 'Supaul', 'Saharsa',
 'Madhepura', 'Triveninganj', 'Purnia', 'Anakapalle', 'Narsiptnm',
 'Visakhapatnam', 'Ramgarh', 'Hazaribag', 'JhumriTlya', 'Beawar', 'Bilara',
 'Badnaur', 'Kekri', 'Nasirabad', 'Bhuvanagiri', 'Mothkur', 'Thirumalagiri',
 'Dhanbad', 'Kodad', 'Kusumnchi', 'Bhiwandi', 'Ambabadi', 'Guwahati', 'Wankaner',
 'Rajkot', 'Bangalore', 'Bhubaneshwar', 'Bharatpur', 'Bayana', 'Kherli', 'Alwar',
 'Bagnan', 'Kolaghat', 'Panskura', 'CCU', 'Hindupur', 'Puttaprthi', 'PNQ',
 'Patancheru', 'Shamshabad', 'Sonipat', 'Kolkata', 'Darbhanga', 'Benipur',
 'Jhanjharpur', 'Muzaffrpur', 'Sakri', 'Nandurbar', 'Shahada', 'Shindkheda',
 'Dhule', 'Hooghly', 'Hoogly', 'Pilkhuwa', 'Hapur', 'Chincholi', 'Gulbarga',
 'Oddnchtram', 'Palani', 'Kodaikanal', 'Batlagundu', 'Vadipatti', 'Panruti',
 'Neyveli', 'Virudhchlm', 'Pennadam', 'Chinnasalem', 'Villupuram', 'Attingal',
 'Kalluvathukal', 'Kilimanoor', 'Khurdha', 'OK', 'Bheemunipatnam',
 'Vizianagaram', 'Amdavad', 'FBD', 'Channaraya', 'Nagamangala', 'Madikeri',
 'Ramanathapura', 'Hassan', 'Tiptur', 'Arsikere', 'Sakleshpur', 'BLR', 'Pataudi',
 'GGN', 'Erode', 'Lalgola', 'Ragunthgnj', 'Jangipur', 'Sagardighi', 'Berhampore',
 'Oriyur', 'Manamelkudi', 'Sivaganga', 'Ramdurg', 'Bagalkot', 'Rona', 'Gadag',
 'Hubli', 'Sirsa', 'Dadri', 'Dhaka', 'Bettiah', 'Narktiganj', 'Udumalpet',
 'Pollachi', 'Coimbatore', 'Kathua', 'Jammu', 'Samba', 'Janakpuri', 'Unnao',
 'AurngbadBR', 'Sasaram', 'Cuttack', 'Tirchngode', 'Mettur', 'Moga', 'Muktsar',
 'Vallior', 'Nagarcoil', 'Tirunelveli', 'Sikandarpur', 'Bariya', 'Ratanpura',
 'Gorakhpur', 'Rampur', 'Patiala', 'Malerkotla', 'Sangrur', 'Moradabad',
 'Rudrapur', 'Digboi', 'Margherita', 'Dibrugarh', 'Betul', 'Pandhurna', 'Sausar',
 'Raichur', 'Kurnool', 'Akola', 'Del', 'Nipani', 'Chikodi', 'Athani', 'Bijapur',
 'Jath', 'Palwal', 'Gadarwara', 'Bareli', 'Solan', 'Baddi', 'Teok', 'Mariani',
 'Jorhat', 'Faridabad', 'Bhatinda', 'Sheohar', 'Pupri', 'Neyatinkra',
 'Kallikkad', 'Nedumangad', 'Karad', 'Chiplun', 'Khed', 'Kamareddy', 'Jaipur',
 'Sehore', 'Ashta', 'Bhopal', 'Rajgurunagar', 'Talegaon', 'Bolpur', 'Nalasopara',
 'Ranebennur', 'Haveri', 'Davangere', 'MAA', 'BilaspurHP', 'SundarNgr', 'Mandi',
 'Kullu', 'Tiruvalla', 'Alappuzha', 'Kottayam', 'Cumbum', 'Kattappana',
 'Madurai', 'Udaipur', 'Doddablpur', 'Chikblapur', 'Bagepalli', 'Gauribidanur',
 'Aurangabad', 'Dindigul', 'Thrissur', 'Vadakkencherry', 'Pallakad', 'Parner',
 'Shirur', 'Orai', 'Konch', 'Dharwad', 'Gokak', 'Mahasamund', 'Bareilly',
 'Faridpur', 'Puttur', 'Koduru', 'Rajampet', 'Tirupati', 'Kharagpur',
 'Bethamangala', 'Bangarapet', 'Betnoti', 'Baripada', 'Ramnagar', 'Kashipur',
 'Shamli', 'Budhana', 'Jasai', 'Chalisingaon', 'Jalna', 'Dabhoi', 'Bellary',
 'Molakalmuru', 'Challakere', 'Vellore', 'Sholinghur', 'Khatra', 'Simplapal',
 'Hura', 'Manuguru', 'Sathupally', 'Amd', 'Berhampur', 'Bhandara', 'Savner',
 'Vadodara', 'Noida', 'Bailhongal', 'Guruvayoor', 'Edappal', 'Kozhikode',
 'Kanti', 'Paota', 'Karnal', 'Goa', 'Araria', 'Raniganj', 'Forbesganj',
 'Simrahi', 'Narpatganj', 'Dholi', 'Samastipur', 'HazratJandaha', 'Mandapeta',

'Kakinada', 'Bokaro', 'Madhubani', 'Jaynagar', 'Khammam', 'Domkal', 'Nazirpur',
 'Nowda', 'Anjar', 'Mudigere', 'Bhuj', 'Osmanabad', 'Barshi', 'Sikandrabad',
 'Jewar', 'Pahasu', 'Anupshahar', 'Baraut', 'Raipur', 'Vijayawada', 'Vadakara',
 'Kallachi', 'Kuthuparamba', 'Mohania', 'Dinara', 'Kolar', 'Mulbagal',
 'Chintamani', 'Kottarakkara', 'Punalur', 'Pthnmthitt', 'Adoor', 'Kollam',
 'Srisailam', 'Godhra', 'Dahod', 'Jhabua', 'Kanchipuram', 'Arakkonam',
 'Chamorshi', 'Gadchiroli', 'Canacona', 'Mangalore', 'Pondicherry', 'Marakkanam',
 'Rayadurgam', 'Kalyandurg', 'Anantapur', 'Srikalahsti', 'Venktagiri', 'Gudur',
 'Ramagundam', 'Amreli', 'Chittaurgarh', 'Bhilwara', 'Kadi', 'Mylduthuri',
 'Mannargudi', 'Thirukkatupli', 'Ukkadagatri', 'Ghaziabad', 'Guskhara', 'Nanoor',
 'Durgapur', 'Nuzvid', 'Kaikaluru', 'Dharmavram', 'Kadiri', 'Rayachoti',
 'Pulivendula', 'Mehkar', 'Chaksu', 'Tonk', 'Siwan', 'Gopalganj', 'HBR',
 'Sambhal', 'Chandausi', 'Aonla', 'Nainital', 'Ranikhet', 'Almora', 'Pithorgarh',
 'Thuraiyur', 'Perambalur', 'Ariyalur', 'Jayamkondan', 'Kulithalai', 'Helencha',
 'Gajraula', 'Amroha', 'Karwar', 'Mallapur', 'Dandeli', 'Karkala', 'Dharmsthal',
 'Uthangarai', 'Ambur', 'Bhavnagar', 'SultnBthry', 'Kothanalloor', 'Pundibari',
 'Kolhapur', 'Ghatampur', 'Vapi', 'Malvan', 'Modinagar', 'Meerut', 'Ratlam',
 'Jaora', 'Sivasagar', 'Manjeshwar', 'Kasaragod', 'Mathabhang', 'Dinhata',
 'CoochBehar', 'Jaisalmer', 'Pokhran', 'Arrah', 'Arwal', 'BariSadri', 'Godda',
 'Sahebganj', 'Vadnagar', 'Palanpur', 'Deesa', 'Mehsana', 'Arimbur',
 'Sankaramangalam', 'Shoranur', 'Pazhayannur', 'Thirthurpondi', 'Pushpavanam',
 'Thiruvarur', 'Deoghar', 'Markapur', 'Vinukonda', 'Lucknow', 'Bangana',
 'Sujanpur', 'Gosainganj', 'Akbarpur', 'Cuddalore', 'Chidambaram', 'Sirkazhi',
 'Karaikal', 'Nagapattinam', 'Nandigama', 'Manikchak', 'Paranpur', 'Samsi',
 'Malda', 'Chanchal', 'Sitapur', 'Lakhimpur', 'Gola', 'Dhaurahara', 'Mussoorie',
 'Dehradun', 'Balrampur', 'Umreth', 'Krishnarajpet', 'Koppa', 'Malappuram',
 'Printhlmna', 'Jabalpur', 'Sirsi', 'Samana', 'Patran', 'Gandhinagar',
 'Farrukhbad', 'Shahabad', 'Shahjhnpur', 'Jalalabad', 'Aliganj', 'RampuraPhul',
 'Sundargarh', 'Rajgangpur', 'Narsinghgarh', 'Pachore', 'Shajapur', 'Ongole',
 'Degana', 'Merta', 'Firozabad', 'Manthani', 'Karimnagar', 'Khambhalia', 'Gooty',
 'Guntakal', 'Ranchi', 'Renukoot', 'Anpara', 'Singrauli', 'Chopan',
 'Robertsganj', 'Modasa', 'Jalore', 'Tezpur', 'Dhemaji', 'Silapathar',
 'Pasighat', 'Silvassa', 'Katwa', 'Chapra', 'Nakashipara', 'Plassey', 'Limbdia',
 'Botad', 'Haripad', 'Bantwal', 'Jahu', 'JognderNgr', 'Zirakpur', 'Deoli',
 'Yavatmal', 'Fatepur', 'Kakdwip', 'Barnala', 'Bhadaur', 'Deoband', 'Deoria',
 'Salempur', 'Padrauna', 'Kaptanganj', 'Baharampur', 'Dharapuram', 'Kangayam',
 'Tirupur', 'Bhinmal', 'Sirohi', 'Porbandar', 'Bhanvad', 'Aligarh', 'Mainpuri',
 'Shikohabad', 'Hoshangabad', 'Medchal', 'Nakodar', 'Khurja', 'Hanumangarh',
 'Ganga Nagar', 'Mundakayam', 'Karukachal', 'Hailakandi', 'Karimganj',
 'Badarpur', 'Sathyamangalam', 'Gobicheti', 'Pukhrayan', 'Kuruksheetra', 'Pehowa',
 'Kaithal', 'Assandh', 'Coonoor', 'Ooty', 'LowerParel', 'Tallada', 'Cjb',
 'Manvi', 'Srivijaynagar', 'Anupgarh', 'Bidar', 'Narayankhed', 'Zahirabad',
 'Manmad', 'Malegaon', 'Satana', 'Hisar', 'Roha', 'Mahad', 'Pen', 'Uchila',
 'Kundapura', 'Bhatkal', 'Honnabar', 'Kumta', 'Ankola', 'Dudu', 'Phulera',
 'Renwal', 'Bhadrak', 'Beed', 'Georai', 'Shevgaon', 'Paithan', 'Kirauli',
 'Areacode', 'Kanigiri', 'Kandukur', 'Kavali', 'Tumkur', 'Khanpur', 'Mahbubabad',
 'Yellandu', 'RoopNagar', 'AnandprShb', 'Chalakydy', 'Irinjlkuda',
 'TalwandiSabo', 'Mansa', 'SrinagarUK', 'Jehanabad', 'BiharSarif', 'Chandi',

'Sitamari', 'YamunaNagar', 'PaontSahib', 'Morgram', 'Rampurhat', 'Khargram',
 'Warangal', 'Ghanpur', 'Jangaon', 'Palakollu', 'Draksharamam', 'Bodhan',
 'Banswada', 'Yellareddy', 'Medak', 'Narsapur', 'Malemruvathur', 'Bikramgang',
 'Phagwara', 'Arani', 'Polur', 'Chetpet', 'Surathkal', 'Chittapur', 'Sedam',
 'Khanna', 'Satara', 'Wai', 'Rath', 'Attur', 'Lalru', 'Gangavathi', 'Koppal',
 'Hospet', 'Raxaul', 'Chinnur', 'Benipatti', 'Duliajan', 'Bardhaman', 'Asangaon',
 'Bina', 'Khurai', 'Rehli', 'Sawantwadi', 'Kankavali', 'Pilibanga', 'Barauni',
 'Najibabad', 'Dhampur', 'Kanth', 'Thakurdwara', 'Nawada', 'Rajgir', 'Lalpet',
 'Varanasi', 'Srikakulam', 'Tiruchi', 'Peravurani', 'Aranthangi', 'Karaikudi',
 'Ponnamaravathi', 'Pudukkotti', 'Karnaprayag', 'Chamoli', 'Krishnarajngr',
 'Gonikoppal', 'HDKote', 'Mysore', 'Allahabad', 'Jeypore', 'Nabarangpr',
 'Jagatsghpr', 'Shirdi', 'Kopargaon', 'Vaijiapur', 'Nashik', 'Kotdwara',
 'Barjora', 'Bankura', 'Bishnupur', 'Hiriyur', 'Chitradurga', 'Chomu', 'Reengus',
 'Sikar', 'Bikaner', 'Nokha', 'Sujargarh', 'Joda', 'Karanjia', 'Chodavaram',
 'Nadiad', 'Moranhat', 'Ghazipur', 'Husnabad', 'Jammikunta', 'Thirthahalli',
 'Shimoga', 'Saraiya', 'Addanki', 'Shillong', 'Bhagalpur', 'Kahalgaon',
 'Kadthal', 'Kalwakurthy', 'Devarakonda', 'Haliya', 'Hoskote', 'Nalgonda',
 'Humnabad', 'Sindagi', 'Indi', 'Aland', 'Katihar', 'Khagaria', 'Gudivada',
 'Machilipatnam', 'Sandur', 'Fatehpur', 'Banda', 'Mahoba', 'Gudalur',
 'Mahabubnagar', 'Bijnapally', 'Jadcherla', 'Shirpur', 'Rewari', 'Chhibramau',
 'Kishangarh', 'Parbatsar', 'Makrana', 'Vishakhapatnam', 'Naugchia', 'Chakia',
 'Motihari', 'Bhusawal', 'Raver', 'Burhanpur', 'Jalgaon', 'Thiruvadanai',
 'Avinashi', 'Tirpur', 'Shrirampur', 'Vansda', 'Bilimora', 'Nandyal',
 'Bngnpalle', 'Gonda', 'Navsari', 'Valsad', 'Melur', 'Lakhnadon', 'Seoni',
 'Chhindwara', 'Mandla', 'Kotagiri', 'Kaman', 'Belgaum', 'KN', 'Satna', 'Rewa',
 'Sidhi', 'Peterbar', 'Islampure', 'Chimkurthy', 'Halvad', 'Dhrangadhra',
 'Kalpetta', 'Mananthavady', 'Chandauli', 'Gahmar', 'Vemulawada', 'DhrmpuriTS',
 'Jhunir', 'Surendranagar', 'Himmatnagar', 'Khedbrahma', 'Madakasira',
 'Pavagada', 'Mangaldoi', 'MirzapurWB', 'Jhunjhunu', 'Sultana', 'NeemKaThana',
 'Shrimadhpor', 'Kaliyaganj', 'Nellore', 'Maihar', 'Churhat', 'Achrol',
 'Nakhatrana', 'Namakkal', 'Jetpur', 'Nanded', 'Tirurangadi', 'Thachnttukra',
 'Nagaur', 'Didwana', 'Kittur', 'Eluru', 'Pandharpur', 'Atapadi', 'Moodbidri',
 'LonaVala', 'Rajam', 'Salur', 'Parvathipuram', 'Kalpakkam', 'Mandsaur',
 'Sitamau', 'Pratapgarh', 'Rangia', 'Nalbari', 'Dhubri', 'Bilasipara',
 'Lakhipur', 'Neemrana', 'Dharuhera', 'Jagtial', 'SikandraRao', 'Etah',
 'Jalesar', 'Bahadurgarh', 'Meham', 'Gandhidham', 'Hindaun', 'Karauli',
 'Gangapur', 'Agra', 'Sagara', 'Giridih', 'Haldwani', 'Mungeli', 'Kawardha',
 'Kozhenchery', 'Balurghat', 'Nanjangud', 'Gundlupet', 'Chamarjngr', 'Kollegala',
 'Malavalli', 'Tirumakudalu', 'Metpally', 'Hamirpur', 'Sullia', 'Kadaba',
 'Bargarh', 'Balangir', 'Sonepur', 'Sambalpur', 'Gotan', 'Dumraon', 'Jagdishpur',
 'Parwanoo', 'Jhargram', 'Dharmapuri', 'Hajo', 'Barpeta', 'Bongaigaon',
 'Kokrajhar', 'Balasore', 'Mancherial', 'Palakonda', 'GanjBasoda', 'Sagar',
 'Narsinghpur', 'Mangrol', 'Veraval', 'Machhiwara', 'Sivakasi', 'Sankaran',
 'Rajpalayam', 'Rajpura', 'Suratgarh', 'RaisingNgr', 'Luxettipet', 'Rayaparthi',
 'HanumanJNC', 'Bassi', 'Dausa', 'Lalsot', 'Pilani', 'Taranagar', 'Kalka',
 'Malur', 'Ratnagiri', 'Shirala', 'Bhatiya', 'Dwarka', 'Mandya', 'Chanapatna',
 'Kanakapura', 'Khalilabad', 'Nawalgarh', 'Rajgarh', 'Trivandrum', 'Betamcherla',
 'Paramakudi', 'Ramnthpurn', 'Rameswram', 'Muthukulathur', 'Narikkudi',

'Kendujhar', 'Tiruppattur', 'NOI', 'Baruipur', 'Khetri', 'Khandela',
 'Choutuppal', 'Miryalguda', 'Suryapet', 'Soraon', 'Phulpur', 'Parbhani', 'Mau',
 'Dohrighat', 'Jiyanpur', 'Eral', 'Tirchchndr', 'Thisayanvilai', 'Peikulam',
 'Anandnagar', 'Gwalior', 'Guna', 'Ashoknagr', 'JoguGadwal', 'Wanaparthi',
 'Koyilandy', 'Chandpur', 'Bijnor', 'Banswara', 'Nawanshahr', 'Dalhousie',
 'Chamba', 'Pathankot', 'Amalapuram', 'Hyd', 'Jamshedpur', 'Jamjodhpur', 'Mejia',
 'Rghunthpur', 'Purulia', 'Madhupur', 'Bhiwani', 'Raigarh', 'Baheri', 'Pilibhit',
 'Puranpur', 'DoomDooma', 'Namsai', 'Tezu', 'Roing', 'Nadaun', 'Tarkeshwar',
 'Khanakul', 'Islampur', 'Murbad', 'Chhaygaon', 'Kushinagar', 'Bansi', 'Theni',
 'Nandikotkr', 'Atmakur', 'Dumka', 'Pakur', 'Manbazar', 'Morena', 'Ambah',
 'Rupnarayanpur', 'Salem', 'Changlang', 'Jalalpur', 'Saraimeer', 'Shahganj',
 'Badlapur', 'Jaunpur', 'Sihora', 'Katni', 'Bilaspur', 'Bijainagar',
 'Krishnagiri', 'Silchar', 'Kapurthala', 'Razole', 'Bhilad', 'Sumerpur', 'Falna',
 'MarwarJn', 'Bellmpalli', 'Lalitpur', 'Tikamgarh', 'Basti', 'Itanagar',
 'Gohpur', 'Bishwanath', 'Narasnpeta', 'Tekkali', 'Paralakhemundi', 'Tulsipur',
 'Shujalpur', 'Palasa', 'Arambag', 'Gujilam', 'Dholpur', 'Balaghat', 'Chabua',
 'DehraGopipur', 'Kangra', 'Palampur', 'Dhekiajuli', 'Khatauli', 'Jowai',
 'Perundurai', 'Dhone', 'Sinnar', 'Panagarh', 'Paradip', 'Kendrpara',
 'Dharmanagr', 'Agartala', 'Durg', 'Fazilka', 'Kolasib', 'ChandroknaRD',
 'Rawatsar', 'Nohar', 'Haldia', 'Khamgaon', 'Shegaon', 'Champhai', 'Aizawl',
 'Shahdol', 'Bongaon', 'Daman', 'Jassur', 'Basta', 'Dola', 'Dhoraji', 'Upleta',
 'Bakhtiarapur', 'Maharajganj', 'Nichlaul', 'Ranipet', 'Akhnoor', 'Maharajapuram',
 'Barbil', 'DalsinghSarai', 'Rusera', 'Manjhaul', 'Bobbili', 'Jhalda', 'Nabha',
 'Sindhanur', 'Siruguppa', 'Udupi', 'Dighwara', 'Sillod', 'Mokokchung', 'Phusro',
 'Darjeeling', 'Kurseong', 'Udgir', 'Sahatwar', 'Hansi', 'Barhi', 'Jamtara',
 'Jairampur', 'Golaghat', 'Rajsamand', 'Asansol', 'Tandur', 'Vikarabad',
 'Shadnagar', 'Karungaply', 'Manthuka', 'Jind', 'Midnapore', 'Ghatkesar',
 'Sheikhpura', 'Nagpur', 'Chikhli', 'Buldhana', 'Baghpat', 'Bhind', 'DehriSone',
 'Pangodu', 'Azamgarh', 'Gangarmpur', 'Ambegaon', 'Panaji', 'Kasganj', 'Rohtak',
 'Gohana', 'Ratia', 'Fatehabad', 'Tenkasi', 'Ambasamdrn', 'Itahar', 'Raiganj',
 'LakhimpurN', 'Keshiary', 'Manglamaro', 'Contai', 'Sonari', 'Gomoh',
 'Sangareddy', 'Narnaul', 'Chikmagalur', 'Khanapur', 'Chhatarpur', 'Kannad',
 'Tadipatri', 'Proddatur', 'Cuddapah', 'Badvel', 'Sangola', 'Sangamner',
 'Muzaffrngr', 'Ghanashyampur', 'Tangi', 'Malout', 'Tamluk', 'MughalSarai',
 'Aunrihar', 'Gopiganj', 'Bhalukpong', 'Nimbahera', 'Neemuch', 'Narsingpur',
 'Umaria', 'Anuppur', 'Mirzapur', 'Abohar', 'Central', 'Vuyyuru', 'Umerkote',
 'Latur', 'Udala', 'Panipat', 'KharagpurBR', 'Munger', 'Sultanganj', 'Mungaoli',
 'Balipara', 'Manteswar', 'Nabadwip', 'Palamaner', 'Vaikom', 'Itarsi', 'Koraput',
 'Pappadahandi', 'Loharu', 'Tinusukia', 'PaliBirsighpr', 'Ghosi', 'Dhuri',
 'Asifabad', 'Shivpuri', 'Kabuganj', 'Kandi', 'Sidhmukh', 'Gangarampr', 'Mulugu',
 'Bhupalpally', 'AhmedNagar', 'Ashti', 'Balotra', 'Lodhan', 'Tarnau', 'Panna',
 'Barwala', 'Soro', 'Jaleswar', 'Gondal', 'Kapadvanj', 'Lunawada', 'Mahadevpur',
 'Parkal', 'Tura', 'Buxar', 'Hanskhali', 'Peddapalli', 'Bamangola', 'Phulbani',
 'Angul', 'Amalner', 'Erandol', 'Pachora', 'Dhulian', 'Kamarpukur', 'Anthiyou',
 'Krishnanagar', 'Ranaghat', 'Tilhar', 'SirhindFatehgarh', 'SawaiMadhopur',
 'Parakkdavu', 'Howrah', 'Bokakhat', 'Jasdan', 'Champa', 'Bhadohi', 'Kanker',
 'Datia', 'Degloor', 'Nirsa', 'Kaghaznagar', 'Giddarbaha', 'Khandala',
 'Chiraiyakot', 'Buhana', 'Bhadra', 'North', 'Kerala', 'AmaDubai', 'Naraingarh']

```
[160]: delhivery["destination_city"].isna().sum()
```

```
[160]: 0
```

Replace the 3 letter cities with original city names

```
[161]: delhivery[delhivery["destination_city"].str.len()<=3]["destination_city"].  
        ↪unique()
```

```
[161]: array(['Una', 'GZB', 'AMD', 'CCU', 'PNQ', 'OK', 'FBD', 'BLR', 'GGN',  
            'Del', 'MAA', 'Amd', 'Goa', 'HBR', 'Cjb', 'Pen', 'Wai', 'KN',  
            'NOI', 'Mau', 'Hyd'], dtype=object)
```

Una, Goa, Pen, Amb, Mau and Wai are valid 3 letter cities

Remaining all should be modified with original names

```
[162]: delhivery[delhivery["destination_city"].str.len()<=3]["destination_name"].  
        ↪unique()
```

```
[162]: array(['Una_Mamlatdr_DC', 'GZB_Mohan_Nagar_DPC', 'AMD_Memnagar',  
            'CCU_Beliaghata_DPC', 'PNQ_Pashan_DPC', 'OK_RPC',  
            'FBD_Balabgharh_DPC', 'BLR_JPNagar_Pc', 'GGN_DPC', 'Del_Okhla_PC',  
            'CCU_DumDum_DPC', 'MAA_Poonamallee_HB', 'CCU_Lake Avenue_DPC',  
            'PNQ_Vadgaon_Sheri_DPC', 'Amd_Chandkheda_Dc', 'Goa_Margao_Dc',  
            'Goa_Hub', 'HBR_Layout_PC', 'BLR_HSR_Layout_PC',  
            'Cjb_Kovaipudur_Dc', 'Pen_BljiMrkt_D', 'Wai_Central_DPP_3',  
            'CCU_New Alipore_DPC', 'PNQ_Rahatani_DPC', 'AMD_Satellite',  
            'KN_RPC', 'Del_B_RPC', 'Goa_ZuariNgr_IP', 'NOI_RPC',  
            'Mau_BaliaMod_D', 'Hyd_Trimulgherry_Dc', 'Goa_Ponda_Dc', 'CCU_Hub',  
            'Goa_Mapusa', 'Hyd_LB-Nagar_Dc', 'Cjb_West_Dc'], dtype=object)
```

```
[163]: # Frame the original city names using web browsing and inspecting source_names  
original_city_names = {  
    "MAA" : "Chennai",  
    "AMD" : "Ahmedabad",  
    "BLR" : "Bengaluru",  
    "Del" : "Delhi",  
    "GZB" : "Ghaziabad",  
    "GGN" : "Gurgaon",  
    "CCU" : "Kolkata",  
    "FBD" : "Faridabad",  
    "Cjb" : "Coimbatore",  
    "PNQ" : "Pune",  
    "HBR" : "Bengaluru",  
    "Amd" : "Ahmedabad",  
    "BOM" : "Mumbai",  
    "NOI" : "Delhi",  
}
```



```

    "Blr" : "Bengaluru",
    "OK"  : "Delhi",
    "Hyd" : "Hyderabad",
    "KN"  : "Delhi"
}

```

```

[164]: delhivery["destination_city"] = delhivery["destination_city"].apply(lambda x:
↳replace_3letter_cities(x))

```

```

[165]: delhivery[delhivery["destination_city"].str.len()<=3]["destination_city"].
↳unique()
# All of these are valid 3 letter cities

```

```

[165]: array(['Una', 'Goa', 'Pen', 'Wai', 'Mau'], dtype=object)

```

2.2.4 Extract destination_place and destination_code

```

[166]: s = delhivery["destination_name"].apply(lambda x: extract_place_code(x))
delhivery[["destination_place","destination_code"]] = pd.DataFrame(s.
↳tolist(),index = delhivery.index)

```

```

[167]: print(list(delhivery["destination_place"].unique()))

```

```

['MotvdDPP', 'Vaghasi', 'Tathawde', 'Chndivli', 'Bomsndra', 'Peedika',
'Jagraon', 'Raikot', 'MilrGanj', 'Bnnrghta', 'keshod', 'NCplxDPP', 'Mamlatdr',
'SsnRdDPP', 'Junagadh', 'IOTCEnc1', 'Haridwar', 'Rishikesh', 'Chennai',
'Jalandhar', 'Amritsar', 'Bilaspur', 'FoySGRRD', 'Nayagaon', 'Basni',
'BsstdDPP', 'Shamshbd', 'Central', 'AryaNagr', 'MhraChng', 'Hoodi', 'Wazirpur',
'Surat', 'SivjiCWK', 'Busstand', 'JirgeNgr', 'BnsllNgr', 'Mayapuri', 'Jhajjar',
'PuranDPP', 'KetyDPP', 'OstwlEmp', 'Mohan_Nagar', 'BpassDPP', 'Mehmdpur',
'Peenya', 'Nehru3PL', 'PalikDPP', 'Unjha', 'TirupDPP', 'Santalpr', 'Mumbai',
'Memnagar', 'East', 'Chtrpuza', 'Pringla', 'Eaglvari', 'AtoNgrRd', 'SadrHsptl',
'Gangjala', 'Krishnpr', 'Kothuru', 'Wardno8', 'Gajuwaka', 'HotelPrk',
'BodomBzr', 'RadhaCpx', 'Beawar', 'BhmrdDPP', 'LxmntDPP', 'HBColny', 'Mainroad',
'Xroad', 'Uppal', 'Kalynpur', 'VidyaNgr', 'SKRoad', 'Mankoli', 'Ambabadi',
'Sixmile', 'JivanDPP', 'PedakRd', 'Sanpada', 'Nelmngla', 'Banshkri',
'Bhubaneshwar', 'Kengeri', 'NraynDPP', 'Bharatpur', 'LalBagh', 'GodamDPP',
'Harop', 'Lajpat', 'Guwahati', 'North', 'Airport', 'Beliaghata', 'Parigi',
'Gokulam', 'KGAirprt', 'CottonGreen', 'Tejpal', 'Pashan', 'Ameenpur',
'Lnrgguda', 'Kundli', 'TrtllaRD', 'Darbhanga', 'Javahar', 'Nagar', 'Bbganj',
'DhuleRoad', 'DhuleRd', 'Nandrbar', 'KakaCplx', 'MIDCAvdn', 'Hooghly', 'Bandel',
'HapurRD', 'Swargash', 'Perungudi', 'Nehrugn', 'Palani', 'RjndraRd',
'Athithnr', 'RTOoffice', 'lalaNGR', 'GandhiRd', 'NJVNgr', 'SelamRd', 'EastmnRD',
'VkotRoad', 'Thirumtr', 'Pariplly', 'Krvnkuzy', 'MdhsnDPP', 'OK', 'Alwal',
'VislkNgr', 'SaiTempl', 'NcsRd', 'Balabhgarh', 'Kishangarh', 'patna',
'MandyaRD', 'MuthpTmp', 'Pandrng', 'YTRd', 'HsnRdDPP', 'RgvdrDPP', 'JPNagar',
'Ulhasngr', 'Pataudi', 'GGN', 'Erode', 'KrsprDPP', 'GopalDPP', 'UtBzrDPP',

```

'Vllyaprm', 'TmpleSrt', 'Wardno3', 'GndhiNGR', 'Sector4', 'GadagRD', 'Cdosclrd',
 'Adargchi', 'AnprnDPP', 'ICDCant', 'PchpkrRD', 'BypassRd', 'Artclgrd',
 'Venkatsa', 'Karayam', 'BOB', 'Wardno13', 'Janakpuri', 'VikasRam', 'Mahindra',
 'SliprDPP', 'Mhdhvpur', 'RTORoad', 'Moga', 'Muktsar', 'SohnaRd', 'Radhaprm',
 'AsrplmRd', 'VdkkuSrt', 'Pawane', 'Dankuni', 'BgnprDPP', 'MubarDPP', 'Matrprpm',
 'RoshnBgh', 'Patiala', 'Malerkotla', 'Sangrur', 'Moradabad', 'UdhamNgr',
 'Madhavaram', 'JyotiNgr', 'CivilHPL', 'Bokule', 'PatelWrd', 'Mataward',
 'LSRoad', 'AbbasNgr', 'Gaurkshn', 'Okhla', 'AkkolRD', 'IndraNgr', 'VikrmMah',
 'Shivprsad', 'Palwal', 'MPward', 'SourvDPP', 'DumDum', 'MohanPrk', 'ByePass',
 'RicMilRd', 'Mthurard', 'Bhatinda', 'Ward9DPP', 'SngihiRD', 'Arlumodu',
 'Mutyvila', 'Arsprmbu', 'Mundhe', 'LxmiNiws', 'Mahad', 'Jogshwri', 'Devenply',
 'Chrompet', 'Mangalam', 'ShantiNg', 'Trnsport', 'Chakan', 'WebelDPP',
 'Vepmpttu', 'Thiruvlr', 'Porur', 'Nalasopara', 'MiraRd', 'SriRmNGR', 'GuttalRD',
 'Poonamallee', 'Lake_Avenue', 'Indsarea', 'Bhogpur', 'PlaceCol', 'AkhraBzr',
 'TKRoad', 'Pazhvedu', 'LFRoad', 'Palikval', 'Kappalur', 'Mangri', 'ChikaDPP',
 'ShntiSgr', 'TBCross', 'Gurukrpa', 'Raiprvlg', 'Rohini', 'Poothole', 'Robinson',
 'ChndrNgr', 'Hindcwk', 'Ajnari', 'Dharwad', 'Bsavangr', 'RajpurRD',
 'Vadgaon_Sheri', 'Bareilly', 'ShjnprRD', 'Artnclny', 'MGRoad', 'RSRoad',
 'Balajicly', 'Kharagpur', 'FshryOFC', 'KolarRd', 'MhliadPP', 'KalikDPP',
 'BhwniGnj', 'Vaishali', 'BajprDPP', 'KarnalRd', 'Nangli', 'JNPT', 'BhadgDPP',
 'BhgyaNgr', 'Bellary', 'Knsgrard', 'Shivangr', 'GndhiNgr', 'ArkonmRD',
 'KoralDPP', 'AskNagar', 'VidyaNGR', 'Chandkheda', 'Ukkadam', 'Khajuria',
 'KaremDPP', 'Wagodha', 'Karelibaug', 'Sec_02', 'NamoNagr', 'ManhrBld',
 'PonaniRD', 'Khandeshwar', 'SmClyDPP', 'Karnal', 'RIICO', 'Jhilmil', 'Sector02',
 'Margao', 'Blbgarh', 'Wardn13', 'JhumanCk', 'Bazar', 'Sriperumbudur', 'Egmore',
 'Mundhawa', 'Chikdply', 'WardNo4', 'Haripur', 'HajiprRD', 'Mainrd', 'Kakinada',
 'KSClly', 'Bardivan', 'Wardno6', 'NSTRoad', 'ArhamDPP', 'AmtlaDPP', 'Anjar',
 'Jaipur', 'HesglDPP', 'Bhuj', 'Mullanpr', 'Kakdepot', 'Kurduwdi', 'GTRoad',
 'SJRoad', 'Kanongyn', 'DcntCLY', 'SrnprHwy', 'MP_Nagar', 'Rynapadu', 'Mandodi',
 'ZamQuatr', 'IdstrlAr', 'Bhabua', 'Wardno7', 'Ambedkar', 'Sunku', 'Amankovl',
 'PostofJN', 'Klskhrpt', 'Town', 'South', 'Sishumdr', 'Jogeshwri', 'Godhra',
 'Dahod', 'Ward11', 'Kanchipuram', 'HousngBd', 'CharRsta', 'Kuntikna',
 'Vasanthm', 'MJRDPP', 'RailGate', 'Shankrpa', 'KamaStrt', 'Goa', 'SDKNGR',
 'TirupthiRd', 'Bngisheb', 'Vandalur', 'Pdmavati', 'Rajula', 'GainMrkt',
 'NgrNigam', 'Chittaurgarh', 'Bhilwara', 'KaranNGR', 'Thiruviz', 'Vadasari',
 'Poondi', 'Tuminkte', 'Itachnda', 'Ward17', 'Atapaka', 'SaiNgr', 'GVManu',
 'Madnpali', 'RTCStand', 'SagarDPP', 'TonkRoad', 'Tonk', 'HnmntNgr', 'Layout',
 'Khwsrai', 'Ganesh', 'KdidmCLY', 'Sookhtal', 'Subhash', 'SuzkiSrv', 'Kumud',
 'Mthrapuri', 'goplurm', 'Kmrajngr', 'Chithbrm', 'AnnaNGR', 'ColnyDPP',
 'JawaharN', 'SamitiRd', 'Kolar_Mandakni', 'ShtDRDPP', 'RKComplx', 'MarketRd',
 'Beltnngdi', 'KHRoad', 'RgstrOFC', 'ChtrGIDC', 'Kollgpra', 'Majoor', 'StatonRD',
 'Shivaji', 'StatinRD', 'IndEstat', 'HSR_Layout', 'BllvMarg', 'SikriKla',
 'Meerut', 'Khjurwli', 'RtlamNka', 'Babupaty', 'Nullipad', 'Pshimpra',
 'WrdN4DPP', 'Psthrjhr', 'Gopa3PL', 'SttinDPP', 'Katira', 'Rozapar', 'BhmprDPP',
 'BaraLoha', 'Palanpur', 'HawaiPlr', 'Panchot', 'Veluthur', 'KdrShrRd',
 'AlathurRD', 'Madaprum', 'Thmpulam', 'Bypasrd', 'Barmasia', 'Kothapet',
 'Pandriba', 'Bhaleti', 'SainkSCL', 'Pakrela', 'Auliyapr', 'KtsiGrsm',
 'ARBNorth', 'Pngktgudi', 'Thalthru', 'Sttyapar', 'Chndrlpd', 'Enayetpr',

'Nijgan', 'RatuaDPP', 'BargaDPP', 'Chowk', 'Maheva', 'BkgnRoad', 'TahsilRD',
 'BrlwgDPP', 'Dehradun', 'PBRDDPP', 'Dakor', 'MuruPost', 'BMRd', 'Munduprm',
 'EmsPnmmbi', 'Adhartal', 'Vidygiri', 'PunjabiB', 'PODPP', 'MheshNGR',
 'Gandhinagar', 'Kalol', 'Pnchlght', 'KDRoad', 'NavdaCln', 'farukngr',
 'KaimgnjRD', 'RampuraPhul', 'DiyoDPP', 'Shop3DPP', 'MhpraRD', 'Varachha',
 'SubhVRTL', 'BhukrdPP', 'Sudmpuri', 'Chaitnya', 'KamnHbRD', 'JdswarRD',
 'StatonRd', 'Verpatem', 'Ranchi', 'Govind', 'Parasi', 'Waidhan', 'Ward8DPP',
 'PreetDPP', 'ArtoDPP', 'RoopNgr', 'Mhbhirab', 'WardNo3', 'Hejunagr', 'MissonRd',
 'Samrvrni', 'Whitefld', 'BSarani', 'NagarDPP', 'MaxDPP', 'BtaiRoad', 'Botad',
 'Kumrpurm', 'Trmltpl', 'Sulgan', 'Dhelu', 'Zirakpur', 'JajuDPP', 'NH117',
 'KlngRDPP', 'Barnala', 'BChwkDPP', 'Ramvlg', 'CCRoad', 'Banjaria', 'BawliDPPP',
 'Subshngr', 'Chuanpur', 'Techrcly', 'Thvlrsrt', 'Koliplm', 'RwStnDPP', 'Ricco',
 'Porbandar', 'KhirByps', 'Agraroad', 'Katrmira', 'Kapsheera', 'MnRDDPP',
 'MR0offce', 'ChowkDPP', 'Sholinganganallur', 'Pnjbiyon', 'Hanumangarh',
 'Ganga_Nagar', 'MnimlaRd', 'kalibari', 'Alngjuri', 'Konapara', 'Mlydpthr',
 'Ward25', 'NehruNGR', 'Arulimod', 'Kuruksheetra', 'WdN14DPP', 'Kaithal',
 'MhrjaDPP', 'Fairbynk', 'Davisdle', 'LowerParel', 'PtrlBunk', 'Kovaipudur',
 'APMCYard', 'BhwanDPP', 'PrmNrDPP', 'Bidar', 'Datatrya', 'Mohim', 'Malegaon',
 'Rawlgaon', 'ThrbadRD', 'ModelTwn', 'DataSagr', 'Govndsgr', 'BljiMrkt',
 'Kundapura', 'KmkshBul', 'Prbhtngr', 'Kakrmath', 'Nrainerd', 'NarenaRD',
 'ChomuRD', 'JalnaRd', 'Bazarrd', 'SantaNGR', 'Jabalpur', 'Mohali', 'AchneraRD',
 'Puthalam', 'Vadodara', 'Tiglgndi', 'LICOffce', 'Kacheri', 'Veersagr',
 'Nrsampt', 'Yellanda', 'Sudimala', 'Kharar', 'ChotiHvl', 'PnjPiara', 'SurbhiTh',
 'Greens', 'GreenVly', 'Srikot', 'Madarpur', 'Soghra', 'SH78', 'Pune', 'Durma',
 'YamunaNagar', 'Gurudwar', 'Kntgorya', 'SrifoDPP', 'BoiDPP', 'HunterRd',
 'Palakrty', 'Hanmkond', 'CroadDPP', 'Anaipeta', 'SuryaDPP', 'Menagrdrn',
 'JKRoad', 'Dwaraka', 'Chnglptu', 'Achipkam', 'Dehrird', 'NwYlhnka', 'Lovely',
 'KrthiKyn', 'StationRD', 'Blmrgnst', 'Surathkal', 'Glbgrd', 'DBRCmplx',
 'Khanna', 'Satara', 'Mughlpra', 'Patparganj', 'Sector63', 'Khar_West',
 'New_Alipore', 'KaaduRd', 'Bhogal', 'OnkarDPP', 'PhrmPlza', 'Banikatt',
 'Hospet', 'KairiyaT', 'Asnsdhrd', 'WardNo1', 'Tolichwk', 'Bankura', 'Shahapur',
 'Srvdycwk', 'Talaiya', 'Ward7DPP', 'LaxmiNgr', 'NrdawDPP', 'Wardno10',
 'Bhankrot', 'KotdwrRD', 'NaginaRD', 'Dayanand', 'Fathuluh', 'PnditNGR',
 'PriyrNGR', 'Kuslpram', 'Samyaprm', 'SH71', 'HsptlRod', 'Sbrmnpram', 'Puduvalvu',
 'Mrthndpr', 'Umalodge', 'CGRoad', 'Jublierd', 'Thomas', 'BegurRD', 'Yadvigiri',
 'Kelasahi', 'PhdofDPP', 'Markndpr', 'SaiBansi', 'NkshtPz', 'YeolaRD',
 'TgrniRD', 'PushPlza', 'Nzbadrd', 'BhowmDPP', 'StnRdDPP', 'TahurDPP',
 'Chitradurga', 'ShsmldPP', 'Shop2DPP', 'FatehpRd', 'Bikaner', 'DeVDPP',
 'LdnunDPP', 'Sarubali', 'BaljiDPP', 'Nadiad', 'TiloiDPP', 'Kaithwal',
 'Greenmkt', 'ConduDPP', 'NadthiCx', 'Sangetha', 'Shimoga', 'Wardno4',
 'Oilmilrd', 'Shillong', 'Pbroad', 'NdiaTola', 'GndhiDPP', 'DindiRD', 'PeroorRD',
 'Hoskote', 'Kadugodi', 'HydRoad', 'Rahatani', 'EBroad', 'Panvel', 'KalyanNg',
 'SindgiRD', 'RazaviRd', 'GvrComp', 'Machilipatnam', 'Phaphamu', 'Indira_Nagar',
 'WrdN1DPP', 'Kotwali', 'GayatriN', 'Mlkpura', 'kalmpuza', 'Mahabubnagar',
 'nagar', 'Badeplly', 'MiraRoad', 'KrantiNgr', 'YuktiDPP', 'Bhainpura',
 'Satellite', 'AjmhwdPP', 'Mwalibad', 'Aurangabad', 'Vishakhapatnam', 'Skynet',
 'Vijaygt', 'RajaBzr', 'Samarth', 'Truptingr', 'StRoad', 'Jalgaon', 'RamnadRD',
 'Valluvar', 'Palladam', 'DavkharRd', 'VUNagar', 'CikhliRD', 'Bilimora',

'KirtiNgr', 'SrnsNgr', 'Enkndla', 'KotwaliN', 'Navsari', 'Valsad', 'MduraiRD',
 'Kidwai', 'NagpurRd', 'Mharajpr', 'CroslySRT', 'Belgaum', 'IndstlAr', 'KN',
 'Rewa', 'Padra', 'GagiDPP', 'ShbdnDPP', 'CotnGren', 'MSRClgRd', 'CrossRD',
 'NvygRDPP', 'Ward19', 'MunplDPP', 'ShubsNGR', 'Wardnor4', 'HanumDPP',
 'BhaRDDPP', 'Surendranagar', 'Manesar', 'Himmatnagar', 'Patelfli', 'TrnptNgr',
 'PnuKndRD', 'Mumbra', 'LNBRoad', 'VidyaDPP', 'Jhunjhunu', 'War5DPP', 'RLSTNDPP',
 'Nellore', 'VarunCly', 'MngalDPP', 'BgwriDPP', 'Kalyan_West', 'Faridabad',
 'ClgRDDPP', 'Rkcomplx', 'Jetpur', 'Aswnngr', 'Kooriyad', 'Nattukal', 'KisanCo',
 'KatlaDPP', 'ColageRD', 'Agraharm', 'RajCmplx', 'Vidyangr', 'MrdiVlge',
 'NngrnRd', 'SamathBv', 'ward9', 'Sadras', 'YashDPP', 'Nimachrd', 'HosptlRd',
 'BhgtPura', 'Tetultol', 'Wardno5', 'Rcocmplx', 'Aravind', 'JydevNGR',
 'CivlLine', 'ChngiDPP', 'Bahadurgarh', 'GModDPP', 'Sector1A', 'MndwrRod',
 'HnsChowk', 'Ward6DPP', 'MohnVRTL', 'Idgah', 'Vardhard', 'Shivalya', 'PiliKoti',
 'Panderia', 'TrnsptNGR', 'Cherukole', 'AkhirDPP', 'RPRoad', 'Swamylyt',
 'BrDbleRd', 'NarsipuraRd', 'SulthnRd', 'Narasipr', 'GunjRDPP', 'KanpurRd',
 'Darbe', 'Srirampt', 'AnugrDPP', 'JJCPxDPP', 'Rjndpara', 'BrezeDPP', 'GurpdDPP',
 'DKLogDPP', 'Nishangr', 'UBamdDPP', 'Feroke', 'Shyndco', 'Chukhndi', 'Sardala',
 'GovndNgr', 'ShivBari', 'Chpaguri', 'PigonDPP', 'Ganeshwr', 'Hitech',
 'VadaiDPP', 'Bahreya', 'Patel_Nagar', 'Kharghar', 'KndliDPP', 'JilRDDPP',
 'Veraval', 'MnBzrDPP', 'Msstreet', 'Kovil', 'AshkTalk', 'Chandmari', 'Rajpura',
 'BisnoldDPP', 'Mhdiptnm', 'ShivaDPP', 'Perkadrd', 'VijywdRD', 'DmodrNGR',
 'IndraCln', 'NWclyDPP', 'Pilani', 'RajRdDPP', 'Pinjore', 'NharuExt', 'B',
 'MjgaonRd', 'Kalyanpr', 'StnRoad', 'Royapuram', 'Mandya', 'VaniThtr',
 'MrgnjDPP', 'NavldiDPP', 'SadulDPP', 'Mnanthla', 'CmtNgRod', 'Roorkee',
 'VagaiNgr', 'TnhbBlkC', 'Kdthdstrt', 'VaiklSRT', 'MukkuRD', 'Sirjudin',
 'ZuariNgr', 'KoilStrt', 'NOI', 'Bnsibtla', 'MjlprDPP', 'PlsrdDPP', 'Nagaram',
 'Ragvendr', 'Krishna', 'BypassRD', 'Shekhpur', 'Rjndrngr', 'BaliaMod',
 'AzmrDPP', 'Shnmgrpm', 'UdnkdiRD', 'SriVnktpm', 'Barwala', 'LohiaDPP',
 'HrihrNgr', 'HnumDPP', 'Bypassrd', 'Raghogrh', 'ColctrOf', 'VallaDPP',
 'Pshrikvu', 'NorprRD', 'NaginaRd', 'KhandDPP', 'Nawanshahr', 'Banikhet',
 'Bangotu', 'Pathankot', 'Vijdurg', 'Trimulgherry', 'Court', 'barkarRd',
 'GariDPP', 'Sitarmrd', 'Bhiwani', 'MithmdRd', 'HoliCDPP', 'ViksClny',
 'MdothdRD', 'Pthrgoan', 'HelipadRD', 'Farmnala', 'DibngVly', 'Ward6',
 'Naraynpr', 'Ramnagar', 'Shantanu', 'SnkunDPP', 'GwhRDDPP', 'KasyaDPP',
 'GangDPP', 'Rathnam', 'UmarDPP', 'Dudhani', 'Hatpada', 'Prjapati', 'MrenTirh',
 'Salanpur', 'Salem', 'Mhimapur', 'MsmcyDPP', 'KcharaRD', 'Bhaluahi', 'Katghara',
 'Ponda', 'KtnRdDPP', 'Bargawan', 'GrnNgriya', 'BnglorRd', 'krshnPly',
 'Varanasi', 'Sirikona', 'RjndrNgr', 'Kapurthala', 'Shanthi', 'Rawatpur',
 'Umargaon', 'BazarDPP', 'SbhRDDPP', 'SndbrDPP', 'BasthDPP', '_Kothanur',
 'RjghatRd', 'MndiRoad', 'WageDPP', 'ChrliDPP', 'HudcoDPP', 'AmvdiDPP', 'Ward14',
 'AstrdDPP', 'BalibDPP', 'Old_City', 'Parai', 'GtRoad', 'Kosmi', 'Balaji_Nagar',
 'CollgeRD', 'Cnsrvila', 'TilakNgr', 'Ldthlabh', 'Noida_Sec-83_DC', 'Kdvantra',
 'Viveka', 'RmNyrDPP', 'Udyabata', 'Kapleswr', 'Ranakant', 'Chmpmura', 'Bhilai',
 'MrktYrd', 'Mahuva', 'Bhavnagar', 'GndhiChk', 'Diakkawn', 'ShivmDPP',
 'WamanDPP', 'SCHwkDPP', 'AwmpiVng', 'HunthrVg', 'Sohagpur', 'Potheri',
 'SukntDPP', 'Daman', 'AadiDPP', 'ChainDPP', 'JmnvadRd', 'AdrshSt', 'PakriDPP',
 'MBTRd', 'ThthiCwk', 'Krsnakcl', 'PunjabPd', 'Purbari', 'ColegRd', 'GMukrDPP',
 'Sahni', 'VasaviNg', 'Wrd12DPP', 'Aliganj', 'Udupi', 'SadarHPL', 'ZebaTWR',

```
'RhmgjDPP', 'Hillcard', 'ABPath', 'NlgaonRd', 'ThanaDPP', 'PnchmDPP',
'DelRdDPP', 'Jamtara', 'Mdiclcly', 'BaruaRd', 'kankroli', 'Asansol', 'Pettah',
'Sn thiNGR', 'Mrtrklgr', 'Jind', 'Kadipur', 'Talkui', 'Todapur', 'Bgwtichk',
'Jaripatk', 'Chandigarh', 'KKndrDPP', 'Thsil3PL', 'Barout', 'BhrolDPP',
'Dilliyan', 'EtwahDPP', 'ChtwrDPP', 'KhdimDPP', 'Manchar', 'Panaji', 'BnkrGate',
'Rohtak', 'DvlalDPP', 'AgrohDPP', 'SchdvDPP', 'BhunaDPP', 'RailwyRd',
'Solaiprm', 'NatunDPP', 'SubrtDPP', 'SashPhkn', 'MdnprDPP', 'Kanakpur', 'Hubli',
'KhsmiDPP', 'Pothredy', 'Narnaul', 'Chikmagalur', 'KeranDPP', 'Antop_Hill',
'KolheDPP', 'CBRoad', 'Cuddapah', 'Sidrd', 'ITICollg', 'JawanChk', 'MhmodNgr',
'FatprDPP', 'NditaDPP', 'SriDPP', 'Malout', 'Khenewa', 'MsjidDPP', 'KarjuDPP',
'JrjolDPP', 'JthriDPP', 'JangiRd', 'Abohar', 'BhogdDPP', 'Paschim', 'Jharia',
'Srnwsngr', 'NagplDPP', 'Panipat', 'Kaura', 'AshkngRd', 'Vijayawada',
'EragndPP', 'Virar', 'MemariRD', 'Srirmpur', 'Nirjanpur', 'Gobindgarh',
'Lakshmi', 'KotyamRD', 'Kondapur', 'DivrsnRd', 'GhtimDPP', 'Nerul', 'Agra',
'Mangol', 'BstndDPP', 'Chrwpaty', 'Gurkhari', 'CtyLgDPP', 'Jamalpur',
'DMComDPP', 'PaikjNGR', 'Sarjapur', 'Jantaclg', 'DohalDPP', 'MnbzrDPP',
'FulbaDPP', 'LaxmiNGR', 'JwahrNGR', 'AhmedNagar', 'SavtaHTL', 'BsnoiHPL',
'GoalpDPP', 'NapitDPP', 'Mohnprwa', 'JiswlDPP', 'SirsaDPP', 'UttarDPP',
'NaturDPP', 'ByprDDPP', 'Gondal', 'VrdhriRD', 'Kataram', 'AmbedDPP', 'CCU',
'Mapusa', 'Sracmplx', 'Sarswati', 'MohanNgr', 'Bhandup_West', 'UdaynDPP',
'Krusphrma', 'Murtigr', 'BsStdDPP', 'PcrrdDPP', 'Manikndm', 'LB', 'RatanDPP',
'ChatiDPP', 'TherSRT', 'AnadiDPP', 'ArickDPP', 'SingCLNY', 'Kadtmtpty',
'SirhindFatehgarh', 'Surat_Pandesra_Gateway', 'KeRoad', 'Salap', 'Chatrpr',
'MlnprDPP', 'MotiDPP', 'Brplicwk', 'West', 'KrisnKunj', 'TownDPP', 'Lajwanti',
'ShantiDPP', 'Giddarbaha', 'JatniDPP', 'Shahdara', 'MahmurGj', 'KamalDPP',
'Kalyan', 'CourtDPP', 'GMndiDPP', 'Delhi', 'Cochin', 'Bulabeda', 'Mylapore',
'Ward2DPP', 'Ghansoli']
```

```
[168]: # destination_code with less than 5 letters are considered as VALID
print(list(delhivery["destination_code"].unique()))
```

```
['D', 'IP', 'H', 'PC', 'HB', 'DC', 'L', 'DPC', 'NULL', 'Hub', 'P', 'I', 'H_6',
'HUB', 'D_2', 'H_1', 'I_2', 'D_1', 'H_2', 'DPP_2', 'I_1', 'D_3', 'R_8', 'I_4',
'RPC', 'GW', 'Pc', 'DPP_1', 'I_7', 'DPP_4', 'I_21', 'D_9', 'DPP_3', 'Dc', 'H_4',
'C', 'D_5', 'D_12', 'M', 'L_8', 'D_10', 'D_7', 'I_3', 'CP', 'I_20', 'INT',
'L_23', 'Goa', 'D_8', 'Old']
```

```
[169]: delhivery["destination_code"].value_counts().iloc[:10]
```

```
[169]: H      34572
      HB      30803
      D      26415
      I      10539
      Hub      7445
      DC      5010
      DPC     4854
      IP      3887
```

```
L      2827
H_1    2734
Name: destination_code, dtype: int64
```

```
[170]: delhivery[delhivery["destination_code"] == "NULL"]["destination_name"].unique()
```

```
[170]: array(['Haridwar', 'AMD_Memnagar', 'Guwahati_Sixmile', 'Darbhanga',
        'Amdavad_East', 'Erode', 'Janakpuri', 'Patiala', 'Palwal',
        'Nalasopara', 'Bareilly', 'Karnal', 'Bhopal MP Nagar', 'Jaipur',
        'Bhopal_Kolar Mandakni', 'Meerut', 'Dehradun', 'Guwahati_North',
        'Bidar', 'Jabalpur', 'Chandigarh_Mohali', 'Vadodara',
        'Delhi_Bhogal', 'Hospet', 'Shillong', 'Lucknow_Indira Nagar',
        'AMD_Satellite', 'Aurangabad', 'Vishakhapatnam', 'Gurgaon_Manesar',
        'Faridabad', 'Ghaziabad_Patel Nagar', 'Guwahati_Chandmari',
        'Pilani', 'Chennai_Royapuram', 'Delhi_Barwala', 'Salem',
        'Varanasi', 'Bhopal_Old City', 'Pune Balaji Nagar',
        'Noida_Sec-83_DC', 'Chennai_Potheri', 'Lucknow_Aliganj', 'Udupi',
        'Gurgaon_Kadipur', 'Chandigarh', 'Rohtak', 'Mumbai Antop Hill',
        'Chennai_Poonamallee', 'Panipat', 'Vijayawada', 'Agra',
        'Goa_Mapusa', 'Hyd_LB-Nagar_Dc', 'Surat_Pandesra_Gateway',
        'Delhi_Lajwanti', 'Delhi_Shahdara', 'Mumbai_Kalyan', 'North Delhi',
        'Chennai_Mylapore'], dtype=object)
```

```
[171]: delhivery.head()
```

```
[171]:      trip_creation_time \
0 2018-09-20 02:35:36.476840
1 2018-09-20 02:35:36.476840
2 2018-09-20 02:35:36.476840
3 2018-09-20 02:35:36.476840
4 2018-09-20 02:35:36.476840

      route_schedule_uuid route_type \
0  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...   Carting
1  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...   Carting
2  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...   Carting
3  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...   Carting
4  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...   Carting

      trip_uuid source_center      source_name destination_center \
0  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC      IND388620AAB
1  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC      IND388620AAB
2  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC      IND388620AAB
3  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC      IND388620AAB
4  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC      IND388620AAB

      destination_name      od_start_time      od_end_time \
```

```

0 Khambhat_MotvdDPP_D 2018-09-20 03:21:32.418600 2018-09-20 04:47:45.236797
1 Khambhat_MotvdDPP_D 2018-09-20 03:21:32.418600 2018-09-20 04:47:45.236797
2 Khambhat_MotvdDPP_D 2018-09-20 03:21:32.418600 2018-09-20 04:47:45.236797
3 Khambhat_MotvdDPP_D 2018-09-20 03:21:32.418600 2018-09-20 04:47:45.236797
4 Khambhat_MotvdDPP_D 2018-09-20 03:21:32.418600 2018-09-20 04:47:45.236797

```

```

      start_scan_to_end_scan  actual_distance_to_destination  actual_time  \
0                86.0                10.435660            14.0
1                86.0                18.936842            24.0
2                86.0                27.637279            40.0
3                86.0                36.118028            62.0
4                86.0                39.386040            68.0

```

```

      osrm_time  osrm_distance  segment_actual_time  segment_osrm_time  \
0          11.0          11.9653              14.0              11.0
1          20.0          21.7243              10.0              9.0
2          28.0          32.5395              16.0              7.0
3          40.0          45.5620              21.0             12.0
4          44.0          54.2181               6.0              5.0

```

```

      segment_osrm_distance  source_state  source_city  source_place  source_code  \
0              11.9653      Gujarat      Anand      VUNagar      DC
1               9.7590      Gujarat      Anand      VUNagar      DC
2              10.8152      Gujarat      Anand      VUNagar      DC
3              13.0224      Gujarat      Anand      VUNagar      DC
4               3.9153      Gujarat      Anand      VUNagar      DC

```

```

      destination_state  destination_city  destination_place  destination_code
0          Gujarat      Khambhat      MotvdDPP      D
1          Gujarat      Khambhat      MotvdDPP      D
2          Gujarat      Khambhat      MotvdDPP      D
3          Gujarat      Khambhat      MotvdDPP      D
4          Gujarat      Khambhat      MotvdDPP      D

```

2.3 Extract month, year and day from Trip_creation_time

```

[172]: delhivery["trip_year"] = delhivery["trip_creation_time"].dt.year
delhivery["trip_month"] = delhivery["trip_creation_time"].dt.month
delhivery["trip_day"] = delhivery["trip_creation_time"].dt.day
delhivery["trip_time"] = delhivery["trip_creation_time"].dt.time
delhivery["trip_hour"] = delhivery["trip_creation_time"].dt.hour
delhivery["trip_week"] = delhivery["trip_creation_time"].dt.isocalendar().week
delhivery["trip_day_of_week"] = delhivery["trip_creation_time"].dt.day_of_week

```

```

[173]: delhivery.dtypes

```

```
[173]: trip_creation_time      datetime64[ns]
      route_schedule_uuid      object
      route_type               object
      trip_uuid                object
      source_center             object
      source_name               object
      destination_center        object
      destination_name          object
      od_start_time             datetime64[ns]
      od_end_time               datetime64[ns]
      start_scan_to_end_scan    float64
      actual_distance_to_destination float64
      actual_time               float64
      osrm_time                 float64
      osrm_distance             float64
      segment_actual_time       float64
      segment_osrm_time         float64
      segment_osrm_distance     float64
      source_state              object
      source_city               object
      source_place              object
      source_code               object
      destination_state         object
      destination_city          object
      destination_place         object
      destination_code          object
      trip_year                 int64
      trip_month                int64
      trip_day                  int64
      trip_time                 object
      trip_hour                 int64
      trip_week                 UInt32
      trip_day_of_week          int64
      dtype: object
```

2.4 Calculate the time taken between od_start_time and od_end_time and keep it as a feature. Drop the original columns, if required

```
[174]: delhivery["od_start_to_end"] =_
      ↪(delhivery["od_end_time"]-delhivery["od_start_time"]).dt.total_seconds()/60
```

```
[175]: delhivery.columns
```

```
[175]: Index(['trip_creation_time', 'route_schedule_uuid', 'route_type', 'trip_uuid',
      'source_center', 'source_name', 'destination_center',
      'destination_name', 'od_start_time', 'od_end_time',
      'start_scan_to_end_scan', 'actual_distance_to_destination',
```



```

'actual_time', 'osrm_time', 'osrm_distance', 'segment_actual_time',
'segment_osrm_time', 'segment_osrm_distance', 'source_state',
'source_city', 'source_place', 'source_code', 'destination_state',
'destination_city', 'destination_place', 'destination_code',
'trip_year', 'trip_month', 'trip_day', 'trip_time', 'trip_hour',
'trip_week', 'trip_day_of_week', 'od_start_to_end'],
dtype='object')

```

```
[176]: delhivery.head()
```

```

[176]:      trip_creation_time \
0 2018-09-20 02:35:36.476840
1 2018-09-20 02:35:36.476840
2 2018-09-20 02:35:36.476840
3 2018-09-20 02:35:36.476840
4 2018-09-20 02:35:36.476840

      route_schedule_uuid route_type \
0  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...  Carting
1  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...  Carting
2  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...  Carting
3  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...  Carting
4  thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...  Carting

      trip_uuid source_center      source_name destination_center \
0  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC  IND388620AAB
1  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC  IND388620AAB
2  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC  IND388620AAB
3  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC  IND388620AAB
4  trip-153741093647649320  IND388121AAA  Anand_VUNagar_DC  IND388620AAB

      destination_name      od_start_time      od_end_time \
0  Khambhat_MotvdDPP_D 2018-09-20 03:21:32.418600 2018-09-20 04:47:45.236797
1  Khambhat_MotvdDPP_D 2018-09-20 03:21:32.418600 2018-09-20 04:47:45.236797
2  Khambhat_MotvdDPP_D 2018-09-20 03:21:32.418600 2018-09-20 04:47:45.236797
3  Khambhat_MotvdDPP_D 2018-09-20 03:21:32.418600 2018-09-20 04:47:45.236797
4  Khambhat_MotvdDPP_D 2018-09-20 03:21:32.418600 2018-09-20 04:47:45.236797

      start_scan_to_end_scan  actual_distance_to_destination  actual_time \
0              86.0              10.435660              14.0
1              86.0              18.936842              24.0
2              86.0              27.637279              40.0
3              86.0              36.118028              62.0
4              86.0              39.386040              68.0

      osrm_time  osrm_distance  segment_actual_time  segment_osrm_time \
0          11.0          11.9653              14.0              11.0

```

1	20.0	21.7243		10.0	9.0
2	28.0	32.5395		16.0	7.0
3	40.0	45.5620		21.0	12.0
4	44.0	54.2181		6.0	5.0

	segment_osrm_distance	source_state	source_city	source_place	source_code	\
0	11.9653	Gujarat	Anand	VUNagar	DC	
1	9.7590	Gujarat	Anand	VUNagar	DC	
2	10.8152	Gujarat	Anand	VUNagar	DC	
3	13.0224	Gujarat	Anand	VUNagar	DC	
4	3.9153	Gujarat	Anand	VUNagar	DC	

	destination_state	destination_city	destination_place	destination_code	\
0	Gujarat	Khambhat	MotvdDPP	D	
1	Gujarat	Khambhat	MotvdDPP	D	
2	Gujarat	Khambhat	MotvdDPP	D	
3	Gujarat	Khambhat	MotvdDPP	D	
4	Gujarat	Khambhat	MotvdDPP	D	

	trip_year	trip_month	trip_day	trip_time	trip_hour	trip_week	\
0	2018	9	20	02:35:36.476840	2	38	
1	2018	9	20	02:35:36.476840	2	38	
2	2018	9	20	02:35:36.476840	2	38	
3	2018	9	20	02:35:36.476840	2	38	
4	2018	9	20	02:35:36.476840	2	38	

	trip_day_of_week	od_start_to_end
0	3	86.213637
1	3	86.213637
2	3	86.213637
3	3	86.213637
4	3	86.213637

3 CHAPTER 3: MERGING OF ROWS AND AGGREGATION OF FIELDS

3.1 Grouping by trip_uuid, source_center, destination_center

```
[177]: delhivery.info()
# No null values after feature extraction
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 144316 entries, 0 to 144866
Data columns (total 34 columns):
#   Column                                Non-Null Count  Dtype
---
```

```

0   trip_creation_time          144316 non-null  datetime64[ns]
1   route_schedule_uuid        144316 non-null  object
2   route_type                  144316 non-null  object
3   trip_uuid                   144316 non-null  object
4   source_center               144316 non-null  object
5   source_name                 144316 non-null  object
6   destination_center          144316 non-null  object
7   destination_name            144316 non-null  object
8   od_start_time               144316 non-null  datetime64[ns]
9   od_end_time                 144316 non-null  datetime64[ns]
10  start_scan_to_end_scan      144316 non-null  float64
11  actual_distance_to_destination 144316 non-null  float64
12  actual_time                 144316 non-null  float64
13  osrm_time                   144316 non-null  float64
14  osrm_distance               144316 non-null  float64
15  segment_actual_time         144316 non-null  float64
16  segment_osrm_time           144316 non-null  float64
17  segment_osrm_distance       144316 non-null  float64
18  source_state                144316 non-null  object
19  source_city                 144316 non-null  object
20  source_place                144316 non-null  object
21  source_code                 144316 non-null  object
22  destination_state           144316 non-null  object
23  destination_city            144316 non-null  object
24  destination_place           144316 non-null  object
25  destination_code            144316 non-null  object
26  trip_year                   144316 non-null  int64
27  trip_month                  144316 non-null  int64
28  trip_day                    144316 non-null  int64
29  trip_time                   144316 non-null  object
30  trip_hour                   144316 non-null  int64
31  trip_week                   144316 non-null  UInt32
32  trip_day_of_week            144316 non-null  int64
33  od_start_to_end             144316 non-null  float64
dtypes: UInt32(1), datetime64[ns](3), float64(9), int64(5), object(16)
memory usage: 38.1+ MB

```

```
[178]: delhivery.head(10)
```

```

[178]:      trip_creation_time  \
0  2018-09-20 02:35:36.476840
1  2018-09-20 02:35:36.476840
2  2018-09-20 02:35:36.476840
3  2018-09-20 02:35:36.476840
4  2018-09-20 02:35:36.476840
5  2018-09-20 02:35:36.476840
6  2018-09-20 02:35:36.476840

```

7 2018-09-20 02:35:36.476840
8 2018-09-20 02:35:36.476840
9 2018-09-20 02:35:36.476840

	route_schedule_uuid	route_type	\
0	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
1	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
2	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
3	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
4	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
5	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
6	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
7	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
8	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	
9	thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3...	Carting	

	trip_uuid	source_center	source_name	\
0	trip-153741093647649320	IND388121AAA	Anand_VUNagar_DC	
1	trip-153741093647649320	IND388121AAA	Anand_VUNagar_DC	
2	trip-153741093647649320	IND388121AAA	Anand_VUNagar_DC	
3	trip-153741093647649320	IND388121AAA	Anand_VUNagar_DC	
4	trip-153741093647649320	IND388121AAA	Anand_VUNagar_DC	
5	trip-153741093647649320	IND388620AAB	Khambhat_MotvdDPP_D	
6	trip-153741093647649320	IND388620AAB	Khambhat_MotvdDPP_D	
7	trip-153741093647649320	IND388620AAB	Khambhat_MotvdDPP_D	
8	trip-153741093647649320	IND388620AAB	Khambhat_MotvdDPP_D	
9	trip-153741093647649320	IND388620AAB	Khambhat_MotvdDPP_D	

	destination_center	destination_name	od_start_time	\
0	IND388620AAB	Khambhat_MotvdDPP_D	2018-09-20 03:21:32.418600	
1	IND388620AAB	Khambhat_MotvdDPP_D	2018-09-20 03:21:32.418600	
2	IND388620AAB	Khambhat_MotvdDPP_D	2018-09-20 03:21:32.418600	
3	IND388620AAB	Khambhat_MotvdDPP_D	2018-09-20 03:21:32.418600	
4	IND388620AAB	Khambhat_MotvdDPP_D	2018-09-20 03:21:32.418600	
5	IND388320AAA	Anand_Vaghasi_IP	2018-09-20 04:47:45.236797	
6	IND388320AAA	Anand_Vaghasi_IP	2018-09-20 04:47:45.236797	
7	IND388320AAA	Anand_Vaghasi_IP	2018-09-20 04:47:45.236797	
8	IND388320AAA	Anand_Vaghasi_IP	2018-09-20 04:47:45.236797	
9	IND388320AAA	Anand_Vaghasi_IP	2018-09-20 04:47:45.236797	

	od_end_time	start_scan_to_end_scan	\
0	2018-09-20 04:47:45.236797	86.0	
1	2018-09-20 04:47:45.236797	86.0	
2	2018-09-20 04:47:45.236797	86.0	
3	2018-09-20 04:47:45.236797	86.0	
4	2018-09-20 04:47:45.236797	86.0	
5	2018-09-20 06:36:55.627764	109.0	

6	2018-09-20 06:36:55.627764	109.0
7	2018-09-20 06:36:55.627764	109.0
8	2018-09-20 06:36:55.627764	109.0
9	2018-09-20 06:36:55.627764	109.0

	actual_distance_to_destination	actual_time	osrm_time	osrm_distance	\
0	10.435660	14.0	11.0	11.9653	
1	18.936842	24.0	20.0	21.7243	
2	27.637279	40.0	28.0	32.5395	
3	36.118028	62.0	40.0	45.5620	
4	39.386040	68.0	44.0	54.2181	
5	10.403038	15.0	11.0	12.1171	
6	18.045481	44.0	17.0	21.2890	
7	28.061896	65.0	29.0	35.8252	
8	38.939167	76.0	39.0	47.1900	
9	43.595802	102.0	45.0	53.2334	

	segment_actual_time	segment_osrm_time	segment_osrm_distance	source_state	\
0	14.0	11.0	11.9653	Gujarat	
1	10.0	9.0	9.7590	Gujarat	
2	16.0	7.0	10.8152	Gujarat	
3	21.0	12.0	13.0224	Gujarat	
4	6.0	5.0	3.9153	Gujarat	
5	15.0	11.0	12.1171	Gujarat	
6	28.0	6.0	9.1719	Gujarat	
7	21.0	11.0	14.5362	Gujarat	
8	10.0	10.0	11.3648	Gujarat	
9	26.0	6.0	6.0434	Gujarat	

	source_city	source_place	source_code	destination_state	destination_city	\
0	Anand	VUNagar	DC	Gujarat	Khambhat	
1	Anand	VUNagar	DC	Gujarat	Khambhat	
2	Anand	VUNagar	DC	Gujarat	Khambhat	
3	Anand	VUNagar	DC	Gujarat	Khambhat	
4	Anand	VUNagar	DC	Gujarat	Khambhat	
5	Khambhat	MotvdDPP	D	Gujarat	Anand	
6	Khambhat	MotvdDPP	D	Gujarat	Anand	
7	Khambhat	MotvdDPP	D	Gujarat	Anand	
8	Khambhat	MotvdDPP	D	Gujarat	Anand	
9	Khambhat	MotvdDPP	D	Gujarat	Anand	

	destination_place	destination_code	trip_year	trip_month	trip_day	\
0	MotvdDPP	D	2018	9	20	
1	MotvdDPP	D	2018	9	20	
2	MotvdDPP	D	2018	9	20	
3	MotvdDPP	D	2018	9	20	
4	MotvdDPP	D	2018	9	20	

5	Vaghasi	IP	2018	9	20
6	Vaghasi	IP	2018	9	20
7	Vaghasi	IP	2018	9	20
8	Vaghasi	IP	2018	9	20
9	Vaghasi	IP	2018	9	20

	trip_time	trip_hour	trip_week	trip_day_of_week	od_start_to_end
0	02:35:36.476840	2	38	3	86.213637
1	02:35:36.476840	2	38	3	86.213637
2	02:35:36.476840	2	38	3	86.213637
3	02:35:36.476840	2	38	3	86.213637
4	02:35:36.476840	2	38	3	86.213637
5	02:35:36.476840	2	38	3	109.173183
6	02:35:36.476840	2	38	3	109.173183
7	02:35:36.476840	2	38	3	109.173183
8	02:35:36.476840	2	38	3	109.173183
9	02:35:36.476840	2	38	3	109.173183

3.2 Aggregation of columns at segment level

Following dictionary shows the aggregation type used for specific columns

3.2.1 Segment Level Aggregation

```
[179]: delhivery['segment_primary_key'] =delhivery['trip_uuid']_
      ↪+delhivery['source_center'] +delhivery['destination_center']
```

```
[180]: delhivery.columns
```

```
[180]: Index(['trip_creation_time', 'route_schedule_uuid', 'route_type', 'trip_uuid',
            'source_center', 'source_name', 'destination_center',
            'destination_name', 'od_start_time', 'od_end_time',
            'start_scan_to_end_scan', 'actual_distance_to_destination',
            'actual_time', 'osrm_time', 'osrm_distance', 'segment_actual_time',
            'segment_osrm_time', 'segment_osrm_distance', 'source_state',
            'source_city', 'source_place', 'source_code', 'destination_state',
            'destination_city', 'destination_place', 'destination_code',
            'trip_year', 'trip_month', 'trip_day', 'trip_time', 'trip_hour',
            'trip_week', 'trip_day_of_week', 'od_start_to_end',
            'segment_primary_key'],
            dtype='object')
```

```
[181]: segment_aggregation_dict = {
        'trip_creation_time' : 'first',
        'route_schedule_uuid' : 'first',
        'route_type' : 'first',
        'trip_uuid' : 'first',
```

```

'source_center' : 'first',
'source_name' : 'first',
'destination_center' : 'last',
'destination_name' : 'last',
'od_start_time' : 'first',
'od_end_time' : 'last',
'start_scan_to_end_scan' : 'first',
'actual_distance_to_destination' : 'sum',
'actual_time' : 'last',
'osrm_time' : 'last',
'osrm_distance' : 'last',
'segment_actual_time' : 'sum',
'segment_osrm_distance' : 'sum',
'segment_osrm_time' : 'sum',
'source_state' : "first",
'source_city' : "first",
'source_place' : "first",
'source_code' : "first",
'destination_state' : "last",
'destination_city' : "last",
'destination_place' : "last",
'destination_code' : "last",
'trip_year' : "first",
'trip_month' : "first",
'trip_day' : "first",
'trip_time' : "first",
'trip_hour' : "first",
'trip_week' : "first",
'trip_day_of_week' : "first",
'od_start_to_end' : "first"
}

```

```

[182]: segment = delhivery.groupby('segment_primary_key').
        ↪agg(segment_aggregation_dict).reset_index()
segment = segment.sort_values(by=['trip_uuid', 'od_start_time'], ascending=True).
        ↪reset_index()

```

```

[183]: segment = segment.drop("index",axis = 1)

```

```

[184]: segment.head()

```

```

[184]:
           segment_primary_key      trip_creation_time \
0  trip-153671041653548748IND462022AAAIND209304AAA  2018-09-12 00:00:16.535741
1  trip-153671041653548748IND209304AAAIND000000ACB  2018-09-12 00:00:16.535741
2  trip-153671042288605164IND572101AAAIND561203AAB  2018-09-12 00:00:22.886430
3  trip-153671042288605164IND561203AABIND562101AAA  2018-09-12 00:00:22.886430
4  trip-153671043369099517IND562132AAAIND000000ACB  2018-09-12 00:00:33.691250

```

	route_schedule_uuid	route_type	\
0	thanos::sroute:d7c989ba-a29b-4a0b-b2f4-288cdc6...	FTL	
1	thanos::sroute:d7c989ba-a29b-4a0b-b2f4-288cdc6...	FTL	
2	thanos::sroute:3a1b0ab2-bb0b-4c53-8c59-eb2a2c0...	Carting	
3	thanos::sroute:3a1b0ab2-bb0b-4c53-8c59-eb2a2c0...	Carting	
4	thanos::sroute:de5e208e-7641-45e6-8100-4d9fb1e...	FTL	

	trip_uuid	source_center	source_name	\
0	trip-153671041653548748	IND462022AAA	Bhopal_Trnsport_H	
1	trip-153671041653548748	IND209304AAA	Kanpur_Central_H_6	
2	trip-153671042288605164	IND572101AAA	Tumkur_Veersagr_I	
3	trip-153671042288605164	IND561203AAB	Doddablpur_ChikaDPP_D	
4	trip-153671043369099517	IND562132AAA	Bangalore_Nelmngla_H	

	destination_center	destination_name	od_start_time	\
0	IND209304AAA	Kanpur_Central_H_6	2018-09-12 00:00:16.535741	
1	IND000000ACB	Gurgaon_Bilaspur_HB	2018-09-12 16:39:46.858469	
2	IND561203AAB	Doddablpur_ChikaDPP_D	2018-09-12 00:00:22.886430	
3	IND562101AAA	Chikblapur_ShntiSgr_D	2018-09-12 02:03:09.655591	
4	IND000000ACB	Gurgaon_Bilaspur_HB	2018-09-12 00:00:33.691250	

	od_end_time	start_scan_to_end_scan	\
0	2018-09-12 16:39:46.858469	999.0	
1	2018-09-13 13:40:23.123744	1260.0	
2	2018-09-12 02:03:09.655591	122.0	
3	2018-09-12 03:01:59.598855	58.0	
4	2018-09-14 03:40:17.106733	3099.0	

	actual_distance_to_destination	actual_time	osrm_time	osrm_distance	\
0	5082.046634	830.0	388.0	544.8027	
1	3778.765471	732.0	329.0	446.5496	
2	186.897974	96.0	42.0	56.9116	
3	53.310332	47.0	26.0	28.1994	
4	66437.911988	2736.0	1528.0	2072.8556	

	segment_actual_time	segment_osrm_distance	segment_osrm_time	\
0	820.0	649.8528	474.0	
1	728.0	670.6205	534.0	
2	95.0	55.9899	39.0	
3	46.0	28.1995	26.0	
4	2700.0	2227.5270	1710.0	

	source_state	source_city	source_place	source_code	destination_state	\
0	Madhya Pradesh	Bhopal	Trnsport	H	Uttar Pradesh	
1	Uttar Pradesh	Kanpur	Central	H_6	Haryana	
2	Karnataka	Tumkur	Veersagr	I	Karnataka	

3	Karnataka	Doddablpur	ChikaDPP	D	Karnataka
4	Karnataka	Bengaluru	Nelmnsla	H	Haryana

	destination_city	destination_place	destination_code	trip_year	trip_month	\
0	Kanpur	Central	H_6	2018	9	
1	Gurgaon	Bilaspur	HB	2018	9	
2	Doddablpur	ChikaDPP	D	2018	9	
3	Chikblapur	ShntiSgr	D	2018	9	
4	Gurgaon	Bilaspur	HB	2018	9	

	trip_day	trip_time	trip_hour	trip_week	trip_day_of_week	\
0	12	00:00:16.535741	0	37	2	
1	12	00:00:16.535741	0	37	2	
2	12	00:00:22.886430	0	37	2	
3	12	00:00:22.886430	0	37	2	
4	12	00:00:33.691250	0	37	2	

	od_start_to_end
0	999.505379
1	1260.604421
2	122.779486
3	58.832388
4	3099.723591

```
[185]: segment[segment["trip_uuid"] == "trip-153741093647649320"]
```

```
[185]:
segment_primary_key \
10370 trip-153741093647649320IND388121AAAIND388620AAB
10371 trip-153741093647649320IND388620AABIND388320AAA

trip_creation_time \
10370 2018-09-20 02:35:36.476840
10371 2018-09-20 02:35:36.476840

route_schedule_uuid route_type \
10370 thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3... Carting
10371 thanos::sroute:eb7bfc78-b351-4c0e-a951-fa3d5c3... Carting

trip_uuid source_center source_name \
10370 trip-153741093647649320 IND388121AAA Anand_VUNagar_DC
10371 trip-153741093647649320 IND388620AAB Khambhat_MotvdDPP_D

destination_center destination_name od_start_time \
10370 IND388620AAB Khambhat_MotvdDPP_D 2018-09-20 03:21:32.418600
10371 IND388320AAA Anand_Vaghasi_IP 2018-09-20 04:47:45.236797

od_end_time start_scan_to_end_scan \
```

10370	2018-09-20 04:47:45.236797	86.0
10371	2018-09-20 06:36:55.627764	109.0

	actual_distance_to_destination	actual_time	osrm_time	osrm_distance \
10370	132.513850	68.0	44.0	54.2181
10371	139.045383	102.0	45.0	53.2334

	segment_actual_time	segment_osrm_distance	segment_osrm_time \
10370	67.0	49.4772	44.0
10371	100.0	53.2334	44.0

	source_state	source_city	source_place	source_code	destination_state \
10370	Gujarat	Anand	VUNagar	DC	Gujarat
10371	Gujarat	Khambhat	MotvdDPP	D	Gujarat

	destination_city	destination_place	destination_code	trip_year \
10370	Khambhat	MotvdDPP	D	2018
10371	Anand	Vaghasi	IP	2018

	trip_month	trip_day	trip_time	trip_hour	trip_week \
10370	9	20	02:35:36.476840	2	38
10371	9	20	02:35:36.476840	2	38

	trip_day_of_week	od_start_to_end
10370	3	86.213637
10371	3	109.173183

[186]: segment.info()

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 26222 entries, 0 to 26221
Data columns (total 35 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   segment_primary_key                  26222 non-null  object
1   trip_creation_time                   26222 non-null  datetime64[ns]
2   route_schedule_uuid                  26222 non-null  object
3   route_type                           26222 non-null  object
4   trip_uuid                            26222 non-null  object
5   source_center                        26222 non-null  object
6   source_name                          26222 non-null  object
7   destination_center                   26222 non-null  object
8   destination_name                     26222 non-null  object
9   od_start_time                        26222 non-null  datetime64[ns]
10  od_end_time                          26222 non-null  datetime64[ns]
11  start_scan_to_end_scan                26222 non-null  float64
12  actual_distance_to_destination        26222 non-null  float64
```

13	actual_time	26222	non-null	float64
14	osrm_time	26222	non-null	float64
15	osrm_distance	26222	non-null	float64
16	segment_actual_time	26222	non-null	float64
17	segment_osrm_distance	26222	non-null	float64
18	segment_osrm_time	26222	non-null	float64
19	source_state	26222	non-null	object
20	source_city	26222	non-null	object
21	source_place	26222	non-null	object
22	source_code	26222	non-null	object
23	destination_state	26222	non-null	object
24	destination_city	26222	non-null	object
25	destination_place	26222	non-null	object
26	destination_code	26222	non-null	object
27	trip_year	26222	non-null	int64
28	trip_month	26222	non-null	int64
29	trip_day	26222	non-null	int64
30	trip_time	26222	non-null	object
31	trip_hour	26222	non-null	int64
32	trip_week	26222	non-null	UInt32
33	trip_day_of_week	26222	non-null	int64
34	od_start_to_end	26222	non-null	float64

dtypes: UInt32(1), datetime64[ns](3), float64(9), int64(5), object(17)
memory usage: 6.9+ MB

3.2.2 Trip level or Order level Aggregation

```
[187]: trip_aggregation_dict = {
    'trip_creation_time' : 'first',
    'route_schedule_uuid' : 'first',
    'route_type' : 'first',
    'source_center' : 'first',
    'source_name' : 'first',
    'destination_center' : 'last',
    'destination_name' : 'last',
    'od_start_time' : 'first',
    'od_end_time' : 'last',
    'start_scan_to_end_scan' : 'sum',
    'actual_distance_to_destination' : 'sum',
    'actual_time' : 'sum',
    'osrm_time' : 'sum',
    'osrm_distance' : 'sum',
    'segment_actual_time' : 'sum',
    'segment_osrm_distance' : 'sum',
    'segment_osrm_time' : 'sum',
    'source_state' : "first",
    'source_city' : "first",
```

```

    'source_place' : "first",
    'source_code' : "first",
    'destination_state' : "last",
    'destination_city' : "last",
    'destination_place' : "last",
    'destination_code' : "last",
    'trip_year' : "first",
    'trip_month' : "first",
    'trip_day' : "first",
    'trip_time' : "first",
    'trip_hour' : "first",
    'trip_week' : "first",
    'trip_day_of_week' : "first",
    'od_start_to_end' : "sum"
}

```

```
[188]: trip = delhivery.groupby('trip_uuid').agg(trip_aggregation_dict).reset_index()
trip = trip.sort_values(by=['od_start_time'], ascending=True).reset_index()
```

```
[189]: trip = trip.drop("index",axis = 1)
```

```
[190]: trip.head()
```

```
[190]:
      trip_uuid      trip_creation_time \
0  trip-153671041653548748  2018-09-12 00:00:16.535741
1  trip-153671042288605164  2018-09-12 00:00:22.886430
2  trip-153671043369099517  2018-09-12 00:00:33.691250
3  trip-153671046011330457  2018-09-12 00:01:00.113710
4  trip-153671052974046625  2018-09-12 00:02:09.740725
```

```

      route_schedule_uuid route_type source_center \
0  thanos::sroute:d7c989ba-a29b-4a0b-b2f4-288cdc6...      FTL  IND462022AAA
1  thanos::sroute:3a1b0ab2-bb0b-4c53-8c59-eb2a2c0...  Carting  IND572101AAA
2  thanos::sroute:de5e208e-7641-45e6-8100-4d9fb1e...      FTL  IND562132AAA
3  thanos::sroute:f0176492-a679-4597-8332-bbd1c7f...  Carting  IND400072AAB
4  thanos::sroute:d9f07b12-65e0-4f3b-bec8-df06134...      FTL  IND583101AAA

```

```

      source_name destination_center      destination_name \
0  Bhopal_Trnsport_H      IND000000ACB  Gurgaon_Bilaspur_HB
1  Tumkur_Veersagr_I      IND562101AAA  Chikblapur_ShntiSgr_D
2  Bangalore_Nelmngla_H  IND160002AAC  Chandigarh_Mehmdpur_H
3  Mumbai_Hub      IND401104AAA      Mumbai_MiraRd_IP
4  Bellary_Dc      IND583101AAA      Bellary_Dc

```

```

      od_start_time      od_end_time \
0  2018-09-12 00:00:16.535741  2018-09-13 13:40:23.123744
1  2018-09-12 00:00:22.886430  2018-09-12 03:01:59.598855

```

2 2018-09-12 00:00:33.691250 2018-09-14 17:34:55.442454
3 2018-09-12 00:01:00.113710 2018-09-12 01:41:29.809822
4 2018-09-12 00:02:09.740725 2018-09-12 12:00:30.683231

	start_scan_to_end_scan	actual_distance_to_destination	actual_time	\
0	43659.0	8860.812105	15682.0	
1	906.0	240.208306	399.0	
2	248631.0	68163.502238	112225.0	
3	200.0	28.529648	82.0	
4	1586.0	239.007304	556.0	

	osrm_time	osrm_distance	segment_actual_time	segment_osrm_distance	\
0	7787.0	10577.7647	1548.0	1320.4733	
1	210.0	269.4308	141.0	84.1894	
2	65768.0	89447.2488	3308.0	2545.2678	
3	24.0	31.6475	59.0	19.8766	
4	207.0	266.2914	340.0	146.7919	

	segment_osrm_time	source_state	source_city	source_place	source_code	\
0	1008.0	Madhya Pradesh	Bhopal	Trnsport	H	
1	65.0	Karnataka	Tumkur	Veersagr	I	
2	1941.0	Karnataka	Bengaluru	Nelmngla	H	
3	16.0	Maharashtra	Mumbai	Mumbai	Hub	
4	115.0	Karnataka	Bellary	Bellary	Dc	

	destination_state	destination_city	destination_place	destination_code	\
0	Haryana	Gurgaon	Bilaspur	HB	
1	Karnataka	Chikblapur	ShntiSgr	D	
2	Punjab	Chandigarh	Mehmdpur	H	
3	Maharashtra	Mumbai	MiraRd	IP	
4	Karnataka	Bellary	Bellary	Dc	

	trip_year	trip_month	trip_day	trip_time	trip_hour	trip_week	\
0	2018	9	12	00:00:16.535741	0	37	
1	2018	9	12	00:00:22.886430	0	37	
2	2018	9	12	00:00:33.691250	0	37	
3	2018	9	12	00:01:00.113710	0	37	
4	2018	9	12	00:02:09.740725	0	37	

	trip_day_of_week	od_start_to_end
0	2	43680.492537
1	2	913.174079
2	2	248694.383681
3	2	200.989870
4	2	1588.710998

4 CHAPTER 4: NULL VALUE & OUTLIER TREATMENT

4.1 Outlier Detection

4.1.1 Convert columns to respective data types

```
[191]: cat_cols = ['route_schedule_uuid', 'route_type', 'trip_uuid',  
                 'source_center', 'source_name', 'destination_center',  
                 'destination_name', 'source_state',  
                 'source_city', 'source_place', 'source_code', 'destination_state',  
                 'destination_city', 'destination_place', 'destination_code',  
                 'trip_year', 'trip_month', 'trip_day', 'trip_time', 'trip_hour',  
                 'trip_week', 'trip_day_of_week']  
num_cols = ['start_scan_to_end_scan', 'actual_distance_to_destination',  
            'actual_time', 'osrm_time', 'osrm_distance', 'segment_actual_time',  
            'segment_osrm_time', 'segment_osrm_distance', 'od_start_to_end']  
time_cols = ['trip_creation_time', 'od_start_time', 'od_end_time']
```

```
[192]: # Convert columns to respective data types  
for col in cat_cols:  
    delhivery[col] = delhivery[col].astype('object')  
    segment[col] = segment[col].astype('object')  
    trip[col] = trip[col].astype('object')
```

```
[193]: delhivery.dtypes
```

```
[193]: trip_creation_time      datetime64[ns]  
route_schedule_uuid          object  
route_type                   object  
trip_uuid                    object  
source_center                 object  
source_name                   object  
destination_center            object  
destination_name              object  
od_start_time                 datetime64[ns]  
od_end_time                   datetime64[ns]  
start_scan_to_end_scan        float64  
actual_distance_to_destination float64  
actual_time                   float64  
osrm_time                     float64  
osrm_distance                  float64  
segment_actual_time           float64  
segment_osrm_time             float64  
segment_osrm_distance         float64  
source_state                  object  
source_city                   object  
source_place                  object  
source_code                   object
```

destination_state	object
destination_city	object
destination_place	object
destination_code	object
trip_year	object
trip_month	object
trip_day	object
trip_time	object
trip_hour	object
trip_week	object
trip_day_of_week	object
od_start_to_end	float64
segment_primary_key	object
dtype:	object

4.1.2 Detection of NullValues

```
[194]: trip.isna().sum()
```

```
[194]: trip_uuid          0
trip_creation_time      0
route_schedule_uuid     0
route_type              0
source_center           0
source_name             0
destination_center      0
destination_name        0
od_start_time           0
od_end_time             0
start_scan_to_end_scan  0
actual_distance_to_destination 0
actual_time             0
osrm_time               0
osrm_distance           0
segment_actual_time     0
segment_osrm_distance   0
segment_osrm_time       0
source_state            0
source_city             0
source_place            0
source_code             0
destination_state       0
destination_city        0
destination_place       0
destination_code        0
trip_year               0
trip_month              0
```

```

trip_day          0
trip_time         0
trip_hour         0
trip_week         0
trip_day_of_week  0
od_start_to_end   0
dtype: int64

```

4.1.3 Descriptive Statistics

```
[195]: trip.describe(include = "all")
```

```

[195]:
      count      trip_uuid      trip_creation_time \
count      14787
unique      14787
top  trip-153671041653548748  2018-09-12 00:00:16.535741
freq          1          1
first      NaN  2018-09-12 00:00:16.535741
last      NaN  2018-10-03 23:59:42.701692
mean      NaN      NaN
std      NaN      NaN
min      NaN      NaN
25%      NaN      NaN
50%      NaN      NaN
75%      NaN      NaN
max      NaN      NaN

      count      route_schedule_uuid  route_type \
count      14787      14787
unique      1497          2
top  thanos::sroute:a16bfa03-3462-4bce-9c82-5784c7d...  Carting
freq          53      8906
first      NaN      NaN
last      NaN      NaN
mean      NaN      NaN
std      NaN      NaN
min      NaN      NaN
25%      NaN      NaN
50%      NaN      NaN
75%      NaN      NaN
max      NaN      NaN

      count      source_center      source_name  destination_center \
count      14787      14787      14787
unique      865      865      951
top  IND000000ACB  Gurgaon_Bilaspur_HB  IND000000ACB
freq          937      937      813

```


first	NaN	NaN	NaN
last	NaN	NaN	NaN
mean	NaN	NaN	NaN
std	NaN	NaN	NaN
min	NaN	NaN	NaN
25%	NaN	NaN	NaN
50%	NaN	NaN	NaN
75%	NaN	NaN	NaN
max	NaN	NaN	NaN

	destination_name	od_start_time	\
count	14787	14787	
unique	951	14787	
top	Gurgaon_Bilaspur_HB	2018-09-12 00:00:16.535741	
freq	813	1	
first	NaN	2018-09-12 00:00:16.535741	
last	NaN	2018-10-04 20:15:07.233819	
mean	NaN	NaN	
std	NaN	NaN	
min	NaN	NaN	
25%	NaN	NaN	
50%	NaN	NaN	
75%	NaN	NaN	
max	NaN	NaN	

	od_end_time	start_scan_to_end_scan	\
count	14787	14787.000000	
unique	14787	NaN	
top	2018-09-13 13:40:23.123744	NaN	
freq	1	NaN	
first	2018-09-12 00:50:10.814399	NaN	
last	2018-10-08 03:00:24.353479	NaN	
mean	NaN	9405.355853	
std	NaN	33734.920594	
min	NaN	26.000000	
25%	NaN	406.000000	
50%	NaN	980.000000	
75%	NaN	2814.000000	
max	NaN	396800.000000	

	actual_distance_to_destination	actual_time	osrm_time	\
count	14787.000000	14787.000000	14787.000000	
unique	NaN	NaN	NaN	
top	NaN	NaN	NaN	
freq	NaN	NaN	NaN	
first	NaN	NaN	NaN	
last	NaN	NaN	NaN	

mean	2290.673675	4079.498546	2092.831406
std	8806.795817	15231.934085	7964.769556
min	9.002461	9.000000	6.000000
25%	49.580093	142.000000	61.000000
50%	133.933562	346.000000	167.000000
75%	460.606591	1059.000000	510.500000
max	85110.885093	167920.000000	76953.000000

	osrm_distance	segment_actual_time	segment_osrm_distance	\
count	14787.000000	14787.000000	14787.000000	
unique	NaN	NaN	NaN	
top	NaN	NaN	NaN	
freq	NaN	NaN	NaN	
first	NaN	NaN	NaN	
last	NaN	NaN	NaN	
mean	2786.867034	353.059174	222.705466	
std	10769.741065	556.365911	416.846279	
min	9.072900	9.000000	9.072900	
25%	65.635550	66.000000	32.578850	
50%	172.886300	147.000000	69.784200	
75%	603.955400	364.000000	216.560600	
max	102415.868000	6230.000000	3523.632400	

	segment_osrm_time	source_state	source_city	source_place	source_code	\
count	14787.000000	14787	14787	14787	14787	
unique	NaN	29	649	736	46	
top	NaN	Maharashtra	Bengaluru	Central	HB	
freq	NaN	2682	1889	1039	3305	
first	NaN	NaN	NaN	NaN	NaN	
last	NaN	NaN	NaN	NaN	NaN	
mean	180.511598	NaN	NaN	NaN	NaN	
std	314.679279	NaN	NaN	NaN	NaN	
min	6.000000	NaN	NaN	NaN	NaN	
25%	30.000000	NaN	NaN	NaN	NaN	
50%	65.000000	NaN	NaN	NaN	NaN	
75%	184.000000	NaN	NaN	NaN	NaN	
max	2564.000000	NaN	NaN	NaN	NaN	

	destination_state	destination_city	destination_place	destination_code	\
count	14787	14787	14787	14787	
unique	32	743	817	49	
top	Maharashtra	Bengaluru	Central	H	
freq	2591	1913	924	2750	
first	NaN	NaN	NaN	NaN	
last	NaN	NaN	NaN	NaN	
mean	NaN	NaN	NaN	NaN	
std	NaN	NaN	NaN	NaN	

min	NaN	NaN	NaN	NaN
25%	NaN	NaN	NaN	NaN
50%	NaN	NaN	NaN	NaN
75%	NaN	NaN	NaN	NaN
max	NaN	NaN	NaN	NaN

	trip_year	trip_month	trip_day	trip_time	trip_hour	\
count	14787.0	14787.0	14787.0	14787	14787.0	
unique	1.0	2.0	22.0	14787	24.0	
top	2018.0	9.0	18.0	00:00:16.535741	22.0	
freq	14787.0	13011.0	791.0	1	1123.0	
first	NaN	NaN	NaN	NaN	NaN	
last	NaN	NaN	NaN	NaN	NaN	
mean	NaN	NaN	NaN	NaN	NaN	
std	NaN	NaN	NaN	NaN	NaN	
min	NaN	NaN	NaN	NaN	NaN	
25%	NaN	NaN	NaN	NaN	NaN	
50%	NaN	NaN	NaN	NaN	NaN	
75%	NaN	NaN	NaN	NaN	NaN	
max	NaN	NaN	NaN	NaN	NaN	

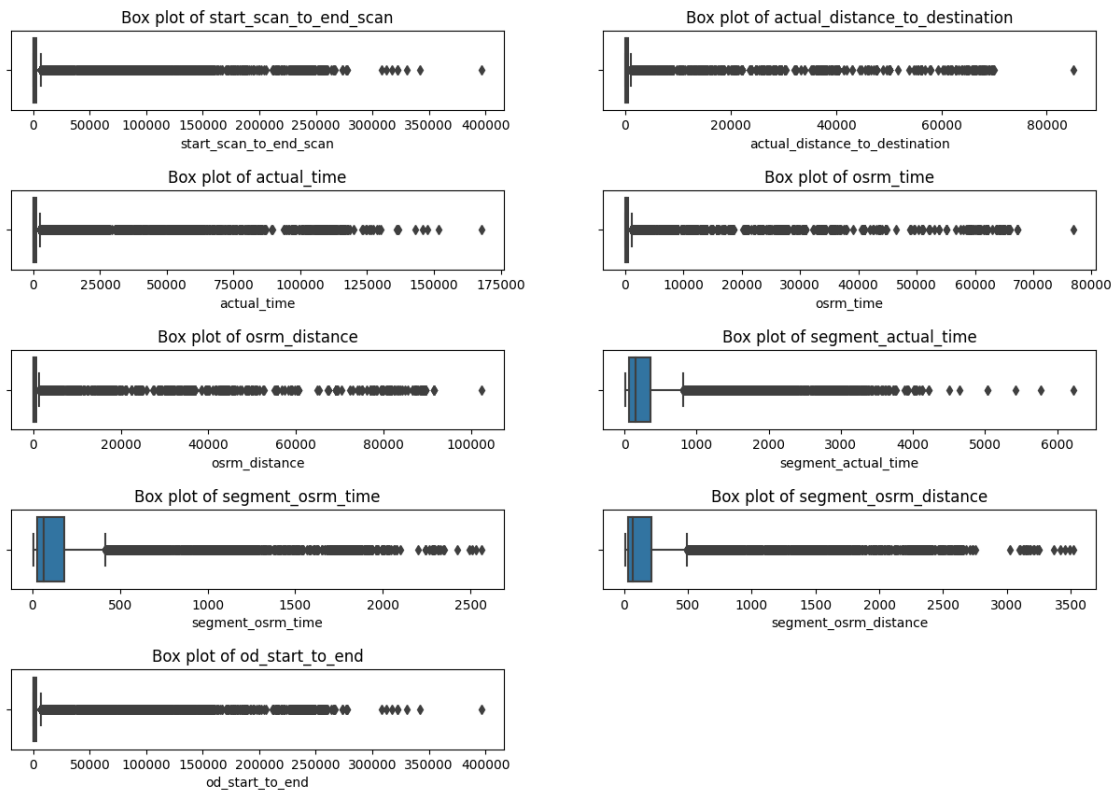
	trip_week	trip_day_of_week	od_start_to_end
count	14787.0	14787.0	14787.000000
unique	4.0	7.0	NaN
top	38.0	2.0	NaN
freq	5001.0	2731.0	NaN
first	NaN	NaN	NaN
last	NaN	NaN	NaN
mean	NaN	NaN	9410.196563
std	NaN	NaN	33740.951733
min	NaN	NaN	26.499164
25%	NaN	NaN	407.969012
50%	NaN	NaN	982.887038
75%	NaN	NaN	2823.122837
max	NaN	NaN	396834.692995

4.1.4 Find outliers in the numerical variables (you might find outliers in almost all the variables), and check it using visual analysis

```
[196]: #Box plot for each numerical column
fig = plt.figure(figsize = (15,10))
plt.suptitle("Outlier Detection Box plots")
k = 1
for i in num_cols:
    plt.subplot(math.ceil(len(num_cols)/2),2,k)
    plt.title(f"Box plot of {i}")
    k += 1
```

```
sns.boxplot(data=trip, x = i,orient="h")
plt.subplots_adjust(hspace = 1)
plt.show()
```

Outlier Detection Box plots



So many outliers are present in every numerical column

```
[197]: # # understanding the distribution for numerical variables
# fig = plt.figure(figsize = (15,25))
# plt.suptitle("Outlier Detection Box plots")
# k = 1
# for i in num_cols:
#     plt.subplot(math.ceil(len(num_cols)/2),2,k)
#     plt.title(f"Box plot of {i}")
#     k += 1
#     sns.histplot(data = trip, x= i, kde = True)
# plt.subplots_adjust(hspace = 1)
# plt.tight_layout()
# plt.show()
```

Normal distribution is not available in above graphs

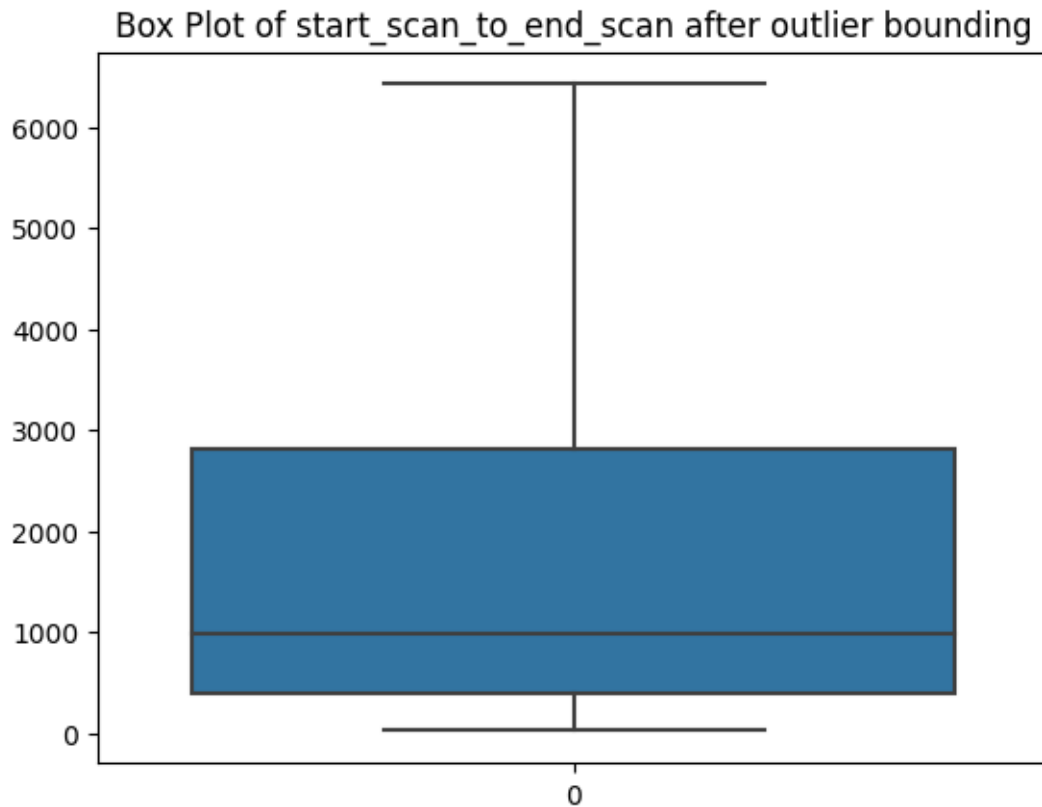
4.2 Handle the outliers using the IQR method Bounding to whiskers method

```
[198]: s = np.where(trip["od_start_to_end"]<6445.  
↳853574162498,trip["od_start_to_end"],6445.853574162498)
```

```
[199]: #create a function to find outliers using IQR (Statistical way)  
def find_outliers_IQR(df):  
    q1=df.quantile(0.25)  
    q3=df.quantile(0.75)  
    IQR=q3-q1  
    upper_whisker = q3+1.5*IQR  
    lower_whisker = q1-1.5*IQR  
    outliers = df[((df<(q1-1.5*IQR)) | (df>(q3+1.5*IQR)))]  
    print("number of outliers =", (len(outliers)))  
    print("max outlier value =", (outliers.max()))  
    print("min outlier value =", (outliers.min()))  
    print("Inter Quartile range =",IQR)  
    print("upper_whisker =", upper_whisker)  
    print("lower whisker =", lower_whisker)  
    return (upper_whisker,lower_whisker)
```

```
[200]: for i in num_cols:  
    print(f"Outliers statistics of {i} column")  
    upper_whisker,lower_whisker = find_outliers_IQR(trip[i])  
    trip[i] = np.where(trip[i] < upper_whisker,  
        np.where(trip[i] >= lower_whisker,  
            trip[i],0),  
            upper_whisker)  
    print(f"Removing the outliers of {i} by bounding the outliers to upper and_  
↳lower whiskers")  
    plt.title(f"Box Plot of {i} after outlier bounding")  
    sns.boxplot(data = trip[i])  
    plt.show()  
    print()
```

```
Outliers statistics of start_scan_to_end_scan column  
number of outliers = 2020  
max outlier value = 396800.0  
min outlier value = 6432.0  
Inter Quartile range = 2408.0  
upper_whisker = 6426.0  
lower whisker = -3206.0  
Removing the outliers of start_scan_to_end_scan by bounding the outliers to  
upper and lower whiskers
```



Outliers statistics of actual_distance_to_destination column

number of outliers = 2124

max outlier value = 85110.88509258961

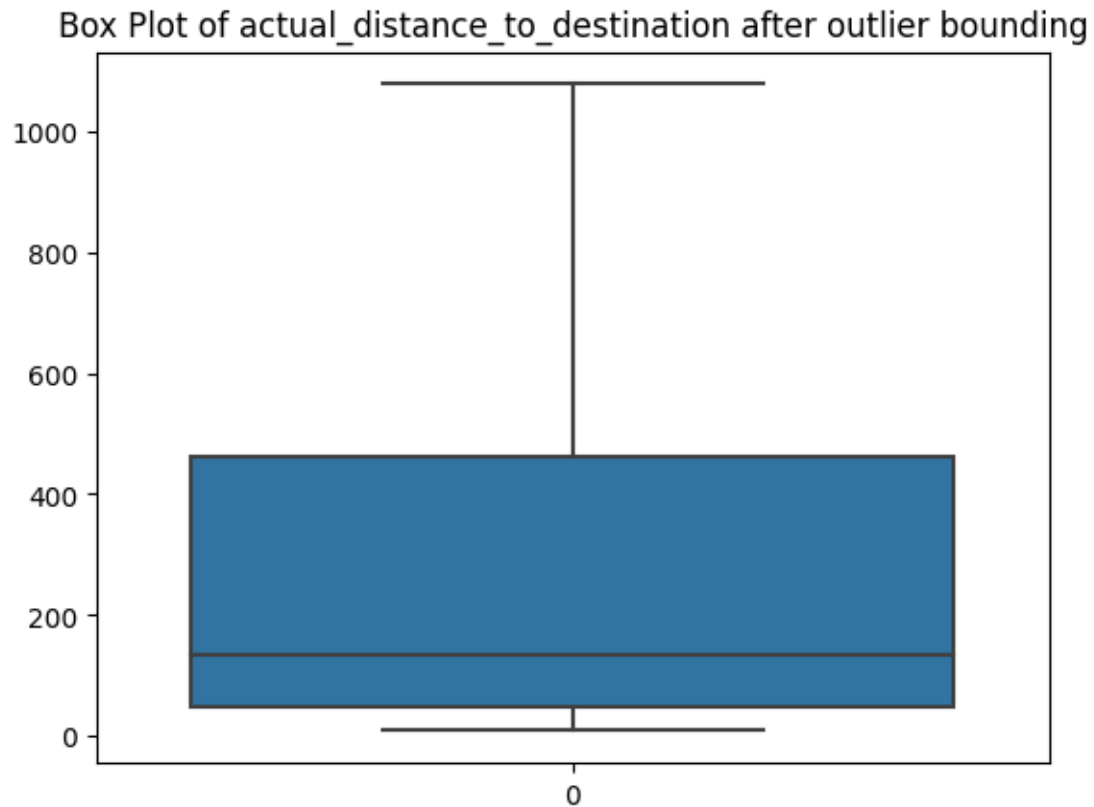
min outlier value = 1077.5324053322074

Inter Quartile range = 411.02649797873073

upper_whisker = 1077.1463380366472

lower whisker = -566.9596538782756

Removing the outliers of actual_distance_to_destination by bounding the outliers to upper and lower whiskers



Outliers statistics of actual_time column

number of outliers = 2069

max outlier value = 167920.0

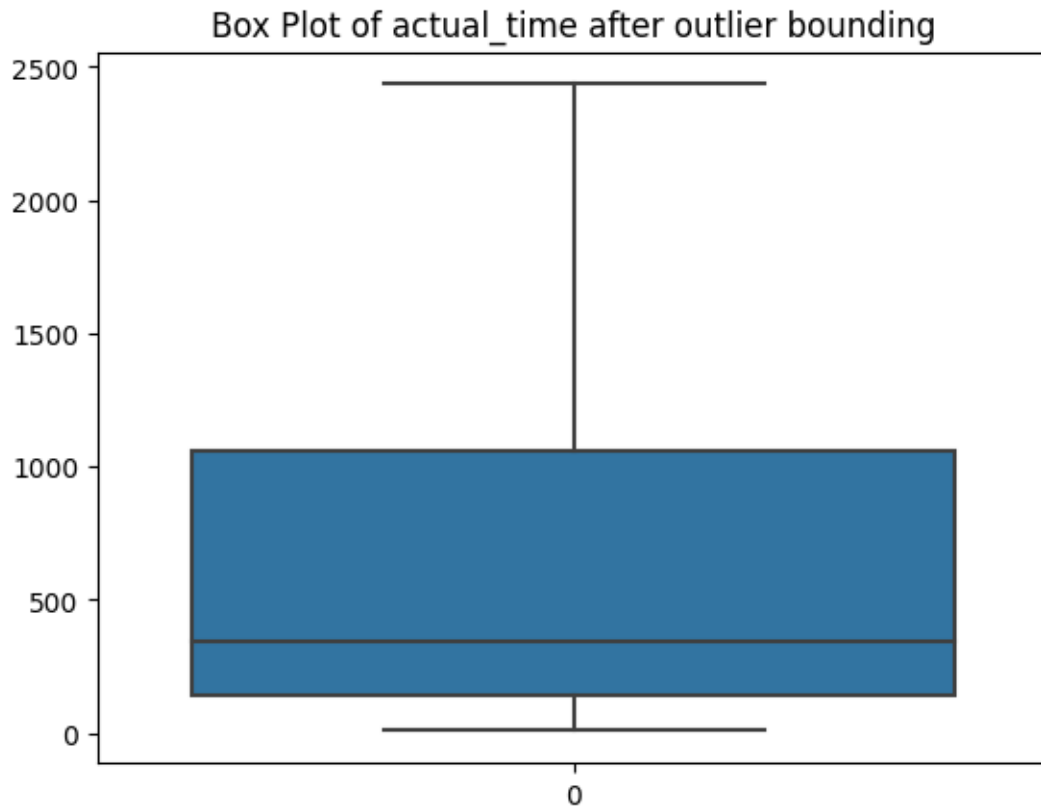
min outlier value = 2435.0

Inter Quartile range = 917.0

upper_whisker = 2434.5

lower whisker = -1233.5

Removing the outliers of actual_time by bounding the outliers to upper and lower whiskers



Outliers statistics of osrm_time column

number of outliers = 1958

max outlier value = 76953.0

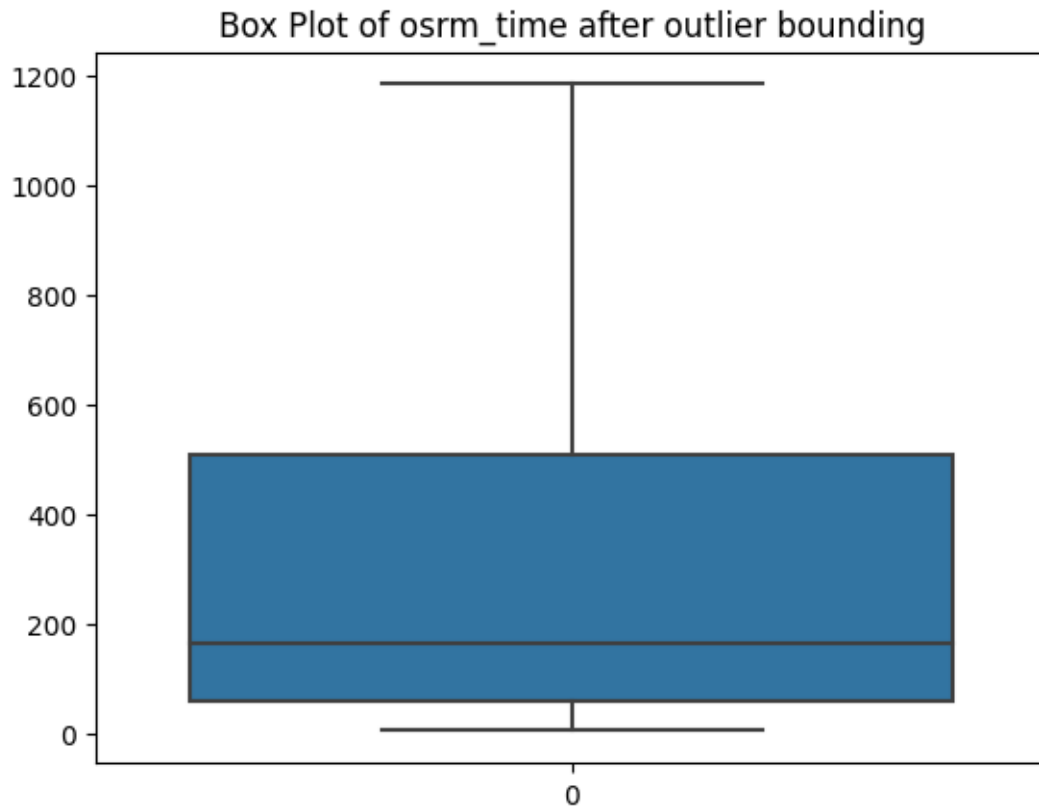
min outlier value = 1185.0

Inter Quartile range = 449.5

upper_whisker = 1184.75

lower whisker = -613.25

Removing the outliers of osrm_time by bounding the outliers to upper and lower whiskers



Outliers statistics of osrm_distance column

number of outliers = 2073

max outlier value = 102415.868

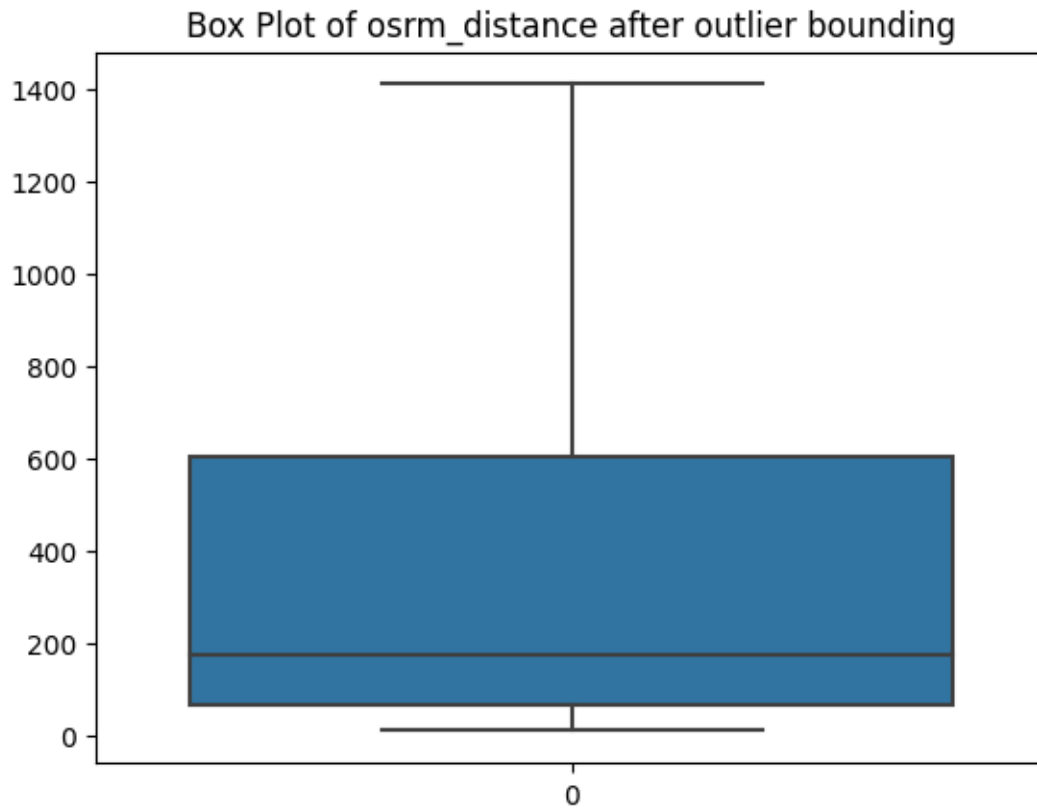
min outlier value = 1412.7296999999999

Inter Quartile range = 538.31985000000001

upper_whisker = 1411.435175

lower whisker = -741.84422500000002

Removing the outliers of osrm_distance by bounding the outliers to upper and lower whiskers



Outliers statistics of segment_actual_time column

number of outliers = 1644

max outlier value = 6230.0

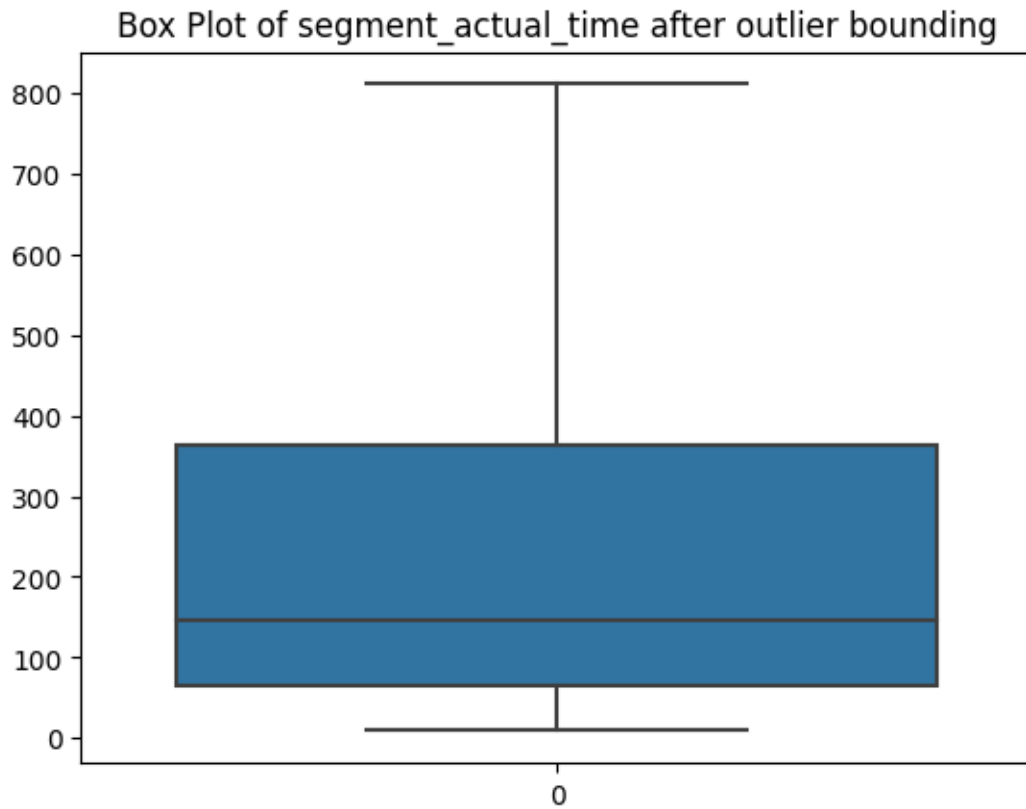
min outlier value = 813.0

Inter Quartile range = 298.0

upper_whisker = 811.0

lower whisker = -381.0

Removing the outliers of segment_actual_time by bounding the outliers to upper and lower whiskers



Outliers statistics of segment_osrm_time column

number of outliers = 1485

max outlier value = 2564.0

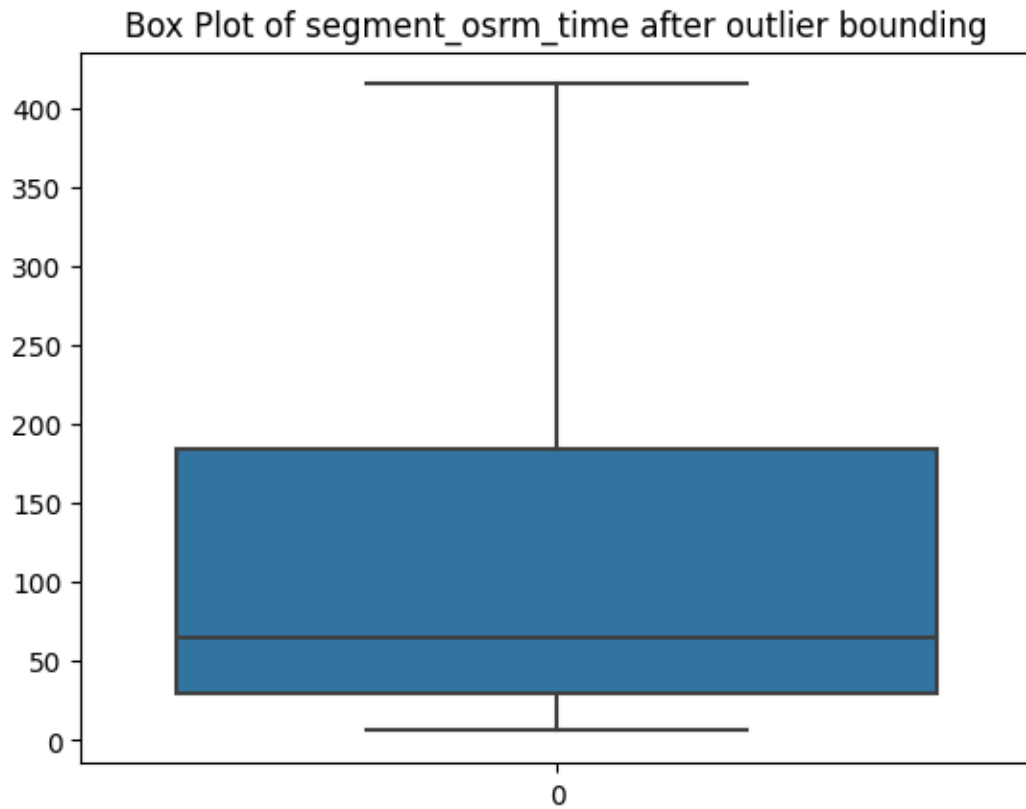
min outlier value = 416.0

Inter Quartile range = 154.0

upper_whisker = 415.0

lower whisker = -201.0

Removing the outliers of segment_osrm_time by bounding the outliers to upper and lower whiskers



Outliers statistics of segment_osrm_distance column

number of outliers = 1550

max outlier value = 3523.6324

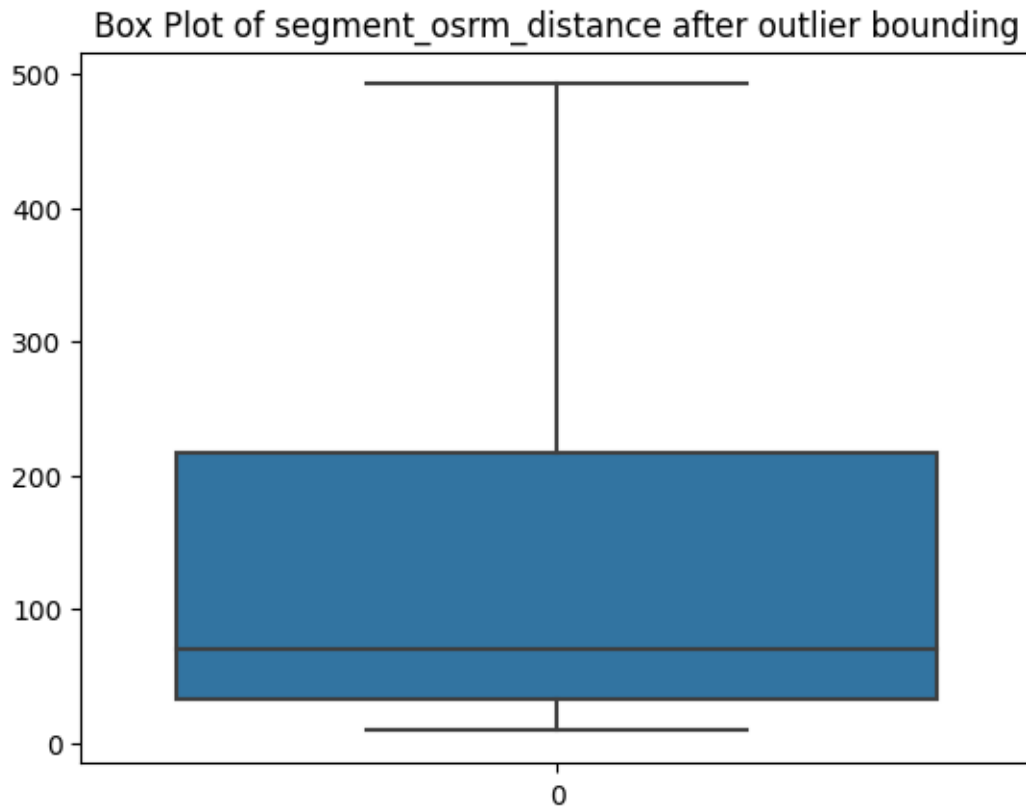
min outlier value = 493.5402

Inter Quartile range = 183.98174999999998

upper_whisker = 492.533225

lower whisker = -243.393775

Removing the outliers of segment_osrm_distance by bounding the outliers to upper and lower whiskers



Outliers statistics of od_start_to_end column

number of outliers = 2018

max outlier value = 396834.6929945834

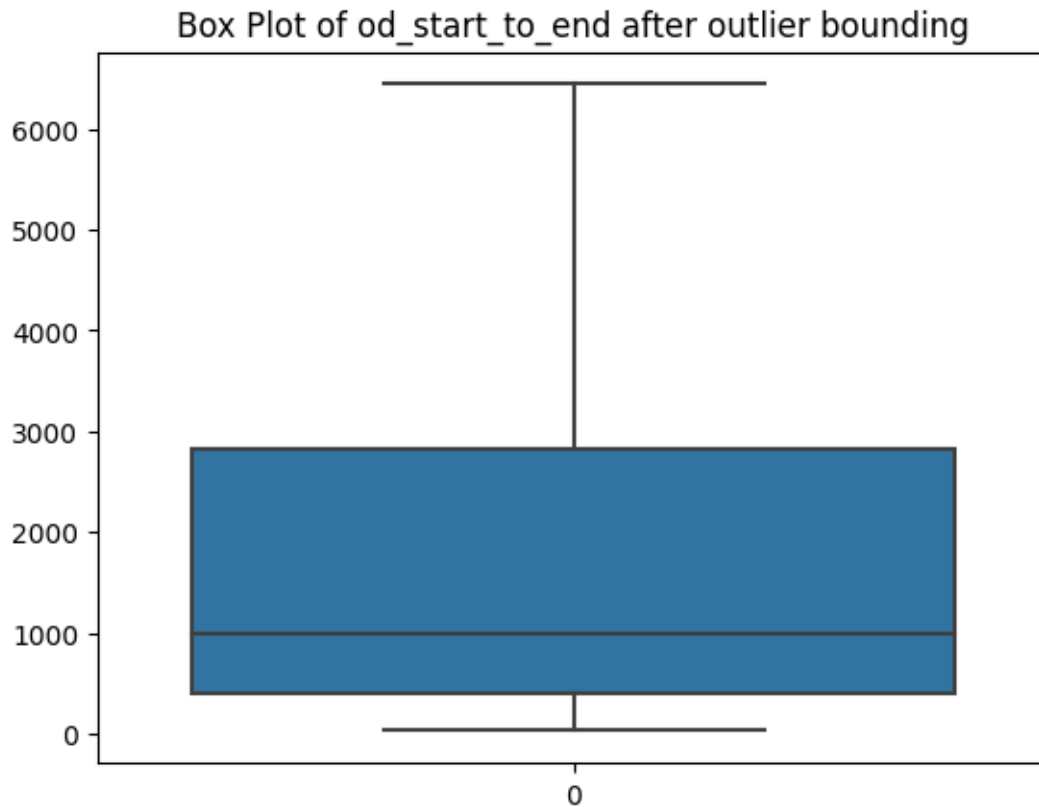
min outlier value = 6450.666158716666

Inter Quartile range = 2415.1538249583327

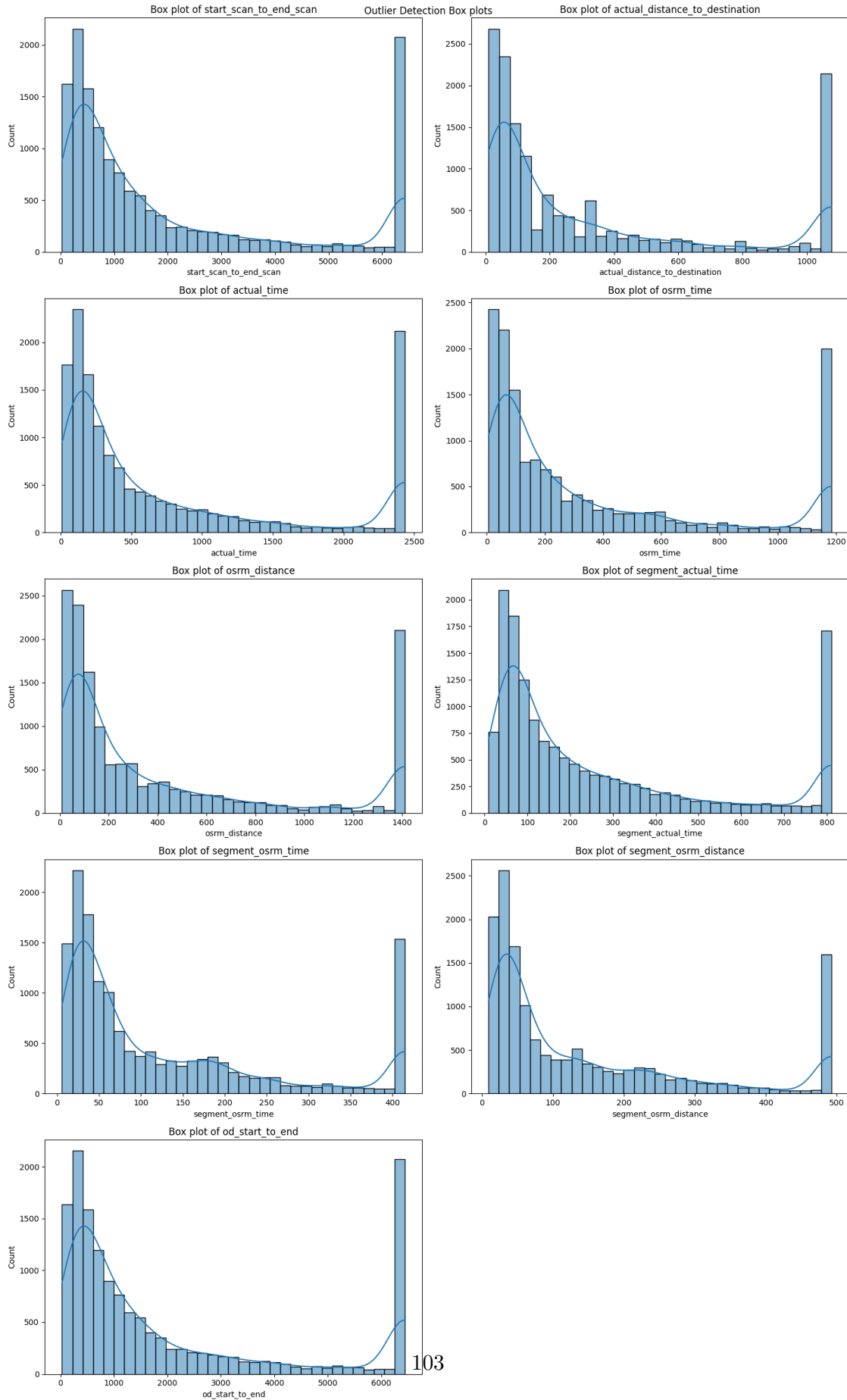
upper_whisker = 6445.853574162498

lower whisker = -3214.7617256708327

Removing the outliers of od_start_to_end by bounding the outliers to upper and lower whiskers



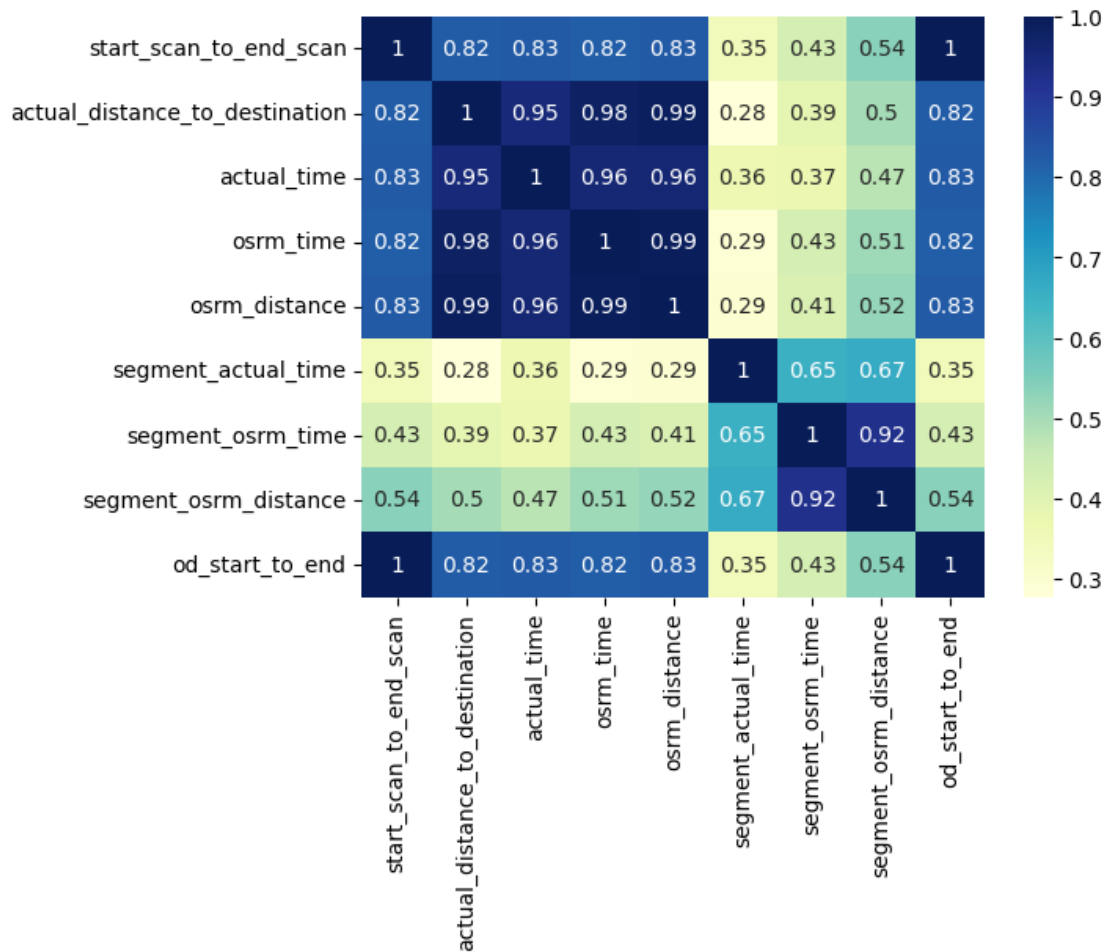
```
[201]: # understanding the distribution for numerical variables
fig = plt.figure(figsize = (15,25))
plt.suptitle("Outlier Detection Box plots")
k = 1
for i in num_cols:
    plt.subplot(math.ceil(len(num_cols)/2),2,k)
    plt.title(f"Box plot of {i}")
    k += 1
    sns.histplot(data = trip, x= i, kde = True)
plt.subplots_adjust(hspace = 1)
plt.tight_layout()
plt.show()
```



4.3 Correlation analysis

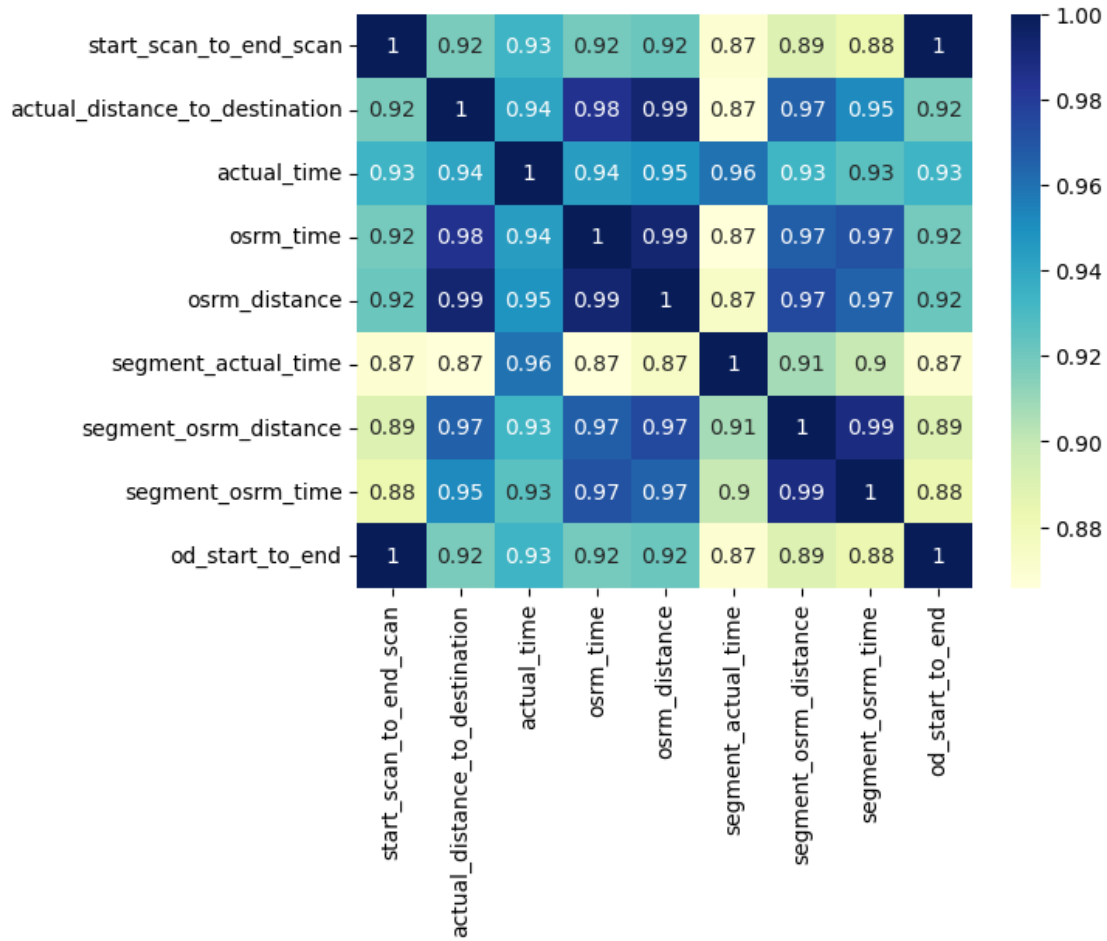
```
[202]: sns.heatmap(delhivery.corr(method = "spearman"), cmap="YlGnBu", annot=True)
```

[202]: <Axes: >



```
[203]: sns.heatmap(trip.corr(method = "spearman"), cmap="YlGnBu", annot=True)
```

[203]: <Axes: >



Improvement in correlation can be observed from pearson to spearman.

High correlation observed among all columns(0.88 to 1)

5 CHAPTER 5: COMPARISON & VISUALIZATION OF TIME AND DISTANCE FIELDS

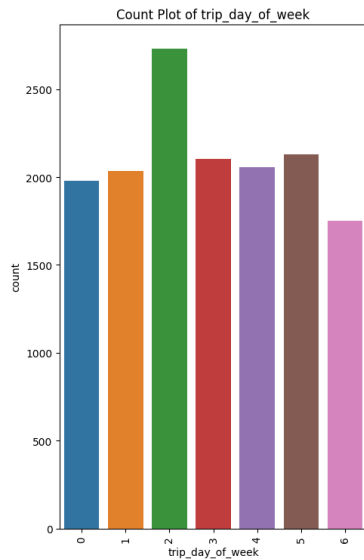
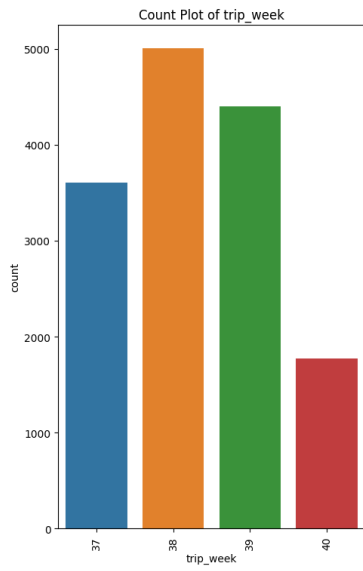
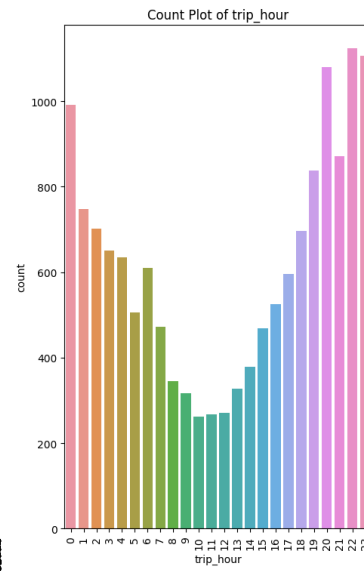
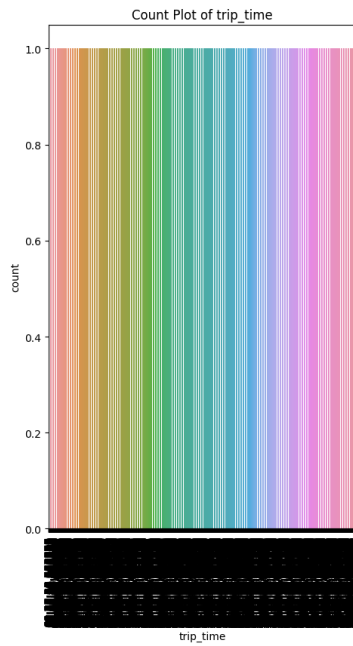
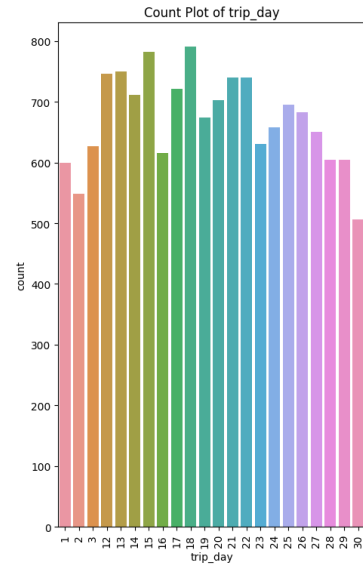
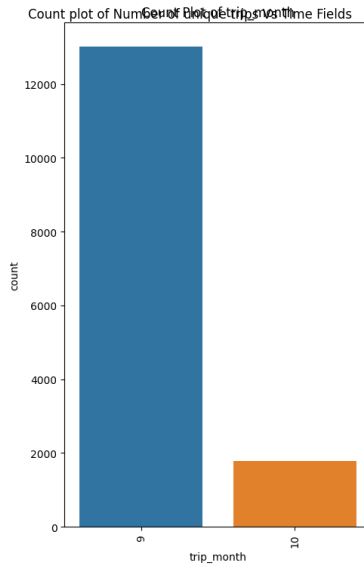
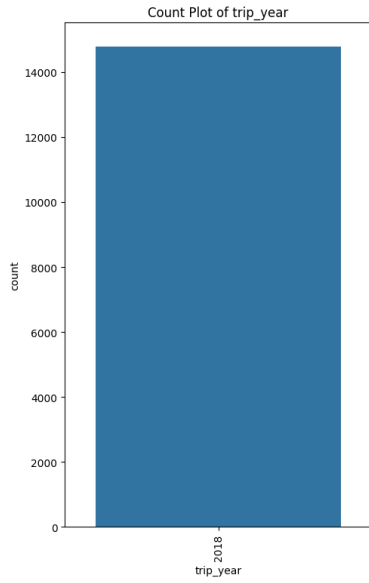
```
[204]: trip["source_city_place"] = trip["source_city"]+"_"+trip["source_place"]
```

```
[205]: trip["destination_city_place"] =_
        ↳trip["destination_city"]+"_"+trip["destination_place"]
```

```
[206]: time_fields = ['trip_year', 'trip_month', 'trip_day', 'trip_time', 'trip_hour',
                    'trip_week', 'trip_day_of_week']
        place_fields = ['source_state','destination_state',
```

```
'source_city','destination_city',  
↪ 'source_city_place','destination_city_place', 'source_code',  
↪ 'destination_code']
```

```
[207]: # understanding the number of trips (unique orders) Vs Time fields  
fig = plt.figure(figsize = (15,25))  
plt.suptitle("Count plot of Number of unique trips Vs Time Fields")  
k = 1  
for i in time_fields:  
    plt.subplot(math.ceil(len(time_fields)/3),3,k)  
    plt.title(f"Count Plot of {i}")  
    plt.xticks(rotation = 90)  
    k += 1  
    sns.countplot(data = trip, x= i)  
plt.subplots_adjust(hspace = 1)  
plt.subplots_adjust(top=0.92)  
plt.tight_layout()  
plt.show()
```



Observations:

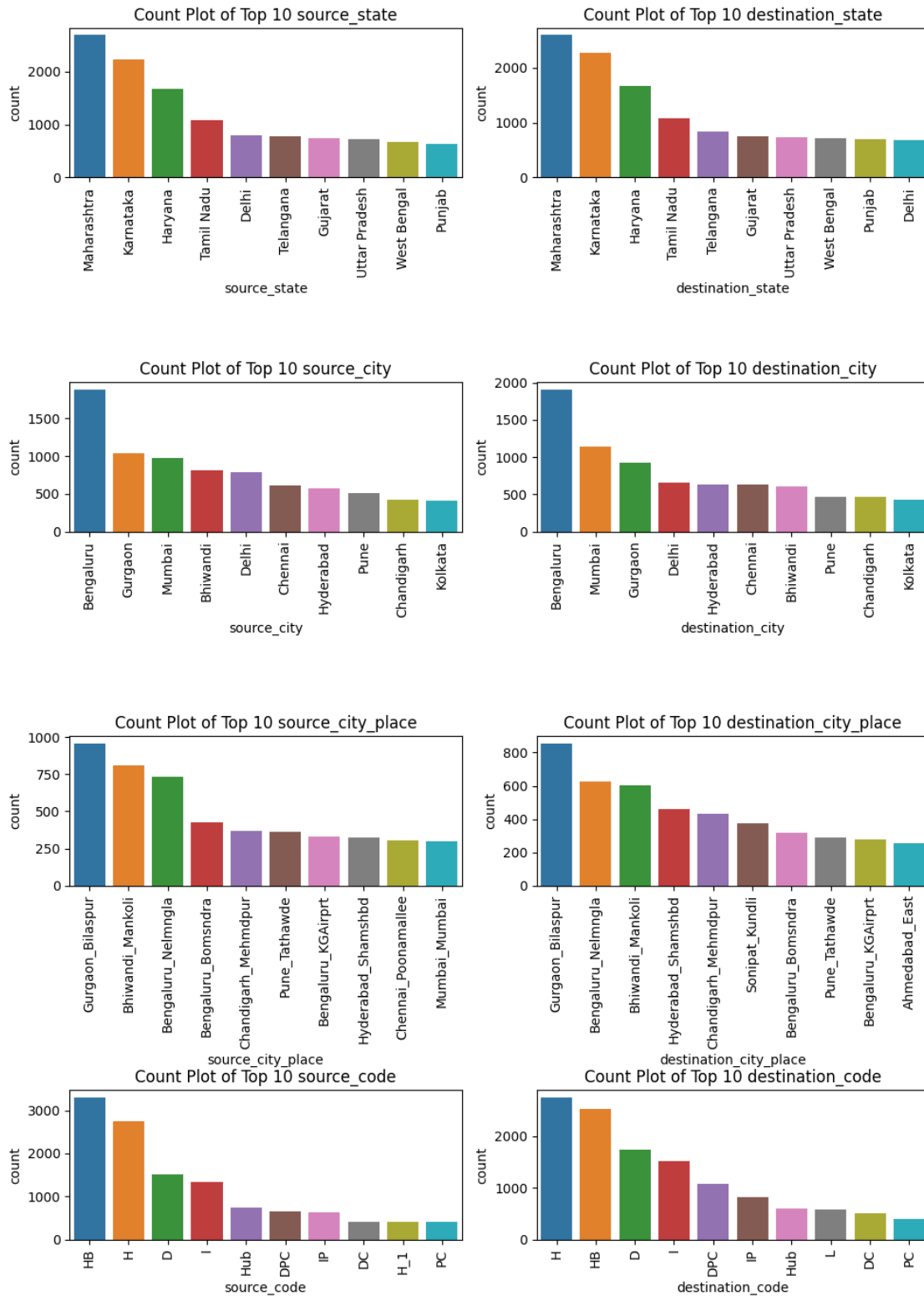
Only 2018 year, september and october data available

with respect to trip hour, during afternoons, less number of orders are registered

with respect to trip day of the week, Day 2: Monday registers more number of orders.

```
[208]: # understanding the number of trips (unique orders) Vs Place fields
fig = plt.figure(figsize = (10,15))
plt.suptitle("Count plot of Number of unique trips Vs Place Fields")
k = 1
for i in place_fields:
    plt.subplot(math.ceil(len(place_fields)/2),2,k)
    plt.title(f"Count Plot of Top 10 {i}")
    plt.xticks(rotation = 90)
    k += 1
    sns.countplot(data = trip, x = i, order=trip[i].value_counts().iloc[:10].
        ↪index)
plt.subplots_adjust(hspace = 1)
plt.tight_layout()
plt.subplots_adjust(top=0.9)
plt.show()
```

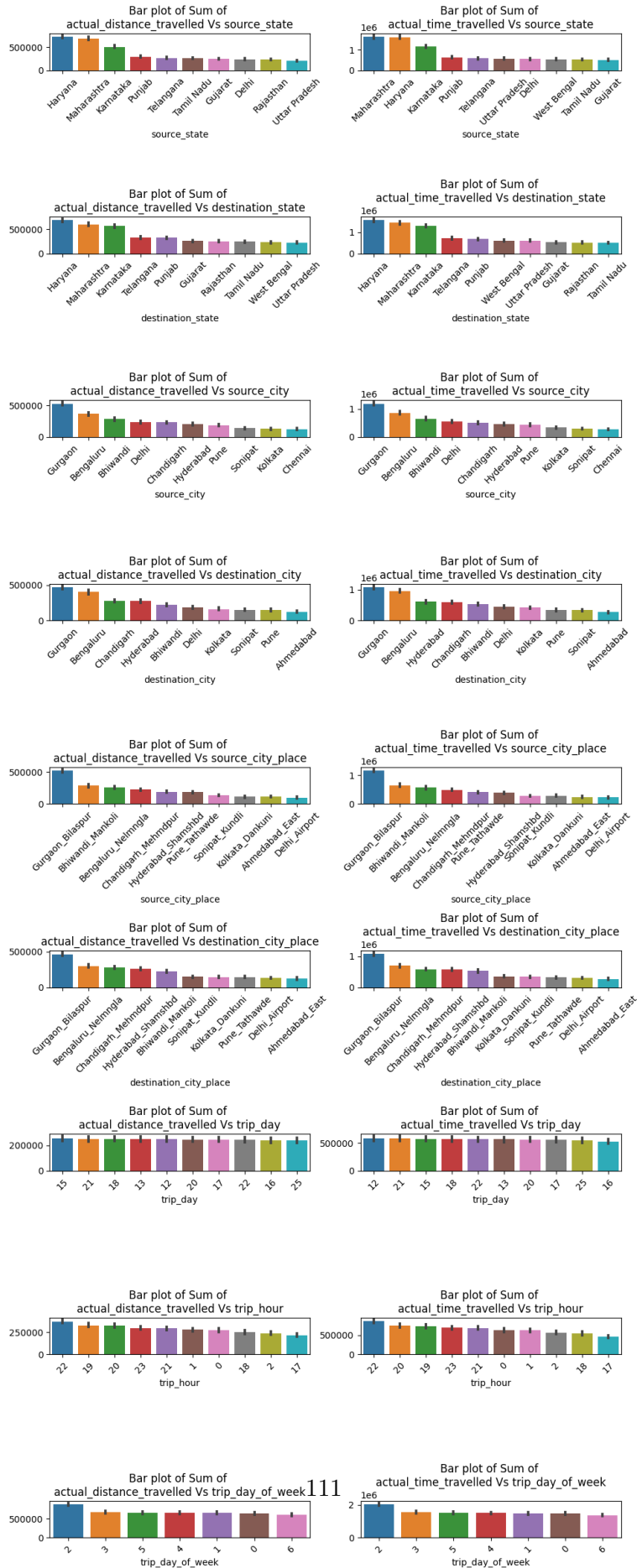
Count plot of Number of unique trips Vs Place Fields



```
[209]: num_fields = ['actual_distance_to_destination', 'actual_time']
cat_fields = ['source_state', 'destination_state',
             ↪
             ↪ 'source_city', 'destination_city', 'source_city_place', 'destination_city_place', ↪
             ↪ 'trip_day', 'trip_hour', 'trip_day_of_week']
```

```
[210]: # understanding the actual_distance & actual_time per trip Vs Categorical ↪
       ↪ Fields
fig = plt.figure(figsize = (10,25))
plt.suptitle("Bar plot Categorical Fields Vs (actual_distance_travelled & ↪
       ↪ actual_time_travelled)")
k = 1
for i in cat_fields:
    plt.subplot(math.ceil(len(cat_fields)),2,k)
    plt.title(f"Bar plot of Sum of \nactual_distance_travelled Vs {i}")
    plt.xticks(rotation = 45)
    k += 1
    sns.barplot(data = trip, x = i, y = num_fields[0], estimator= "sum",
                order=trip.groupby(i)[num_fields[0]].sum().
    ↪ sort_values(ascending=False).iloc[:10].index)
    plt.ylabel("")
    plt.subplot(math.ceil(len(cat_fields)),2,k)
    plt.title(f"Bar plot of Sum of \nactual_time_travelled Vs {i}")
    plt.xticks(rotation = 45)
    k += 1
    sns.barplot(data = trip, x = i, y = num_fields[1], estimator= "sum",
                order=trip.groupby(i)[num_fields[1]].sum().
    ↪ sort_values(ascending=False).iloc[:10].index)
    plt.ylabel("")
plt.subplots_adjust(hspace = 1)
plt.tight_layout()
plt.subplots_adjust(top=0.95)
plt.show()
```

Bar plot Categorical Fields Vs (actual_distance_travelled & actual_time_travelled)



```
[211]: trip.head()
```

```
[211]:
```

	trip_uuid	trip_creation_time	\
0	trip-153671041653548748	2018-09-12 00:00:16.535741	
1	trip-153671042288605164	2018-09-12 00:00:22.886430	
2	trip-153671043369099517	2018-09-12 00:00:33.691250	
3	trip-153671046011330457	2018-09-12 00:01:00.113710	
4	trip-153671052974046625	2018-09-12 00:02:09.740725	

	route_schedule_uuid	route_type	source_center	\
0	thanos::sroute:d7c989ba-a29b-4a0b-b2f4-288cdc6...	FTL	IND462022AAA	
1	thanos::sroute:3a1b0ab2-bb0b-4c53-8c59-eb2a2c0...	Carting	IND572101AAA	
2	thanos::sroute:de5e208e-7641-45e6-8100-4d9fb1e...	FTL	IND562132AAA	
3	thanos::sroute:f0176492-a679-4597-8332-bbd1c7f...	Carting	IND400072AAB	
4	thanos::sroute:d9f07b12-65e0-4f3b-bec8-df06134...	FTL	IND583101AAA	

	source_name	destination_center	destination_name	\
0	Bhopal_Trnsport_H	IND000000ACB	Gurgaon_Bilaspur_HB	
1	Tumkur_Veersagr_I	IND562101AAA	Chikblapur_ShntiSgr_D	
2	Bangalore_Nelmn gla_H	IND160002AAC	Chandigarh_Mehmdpur_H	
3	Mumbai Hub	IND401104AAA	Mumbai_MiraRd_IP	
4	Bellary_Dc	IND583101AAA	Bellary_Dc	

	od_start_time	od_end_time	\
0	2018-09-12 00:00:16.535741	2018-09-13 13:40:23.123744	
1	2018-09-12 00:00:22.886430	2018-09-12 03:01:59.598855	
2	2018-09-12 00:00:33.691250	2018-09-14 17:34:55.442454	
3	2018-09-12 00:01:00.113710	2018-09-12 01:41:29.809822	
4	2018-09-12 00:02:09.740725	2018-09-12 12:00:30.683231	

	start_scan_to_end_scan	actual_distance_to_destination	actual_time	\
0	6426.0	1077.146338	2434.5	
1	906.0	240.208306	399.0	
2	6426.0	1077.146338	2434.5	
3	200.0	28.529648	82.0	
4	1586.0	239.007304	556.0	

	osrm_time	osrm_distance	segment_actual_time	segment_osrm_distance	\
0	1184.75	1411.435175	811.0	492.533225	
1	210.00	269.430800	141.0	84.189400	
2	1184.75	1411.435175	811.0	492.533225	
3	24.00	31.647500	59.0	19.876600	
4	207.00	266.291400	340.0	146.791900	

	segment_osrm_time	source_state	source_city	source_place	source_code	\
--	-------------------	--------------	-------------	--------------	-------------	---

0	415.0	Madhya Pradesh	Bhopal	Trnsport	H
1	65.0	Karnataka	Tumkur	Veersagr	I
2	415.0	Karnataka	Bengaluru	Nelmngla	H
3	16.0	Maharashtra	Mumbai	Mumbai	Hub
4	115.0	Karnataka	Bellary	Bellary	Dc

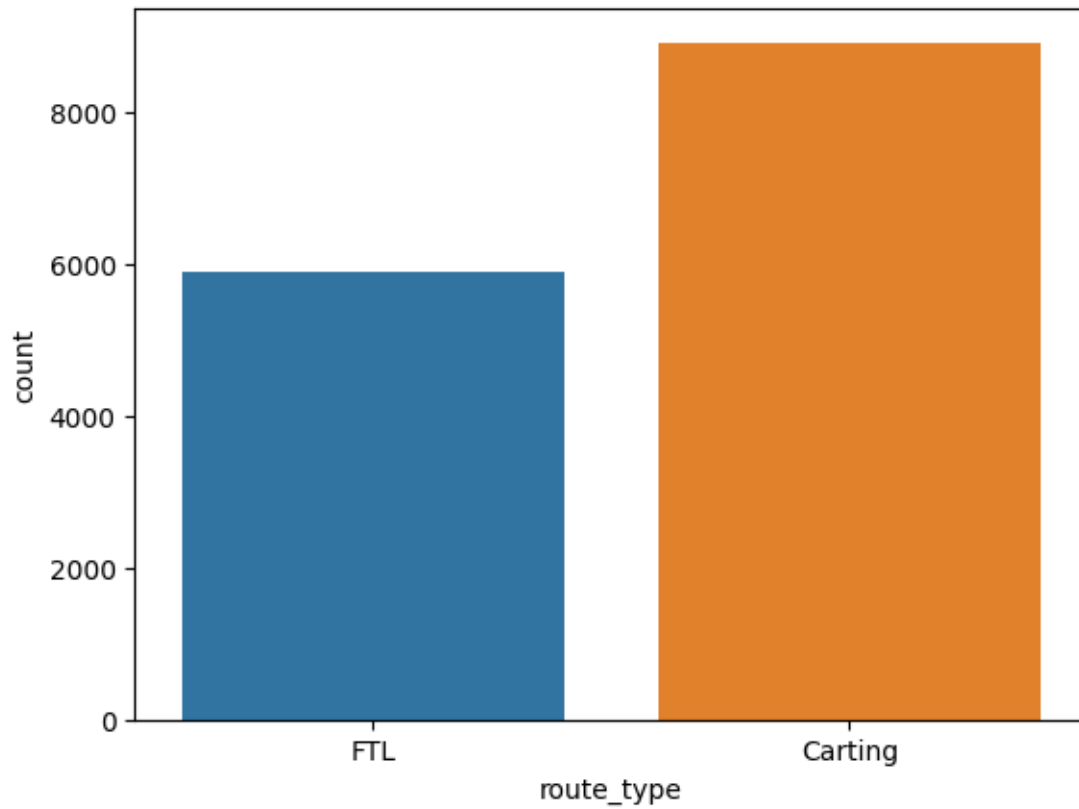
	destination_state	destination_city	destination_place	destination_code	\
0	Haryana	Gurgaon	Bilaspur	HB	
1	Karnataka	Chikblapur	ShntiSgr	D	
2	Punjab	Chandigarh	Mehmdpur	H	
3	Maharashtra	Mumbai	MiraRd	IP	
4	Karnataka	Bellary	Bellary	Dc	

	trip_year	trip_month	trip_day	trip_time	trip_hour	trip_week	\
0	2018	9	12	00:00:16.535741	0	37	
1	2018	9	12	00:00:22.886430	0	37	
2	2018	9	12	00:00:33.691250	0	37	
3	2018	9	12	00:01:00.113710	0	37	
4	2018	9	12	00:02:09.740725	0	37	

	trip_day_of_week	od_start_to_end	source_city_place	destination_city_place
0	2	6445.853574	Bhopal_Trnsport	Gurgaon_Bilaspur
1	2	913.174079	Tumkur_Veersagr	Chikblapur_ShntiSgr
2	2	6445.853574	Bengaluru_Nelmngla	Chandigarh_Mehmdpur
3	2	200.989870	Mumbai_Mumbai	Mumbai_MiraRd
4	2	1588.710998	Bellary_Bellary	Bellary_Bellary

```
[212]: # comparison between route_type and numerical columns
sns.countplot(data = trip, x = "route_type")
```

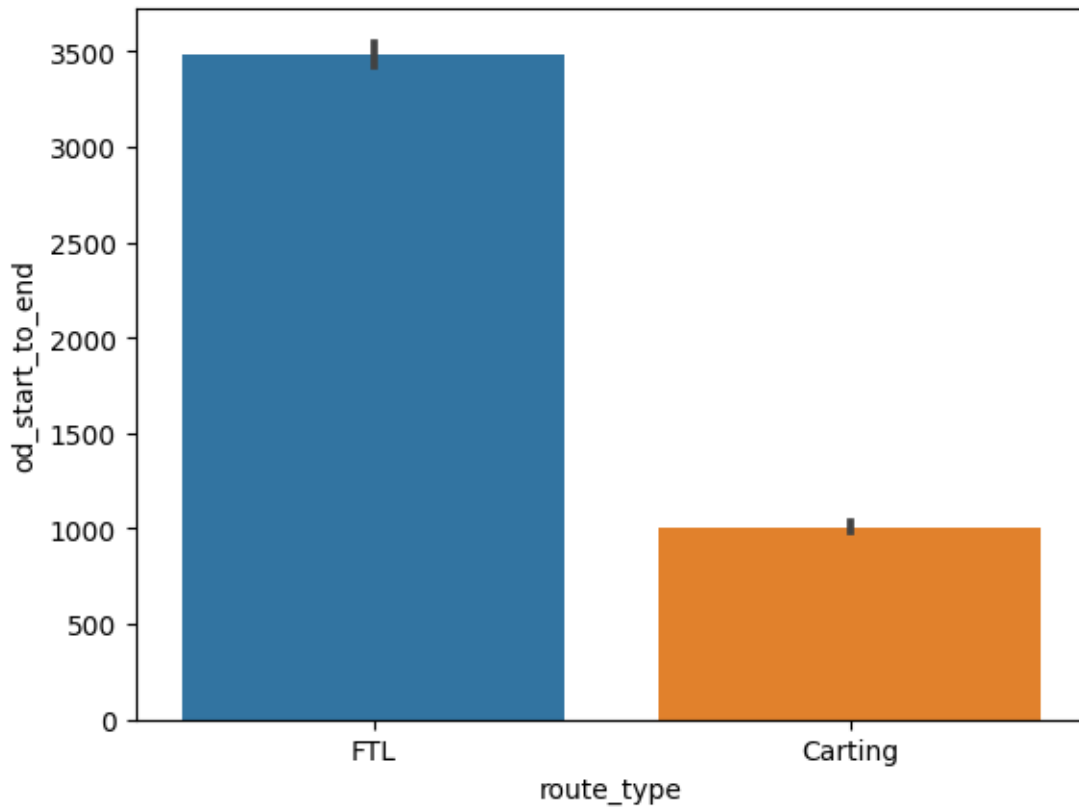
```
[212]: <Axes: xlabel='route_type', ylabel='count'>
```



Carting type of route_type is dominating FTL route type in number of trips

```
[213]: # Comparison between route_type and time taken from order start to end
sns.barplot(data =trip, x = "route_type", y= "od_start_to_end")
```

```
[213]: <Axes: xlabel='route_type', ylabel='od_start_to_end'>
```

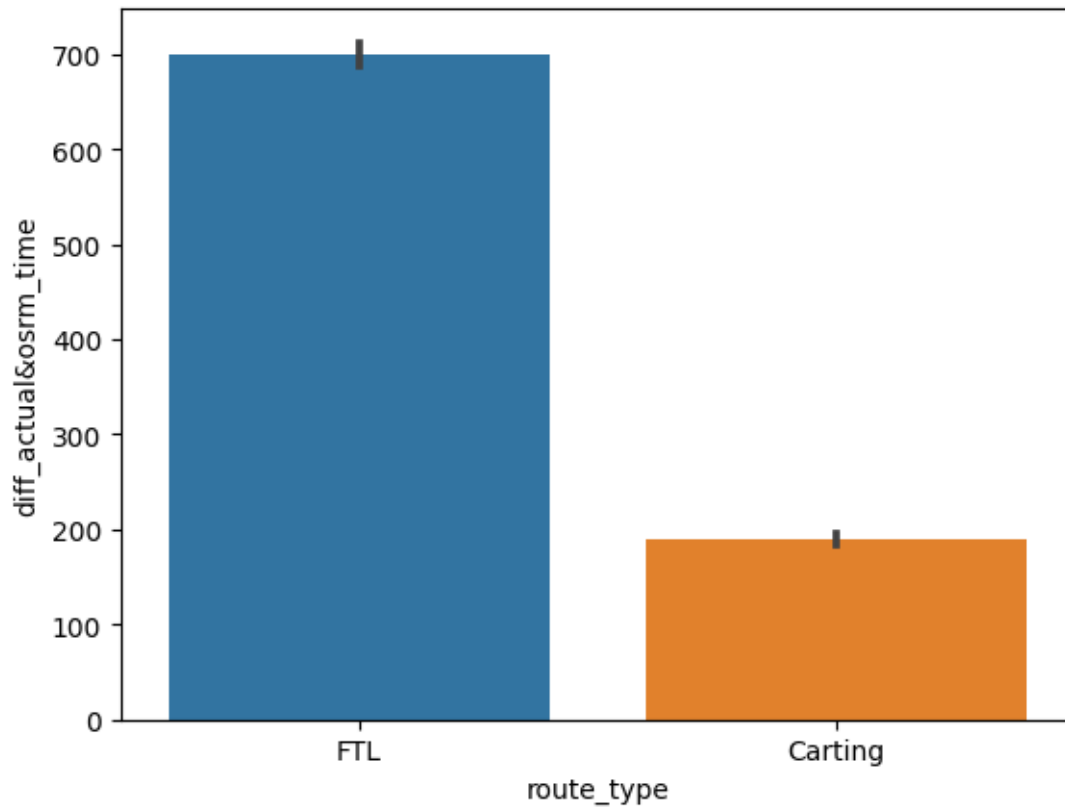


```
[214]: trip_modified = trip
```

```
[215]: trip_modified["diff_actual&osrm_time"] = trip_modified["actual_time"] -  
↳ trip_modified["osrm_time"]
```

```
[216]: sns.barplot(data = trip_modified, x = "route_type", y =  
↳ "diff_actual&osrm_time", estimator="mean")
```

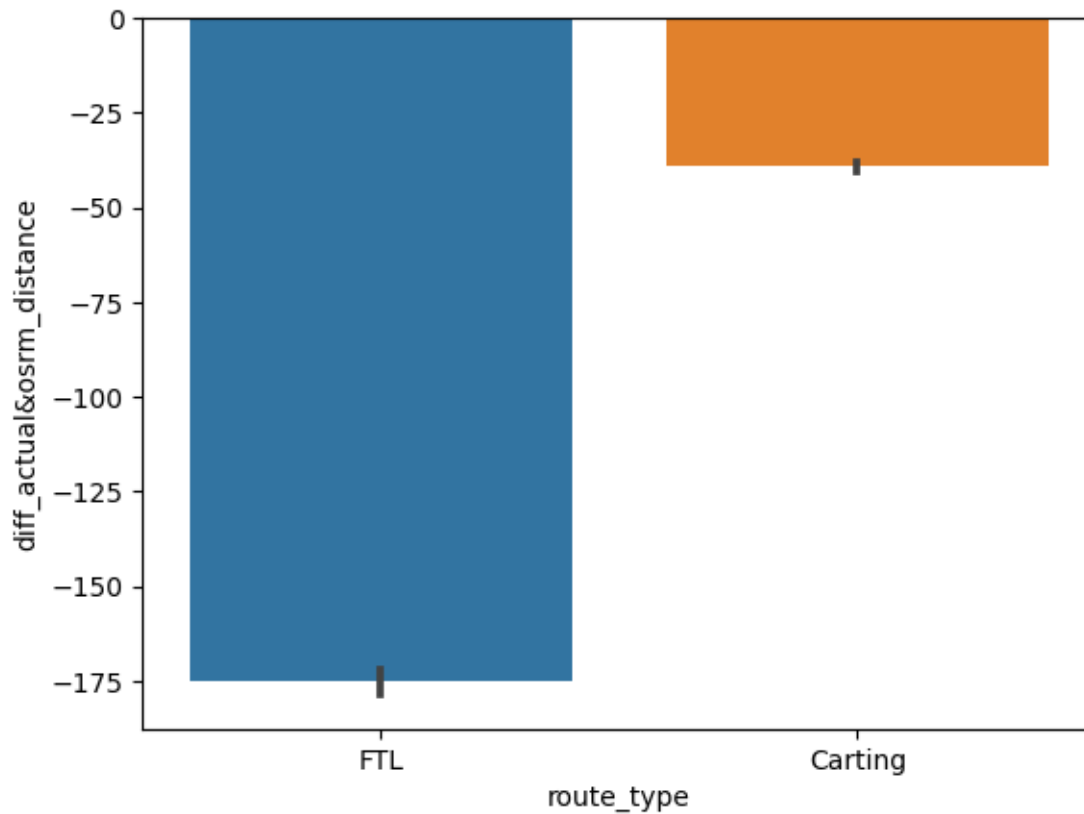
```
[216]: <Axes: xlabel='route_type', ylabel='diff_actual&osrm_time'>
```



```
[218]: trip_modified["diff_actual&osrm_distance"] =  
↳ trip_modified["actual_distance_to_destination"] -  
↳ trip_modified["osrm_distance"]
```

```
[219]: sns.barplot(data = trip_modified, x = "route_type", y =  
↳ "diff_actual&osrm_distance", estimator="mean")
```

```
[219]: <Axes: xlabel='route_type', ylabel='diff_actual&osrm_distance'>
```



FTL has less number of trips but contains more error in difference between actual time/distance and osrm time/distance

Infrastructure of FTL should be modified to get perfect results.

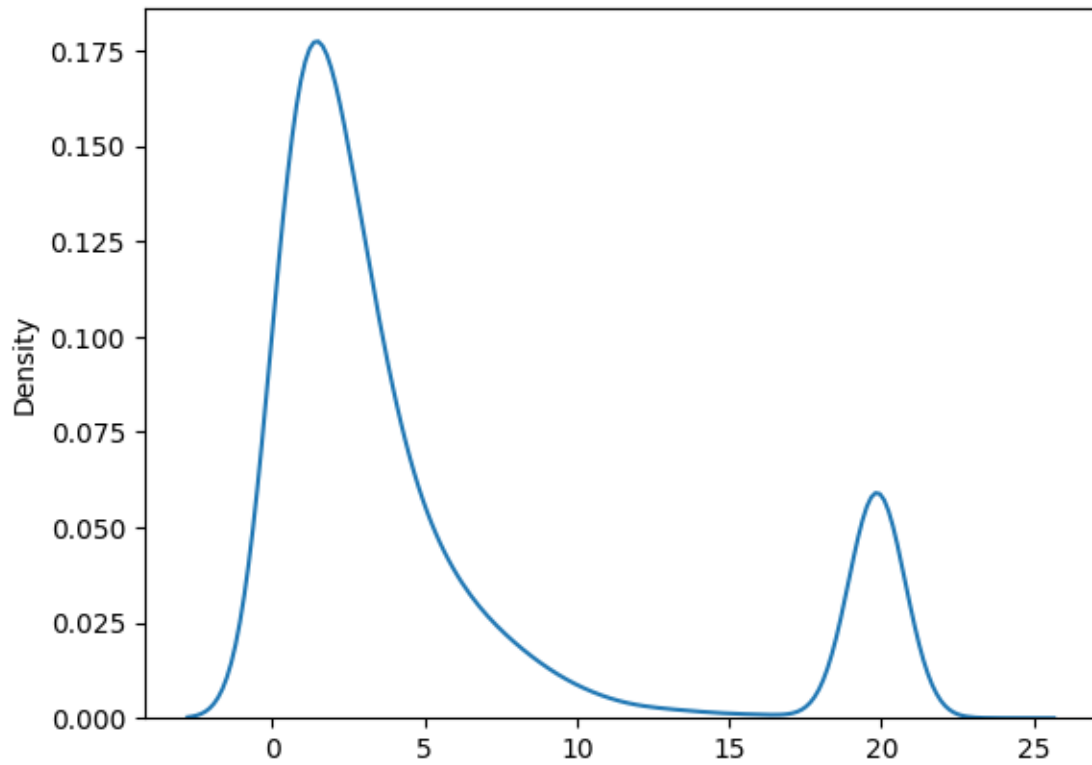
6 CHAPTER 6: CHECKING RELATIONSHIP BETWEEN AGGREGATED FIELDS USING HYPOTHESIS TESTING METHODS

6.1 Compare the difference between `od_start_to_end` and `start_scan_to_end_scan`. Do hypothesis testing/ Visual analysis to check.

6.1.1 Visual analysis

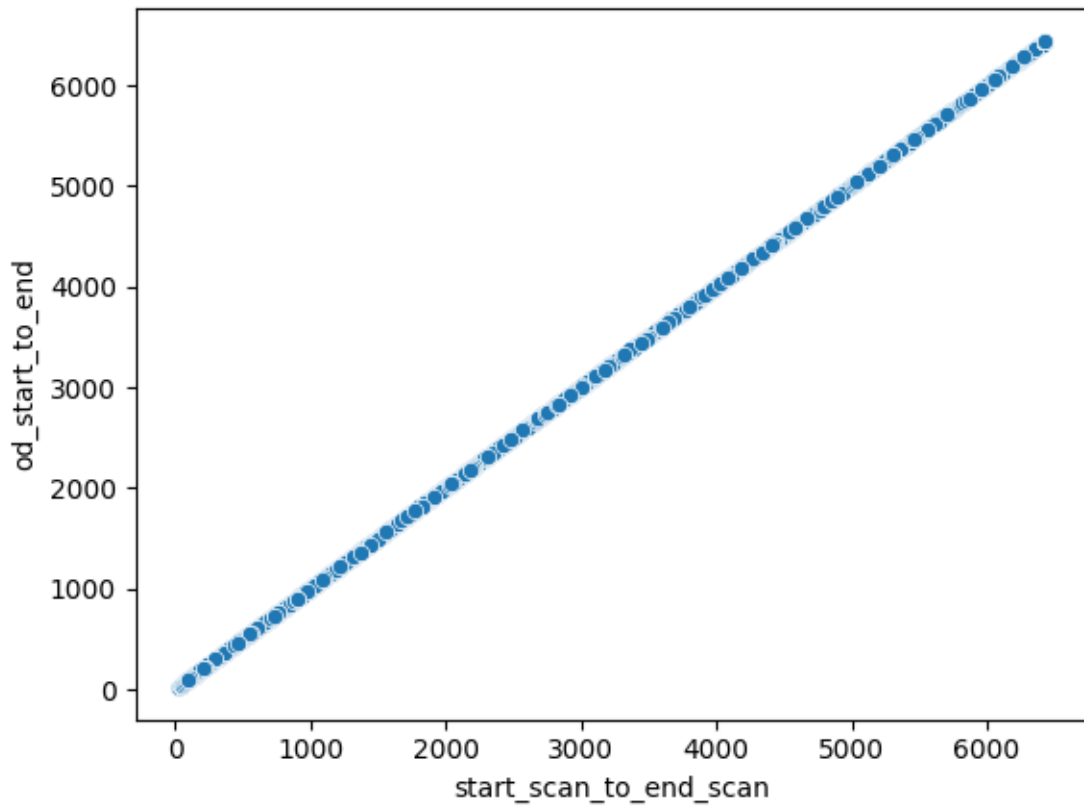
```
[220]: sns.kdeplot(data = trip["od_start_to_end"]-trip["start_scan_to_end_scan"])
```

```
[220]: <Axes: ylabel='Density'>
```



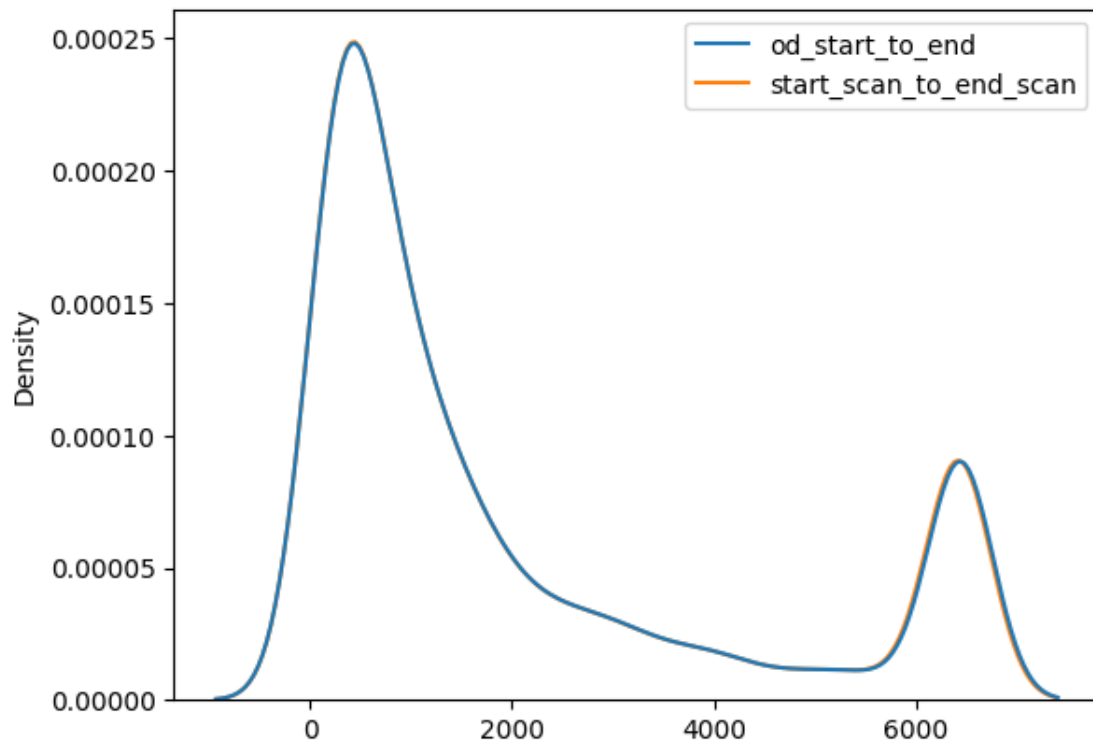
```
[221]: sns.scatterplot(data = trip, x = "start_scan_to_end_scan",y = "od_start_to_end")
```

```
[221]: <Axes: xlabel='start_scan_to_end_scan', ylabel='od_start_to_end'>
```



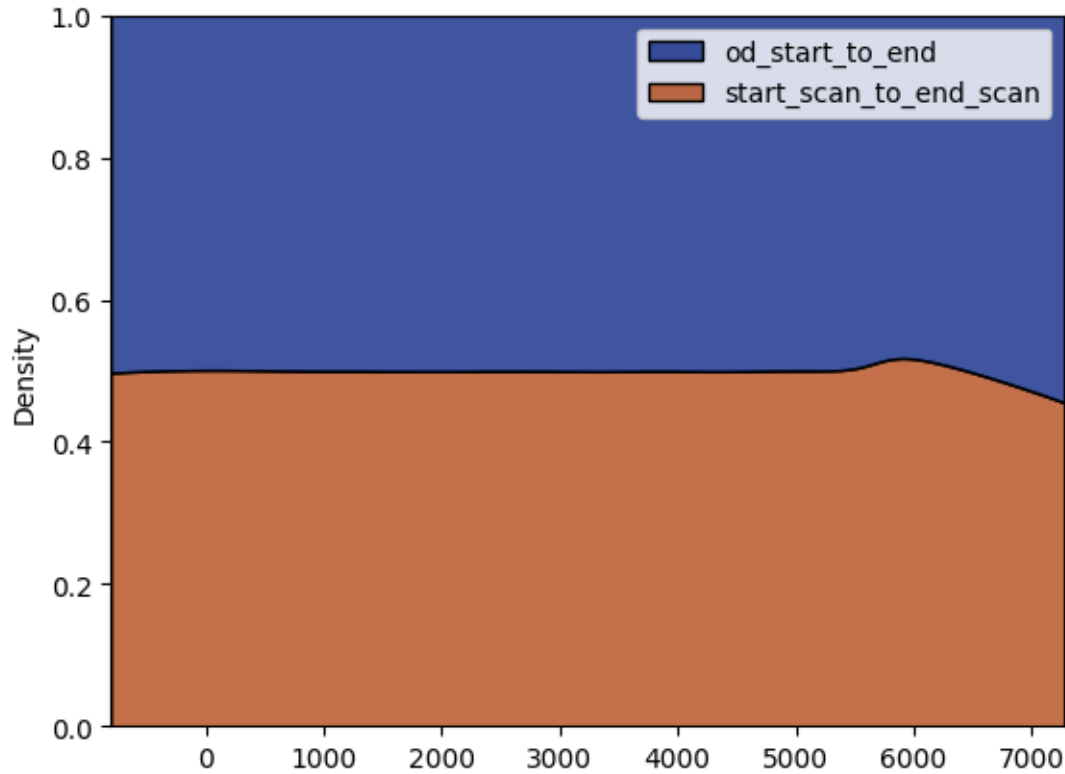
```
[222]: sns.kdeplot(data = trip[["od_start_to_end","start_scan_to_end_scan"]])
```

```
[222]: <Axes: ylabel='Density'>
```



```
[223]: sns.kdeplot(data = trip[["od_start_to_end","start_scan_to_end_scan"]],fill =  
↳ True,palette="dark",multiple="fill")
```

```
[223]: <Axes: ylabel='Density'>
```

Graph indicates that there is no much difference between “od_start_to_end” and “start_scan_to_end_scan”

6.1.2 Hypothesis formulation

Null Hypothesis H0: No difference between Mean of od_start_to_end and Start_scan_to_end_scan

$$\mu_{od-start-to-end} = \mu_{Start-scan-to-end-scan} \quad (1)$$

Alternate Hypothesis Ha: There is difference between Mean of od_start_to_end and Start_scan_to_end_scan

$$\mu_{od-start-to-end} \neq \mu_{Start-scan-to-end-scan} \quad (2)$$

two-tailed test

Significance level: 0.05

[224]: `alpha = 0.05`

6.1.3 Selection of appropriate test

od_start_to_end and start_scan_to_end_scan are independent as they are gathered in different manner.

So here two independent samples are tested. samples are numerical and continuous.

ttest comparing means of two independent samples is required so `ttest_ind` is appropriate (2sample ttest)

6.1.4 Check the test assumptions

The two-samples independent t-test assume the following characteristics about the data:

```
[225]: data_group1 = trip["od_start_to_end"].values  
data_group2 = trip["start_scan_to_end_scan"].values
```

Assumption 1: Independence of the observations- Each subject should belong to only one group.

There is no relationship between the observations in each group. (gathered two columns in different manner, so independent)

Assumption 2: Data groups should follow Normal distribution (atleast approximately)

Shapiro test for normality check

```
[226]: #Normality by shapiro test  
shapiro(data_group1)
```

```
[226]: ShapiroResult(statistic=0.7589576840400696, pvalue=0.0)
```

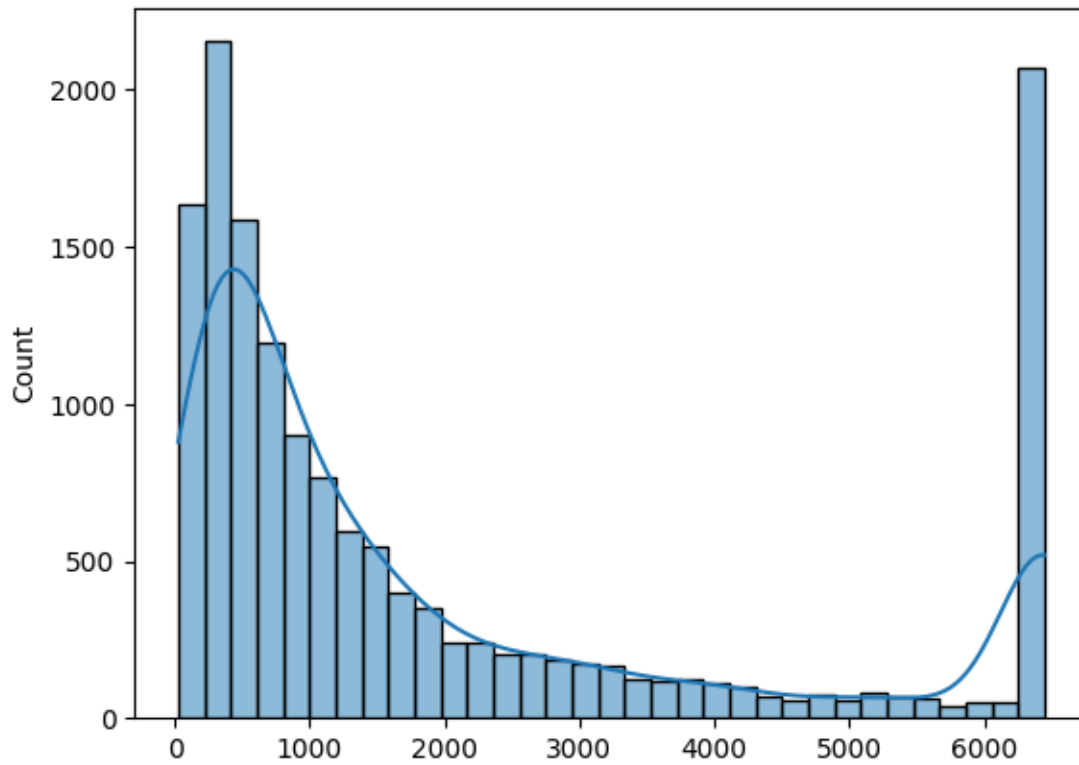
```
[227]: shapiro(data_group2)
```

```
[227]: ShapiroResult(statistic=0.7590374946594238, pvalue=0.0)
```

p = 0 indicates that distribution is not normal. So Box cox transformation may require

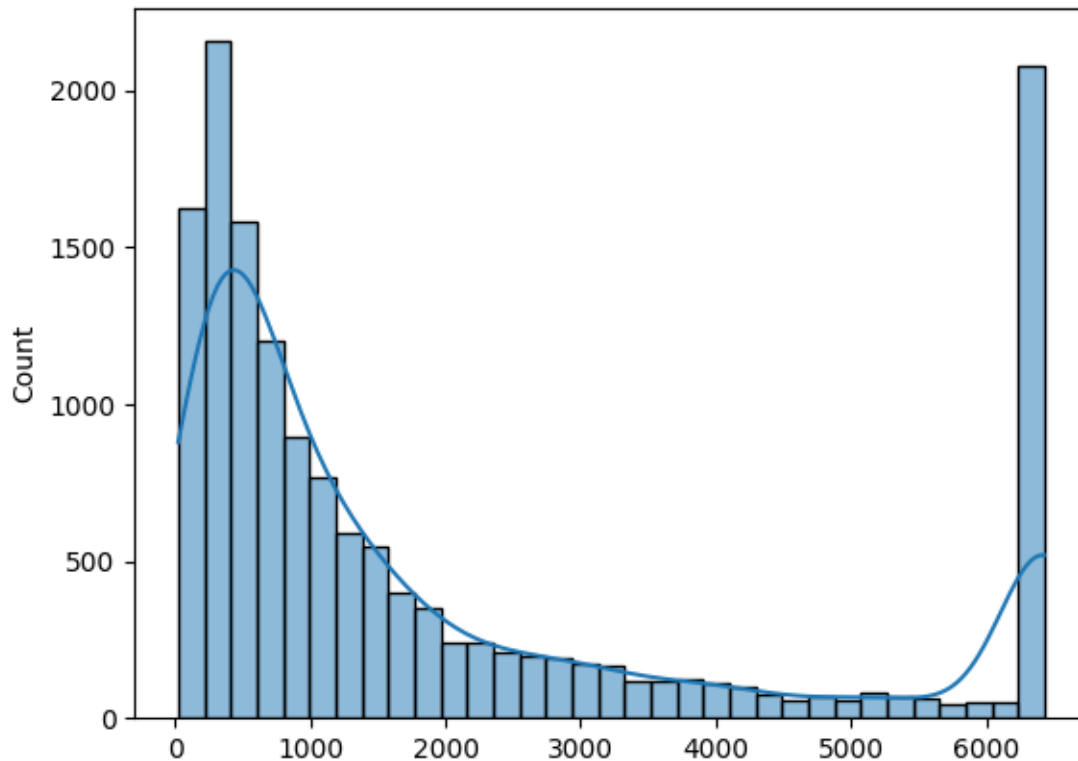
```
[228]: sns.histplot(data = data_group1,kde = True)
```

```
[228]: <Axes: ylabel='Count'>
```



```
[229]: sns.histplot(data = data_group2,kde = True)
```

```
[229]: <Axes: ylabel='Count'>
```



Above graph and shapiro test tells that data groups are not following NORMAL distribution

Box Cox Transformation

```
[230]: # generate non-normal data
original_data = trip["od_start_to_end"]

# transform training data & save lambda value
fitted_od_start_to_end, fitted_od_start_to_end_lambda = boxcox(original_data)

# creating axes to draw plots
fig, ax = plt.subplots(1, 2)

# plotting the original data(non-normal) and
# fitted data (normal)
sns.distplot(original_data, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Non-Normal", color = "green", ax = ax[0])

sns.distplot(fitted_od_start_to_end, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Normal", color = "green", ax = ax[1])
```

```

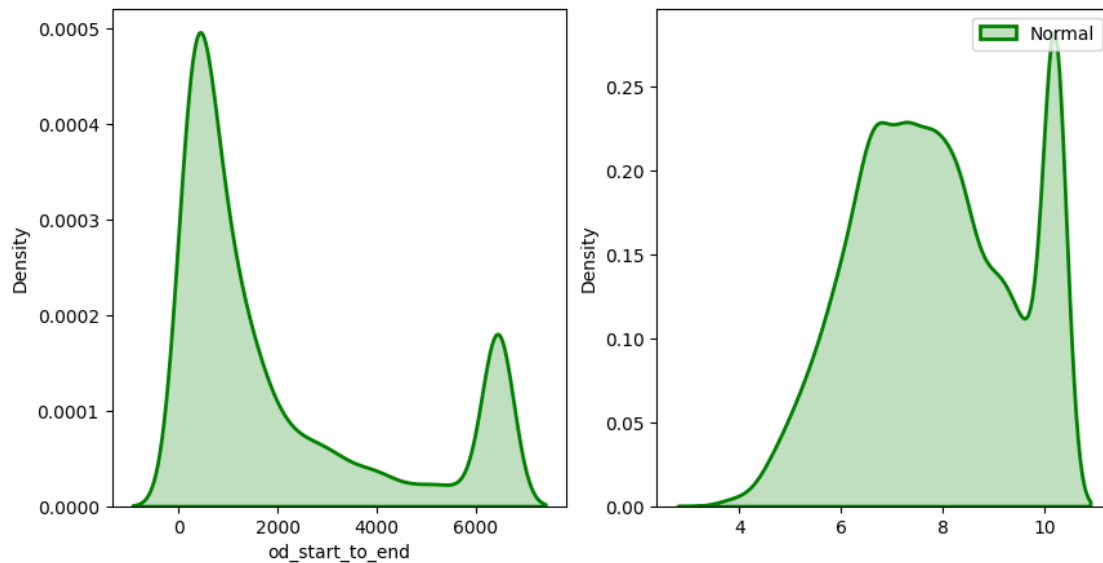
# adding legends to the subplots
plt.legend(loc = "upper right")

# rescaling the subplots
fig.set_figheight(5)
fig.set_figwidth(10)

print(f"Lambda value used for Transformation: {fitted_od_start_to_end_lambda}")

```

Lambda value used for Transformation: 0.03385185948347267



```

[231]: # generate non-normal data
original_data = trip["start_scan_to_end_scan"]

# transform training data & save lambda value
fitted_start_scan_to_end_scan, fitted_start_scan_to_end_scan_lambda = \
    boxcox(original_data)

# creating axes to draw plots
fig, ax = plt.subplots(1, 2)

# plotting the original data(non-normal) and
# fitted data (normal)
sns.distplot(original_data, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Non-Normal", color = "green", ax = ax[0])

sns.distplot(fitted_start_scan_to_end_scan, hist = False, kde = True,

```

```

kde_kws = {'shade': True, 'linewidth': 2},
label = "Normal", color = "green", ax = ax[1])

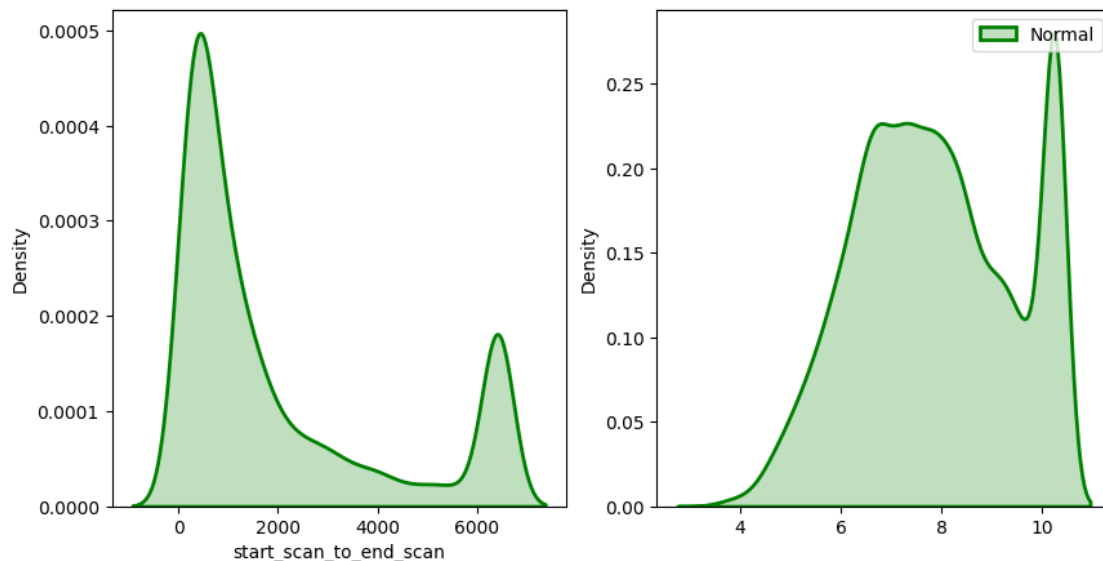
# adding legends to the subplots
plt.legend(loc = "upper right")

# rescaling the subplots
fig.set_figheight(5)
fig.set_figwidth(10)

print(f"Lambda value used for Transformation:␣
↪{fitted_start_scan_to_end_scan_lambda}")

```

Lambda value used for Transformation: 0.03492821561744983



```

[232]: data_group1 = fitted_od_start_to_end
data_group2 = fitted_start_scan_to_end_scan

```

Assumption 3: No significant outliers in the two groups (No outliers according to box plots after bounding)

```

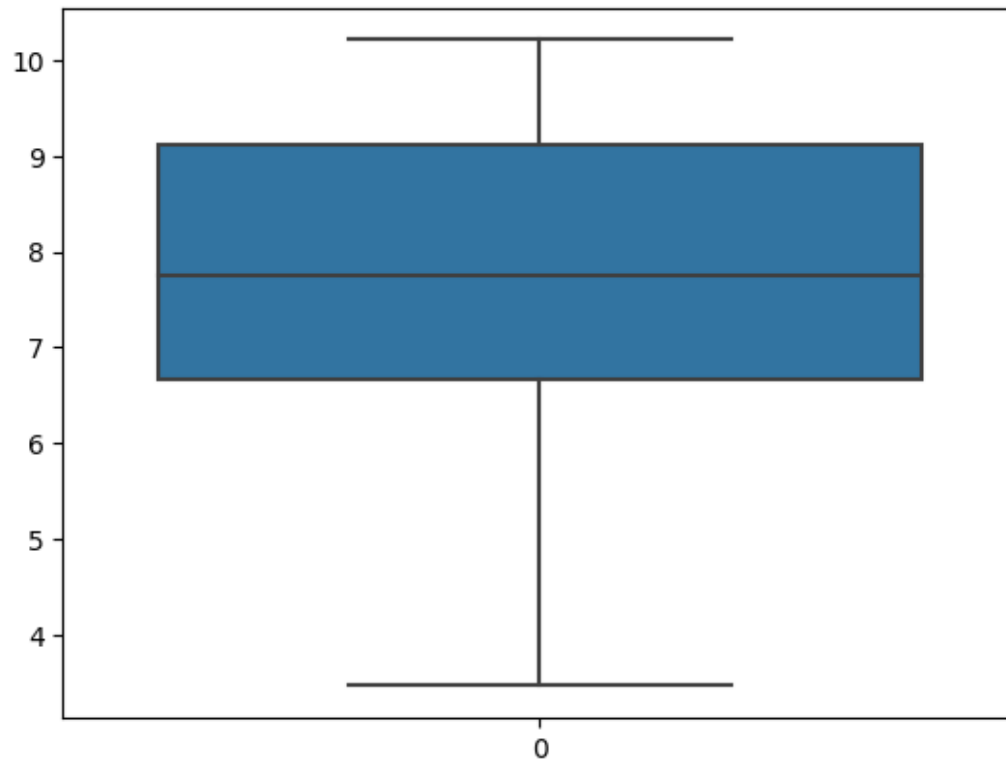
[233]: sns.boxplot(data_group1)

```

```

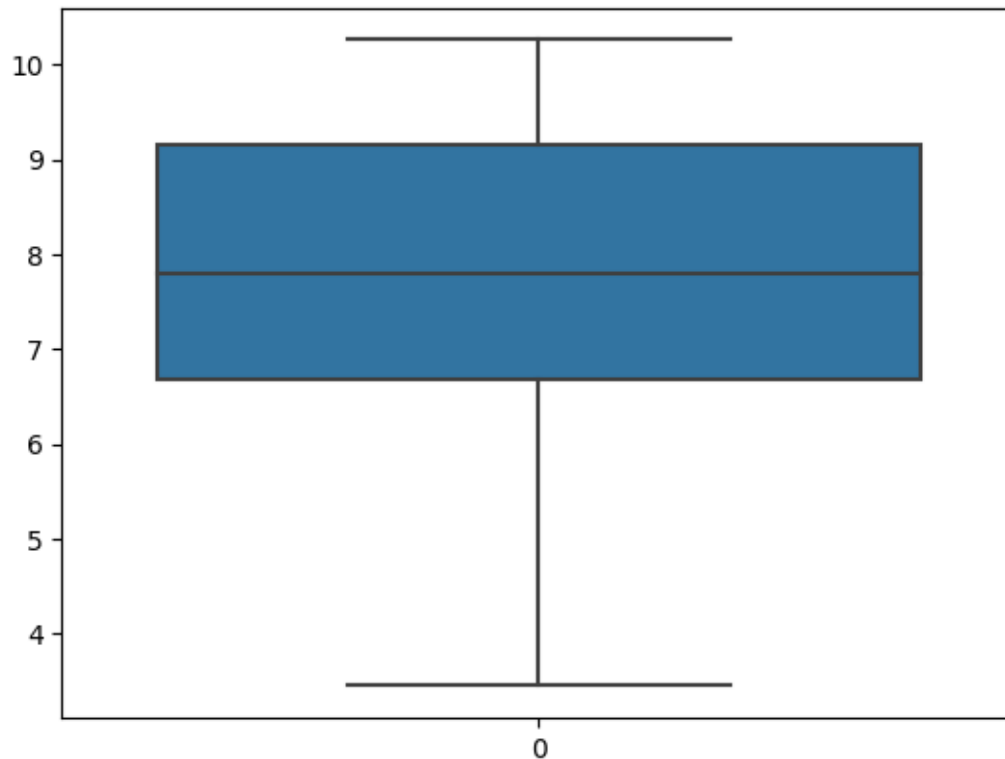
[233]: <Axes: >

```



```
[234]: sns.boxplot(data_group2)
```

```
[234]: <Axes: >
```



No outliers are present in both box plots

Assumption 4: Equal variances should be observed between two data groups

```
[235]: #homogeneity of variances
print("variance of od_start_to_end", np.var(data_group1), "\nvariance of_\nstart_scan_to_end_scan", np.var(data_group2))
```

```
variance of od_start_to_end 2.4135595113310835
variance of start_scan_to_end_scan 2.454796393170503
```

Before conducting the two-sample T-Test we need to find if the given data groups have the same variance. If the ratio of the larger data groups to the small data group is less than 4:1 then we can consider that the given data groups have equal variance.

Levene Test

```
[236]: levene(data_group1, data_group2)
```

```
[236]: LeveneResult(statistic=1.2323684058451925, pvalue=0.26695596014718814)
```

p value > 0.05 indicates that data groups have equal variances

6.1.5 Finding the p-value

```
[237]: tstat,p_val = ttest_ind(a=data_group1, b=data_group2,
    ↪equal_var=True,alternative = "two-sided")
```

```
[238]: print("test statistic",tstat)
    print("p value",p_val)
```

```
test statistic -1.5016668820636212
p value 0.1331938380802412
```

6.1.6 Conclusion based on the p-value

```
[239]: if p_val <= alpha:
    print("\nSince p-value is less than the alpha 0.05, We reject the Null
    ↪Hypothesis. Meaning that\n\
        There is difference between Mean of od_start_to_end and
    ↪Start_scan_to_end_scan")
else:
    print("Since p-value is greater than the alpha 0.05, We do not reject the
    ↪Null Hypothesis\n\
        i.e, No difference between Mean of od_start_to_end and
    ↪Start_scan_to_end_scan")
```

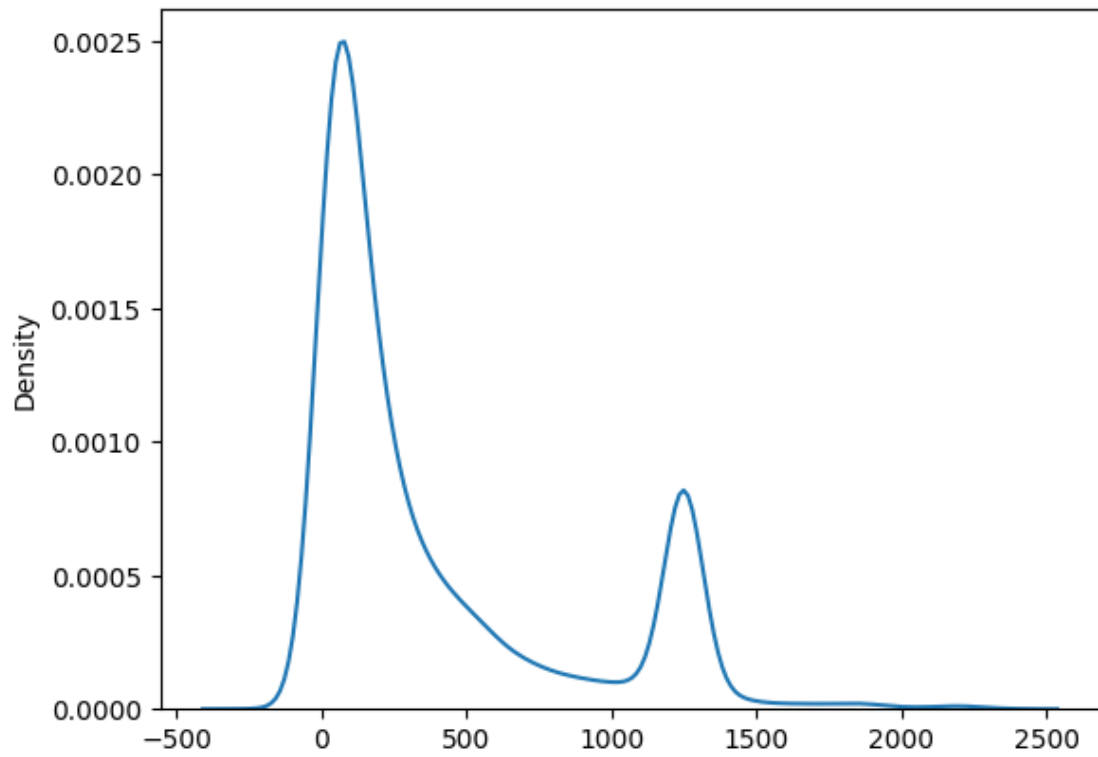
```
Since p-value is greater than the alpha 0.05, We do not reject the Null
Hypothesis
    i.e, No difference between Mean of od_start_to_end and
Start_scan_to_end_scan
```

6.2 Do hypothesis testing/ visual analysis between actual_time aggregated value and OSRM time aggregated value (aggregated values are the values you'll get after merging the rows on the basis of trip_uuid)

6.2.1 Visual analysis

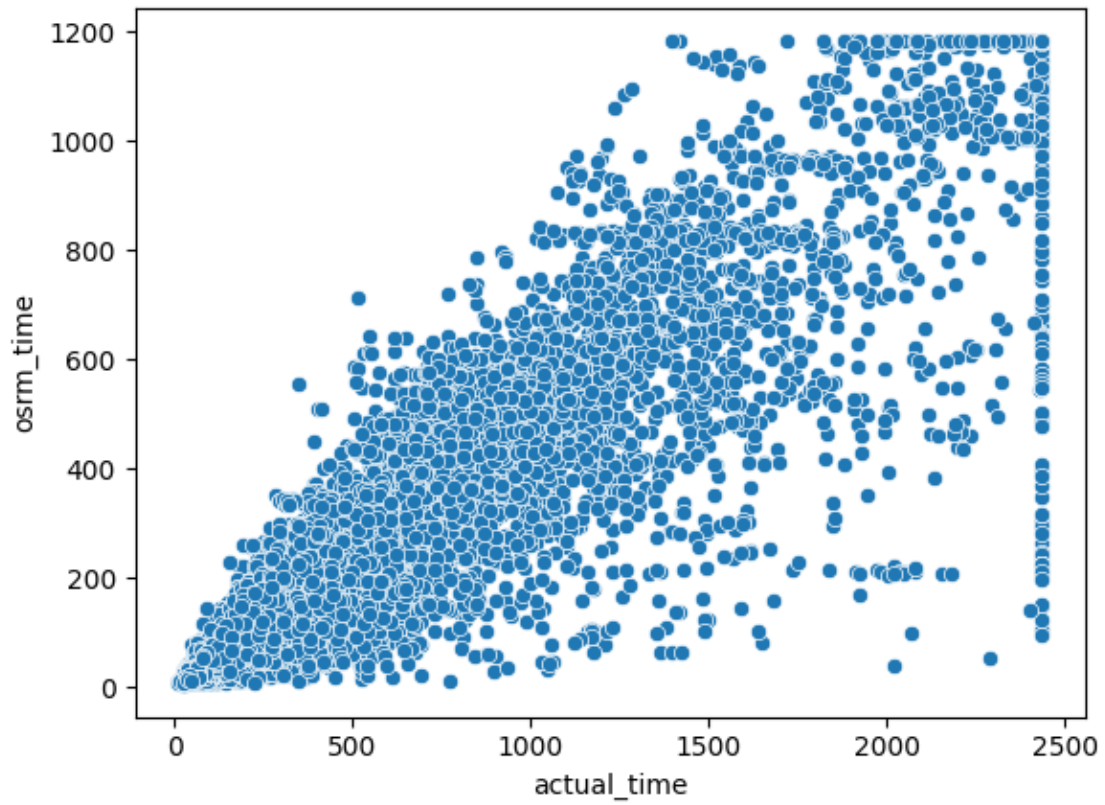
```
[240]: sns.kdeplot(data = trip["actual_time"]-trip["osrm_time"])
```

```
[240]: <Axes: ylabel='Density'>
```



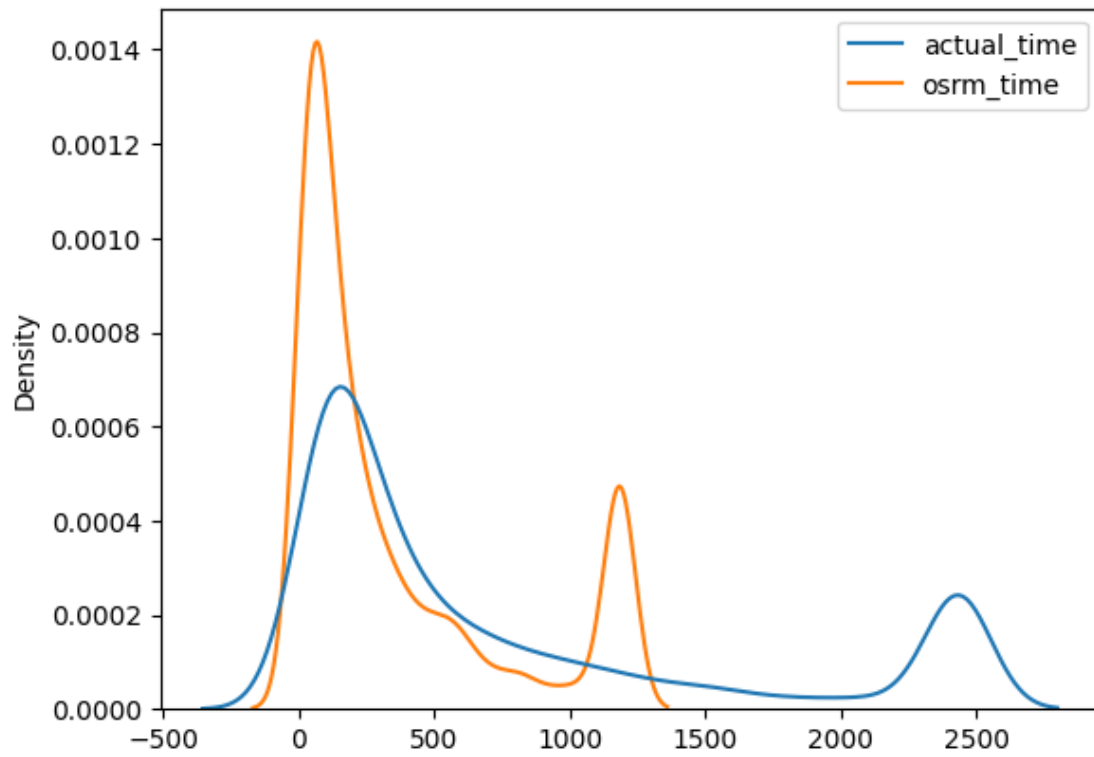
```
[241]: sns.scatterplot(data = trip, x = "actual_time",y ="osrm_time")
```

```
[241]: <Axes: xlabel='actual_time', ylabel='osrm_time'>
```



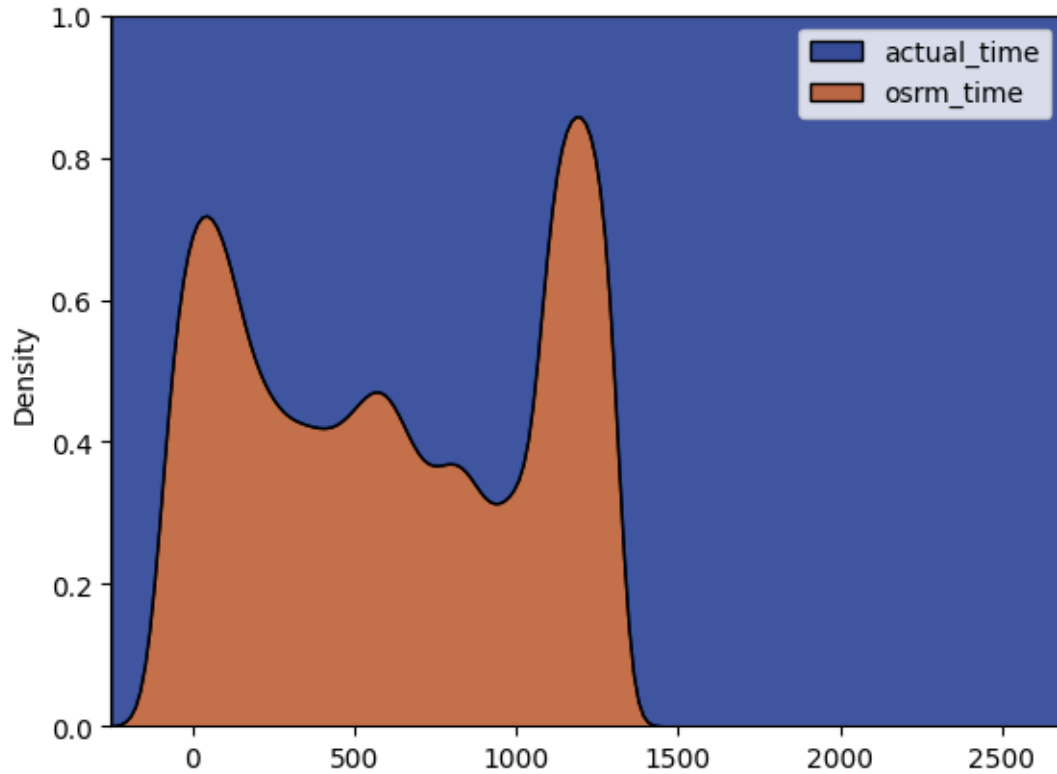
```
[242]: sns.kdeplot(data = trip[["actual_time","osrm_time"]])
```

```
[242]: <Axes: ylabel='Density'>
```



```
[243]: sns.kdeplot(data = trip[["actual_time","osrm_time"]],fill =_
↪True,palette="dark",multiple="fill")
```

```
[243]: <Axes: ylabel='Density'>
```



Graph indicates that there is difference between “actual_time” and “osrm_time”

6.2.2 Hypothesis formulation

Null Hypothesis H0: No difference between Mean of actual_time and osrm_time

$$\mu_{actual-time} = \mu_{osrm-time} \quad (3)$$

Alternate Hypothesis Ha: There is difference between Mean of actual_time and osrm_time

$$\mu_{actual-time} \neq \mu_{osrm-time} \quad (4)$$

two-tailed test

Significance level: 0.05

[244]: `alpha = 0.05`

6.2.3 Selection of appropriate test

actual_time and osrm_time are independent as they are gathered in different manner.

So here two independent samples are tested. samples are numerical and continuous.

ttest comparing means of two independent samples is required so `ttest_ind` is appropriate (2sample ttest)

6.2.4 Check the test assumptions

The two-samples independent t-test assume the following characteristics about the data:

```
[245]: data_group1 = trip["actual_time"].values  
data_group2 = trip["osrm_time"].values
```

Assumption 1: Independence of the observations- Each subject should belong to only one group.

There is no relationship between the observations in each group. (gathered two columns in different manner, so independent)

Assumption 2: Data groups should follow Normal distribution (atleast approximately)

Shapiro test for normality check

```
[246]: #Normality by shapiro test  
shapiro(data_group1)
```

```
[246]: ShapiroResult(statistic=0.7551202774047852, pvalue=0.0)
```

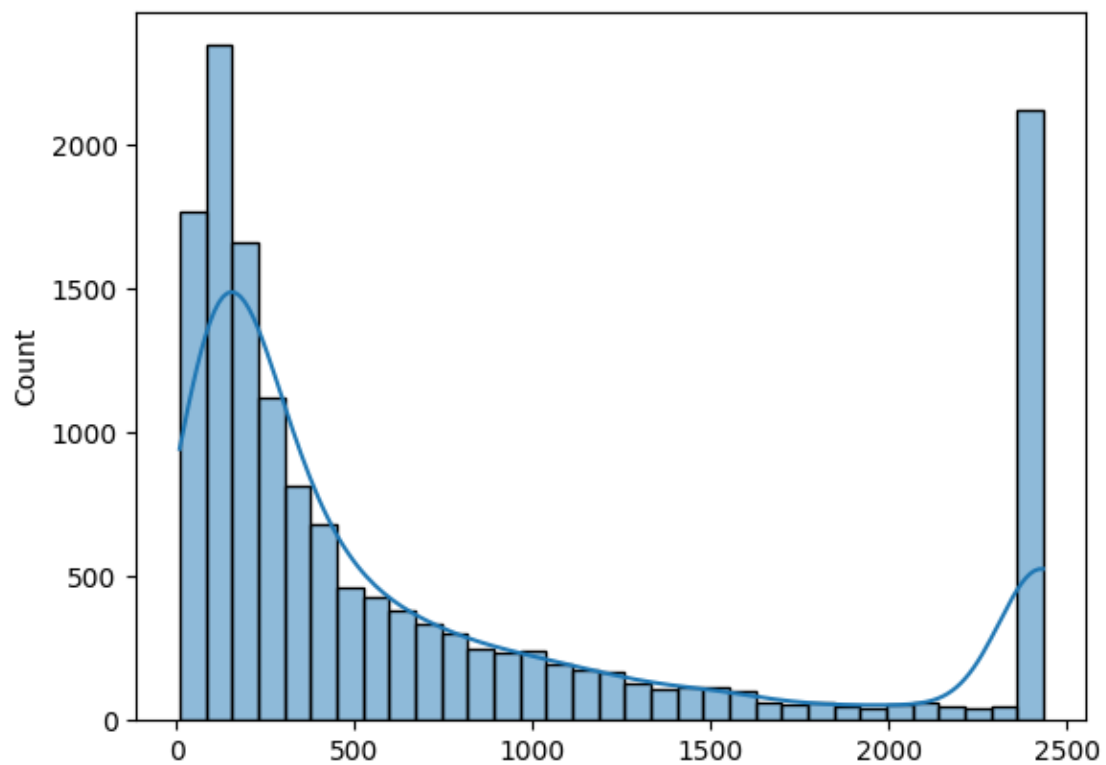
```
[247]: shapiro(data_group2)
```

```
[247]: ShapiroResult(statistic=0.7560504078865051, pvalue=0.0)
```

$p = 0$ indicates that distribution is not normal. So Box cox transformation may require

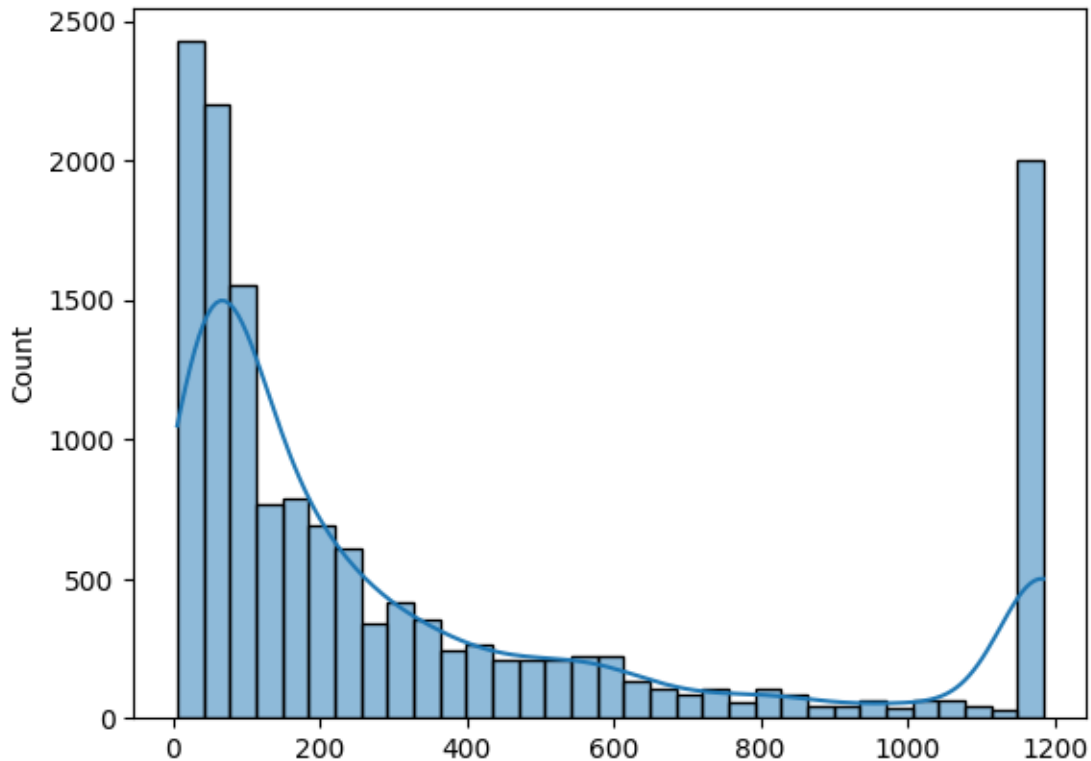
```
[248]: sns.histplot(data = data_group1, kde = True)
```

```
[248]: <Axes: ylabel='Count'>
```



```
[249]: sns.histplot(data = data_group2,kde = True)
```

```
[249]: <Axes: ylabel='Count'>
```



Above graph and shapiro test tells that data groups are not following NORMAL distribution

Box Cox Transformation

```
[250]: # generate non-normal data
original_data = trip["actual_time"]

# transform training data & save lambda value
fitted_actual_time, fitted_actual_time_lambda = boxcox(original_data)

# creating axes to draw plots
fig, ax = plt.subplots(1, 2)

# plotting the original data(non-normal) and
# fitted data (normal)
sns.distplot(original_data, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Non-Normal", color = "green", ax = ax[0])

sns.distplot(fitted_actual_time, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Normal", color = "green", ax = ax[1])
```



```

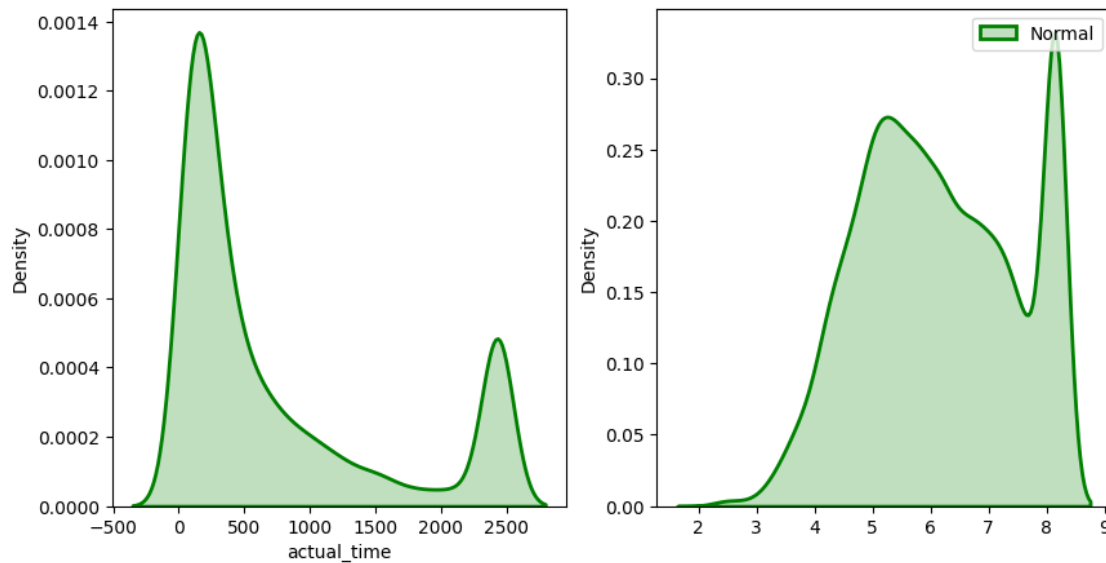
# adding legends to the subplots
plt.legend(loc = "upper right")

# rescaling the subplots
fig.set_figheight(5)
fig.set_figwidth(10)

print(f"Lambda value used for Transformation: {fitted_actual_time_lambda}")

```

Lambda value used for Transformation: 0.011661865710665452



```

[251]: # generate non-normal data
original_data = trip["osrm_time"]

# transform training data & save lambda value
fitted_osrm_time, fitted_osrm_time_lambda = boxcox(original_data)

# creating axes to draw plots
fig, ax = plt.subplots(1, 2)

# plotting the original data(non-normal) and
# fitted data (normal)
sns.distplot(original_data, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Non-Normal", color = "green", ax = ax[0])

sns.distplot(fitted_osrm_time, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},

```

```

        label = "Normal", color = "green", ax = ax[1])

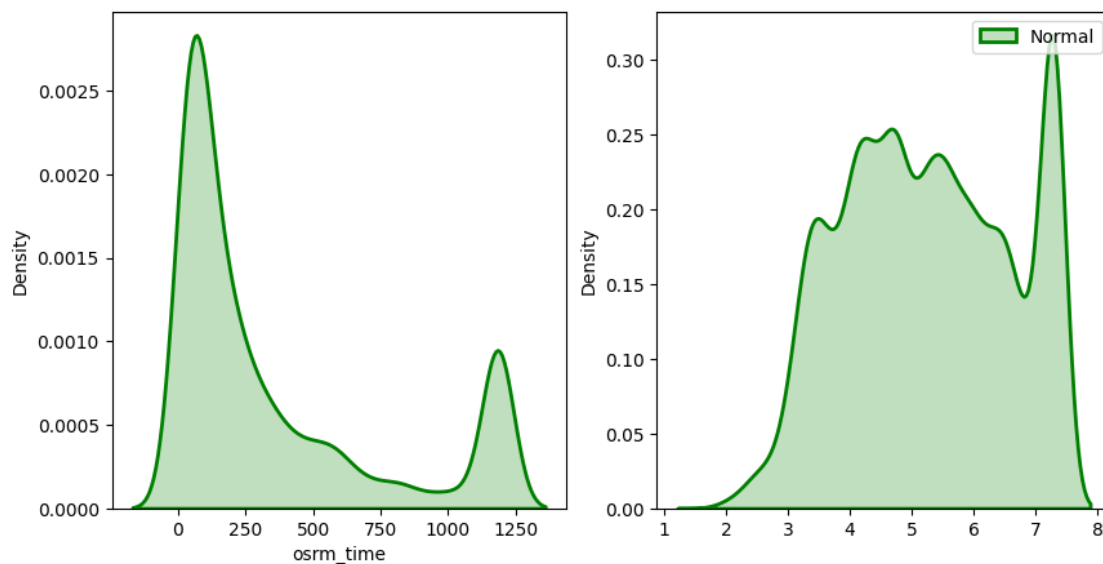
# adding legends to the subplots
plt.legend(loc = "upper right")

# rescaling the subplots
fig.set_figheight(5)
fig.set_figwidth(10)

print(f"Lambda value used for Transformation: {fitted_osrm_time_lambda}")

```

Lambda value used for Transformation: 0.008528277972301913



```

[252]: data_group1 = fitted_actual_time
       data_group2 = fitted_osrm_time

```

Assumption 3: No significant outliers in the two groups (No outliers according to box plots after bounding)

```

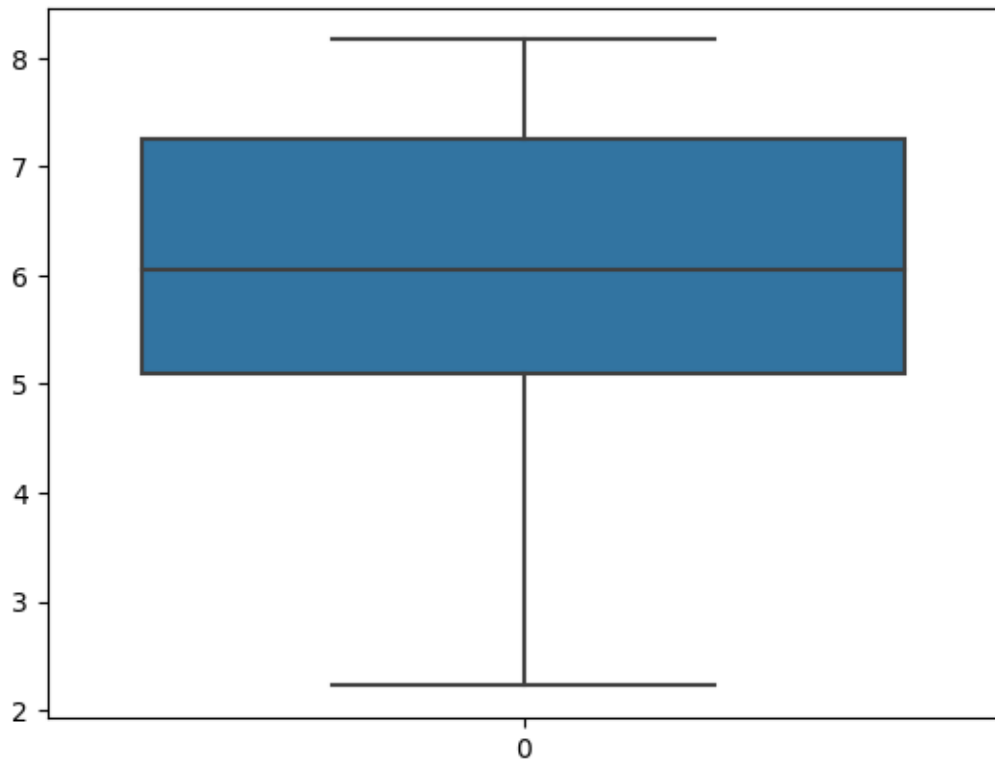
[253]: sns.boxplot(data_group1)

```

```

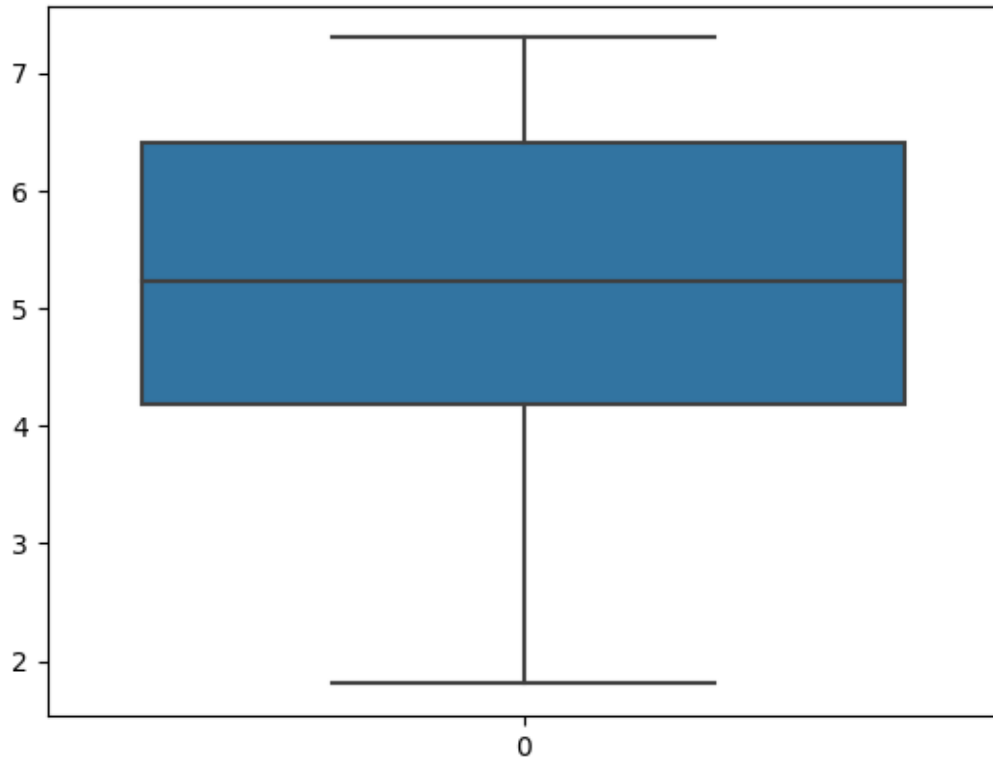
[253]: <Axes: >

```



```
[254]: sns.boxplot(data_group2)
```

```
[254]: <Axes: >
```



No outliers are present in both box plots

Assumption 4: Equal variances should be observed between two data groups

```
[255]: #homogeneity of variances
print("variance of actual_time",np.var(data_group1),"\nvariance of osrm_time",
      ↪np.var(data_group2))
```

variance of actual_time 1.7942706805535242

variance of osrm_time 1.8028476626407721

Before conducting the two-sample T-Test we need to find if the given data groups have the same variance. If the ratio of the larger data groups to the small data group is less than 4:1 then we can consider that the given data groups have equal variance.

Levene Test

```
[256]: levene(data_group1,data_group2)
```

```
[256]: LeveneResult(statistic=1.4295084618738148, pvalue=0.231854261737376)
```

p value > 0.05 indicates that data groups have equal variances

6.2.5 Finding the p-value

```
[257]: tstat,p_val = ttest_ind(a=data_group1, b=data_group2,
    ↪equal_var=True,alternative = "two-sided")
```

```
[258]: print("test statistic",tstat)
    print("p value",p_val)
```

```
test statistic 56.2461278743142
p value 0.0
```

6.2.6 Conclusion based on the p-value

```
[259]: if p_val <= alpha:
    print("\nSince p-value is less than the alpha 0.05, We reject the Null_
    ↪Hypothesis. Meaning that\n\
        There is difference between Mean of  actual_time and osrm_time")
else:
    print("Since p-value is greater than the alpha 0.05, We do not reject the_
    ↪Null Hypothesis\n\
        i.e, No difference between  Mean of actual_time and osrm_time")
```

Since p-value is less than the alpha 0.05, We reject the Null Hypothesis.
Meaning that

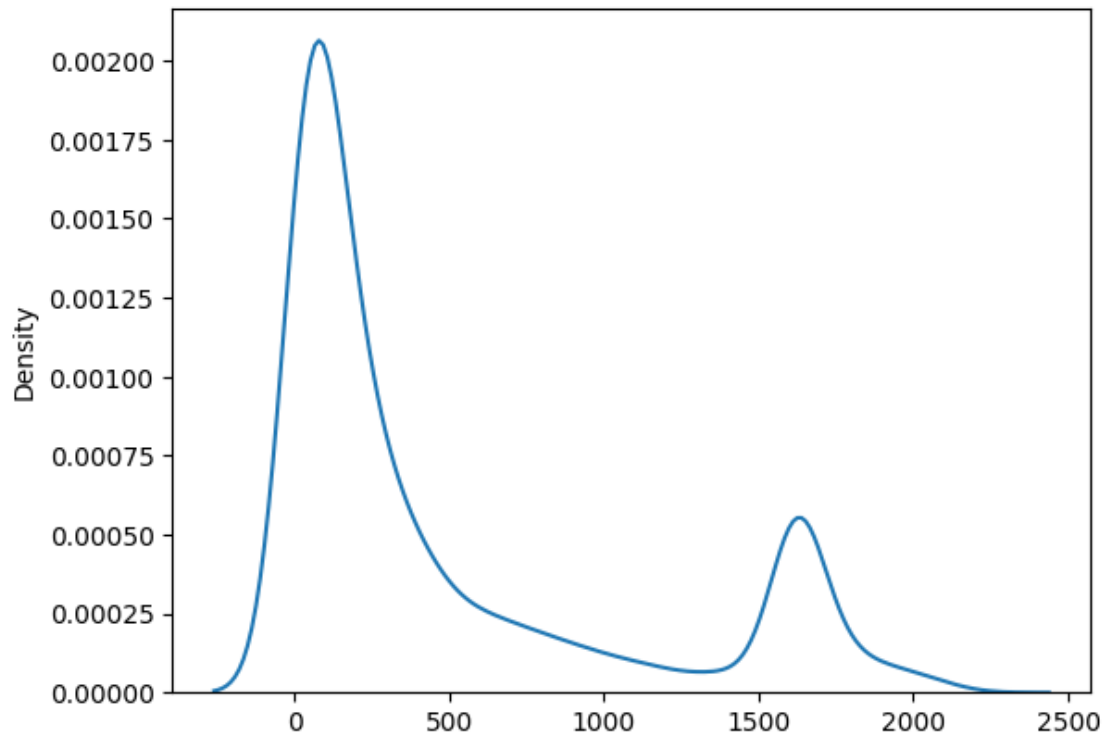
There is difference between Mean of actual_time and osrm_time

6.3 Do hypothesis testing/ visual analysis between actual_time aggregated value and segment actual time aggregated value (aggregated values are the values you'll get after merging the rows on the basis of trip_uuid)

6.3.1 Visual analysis

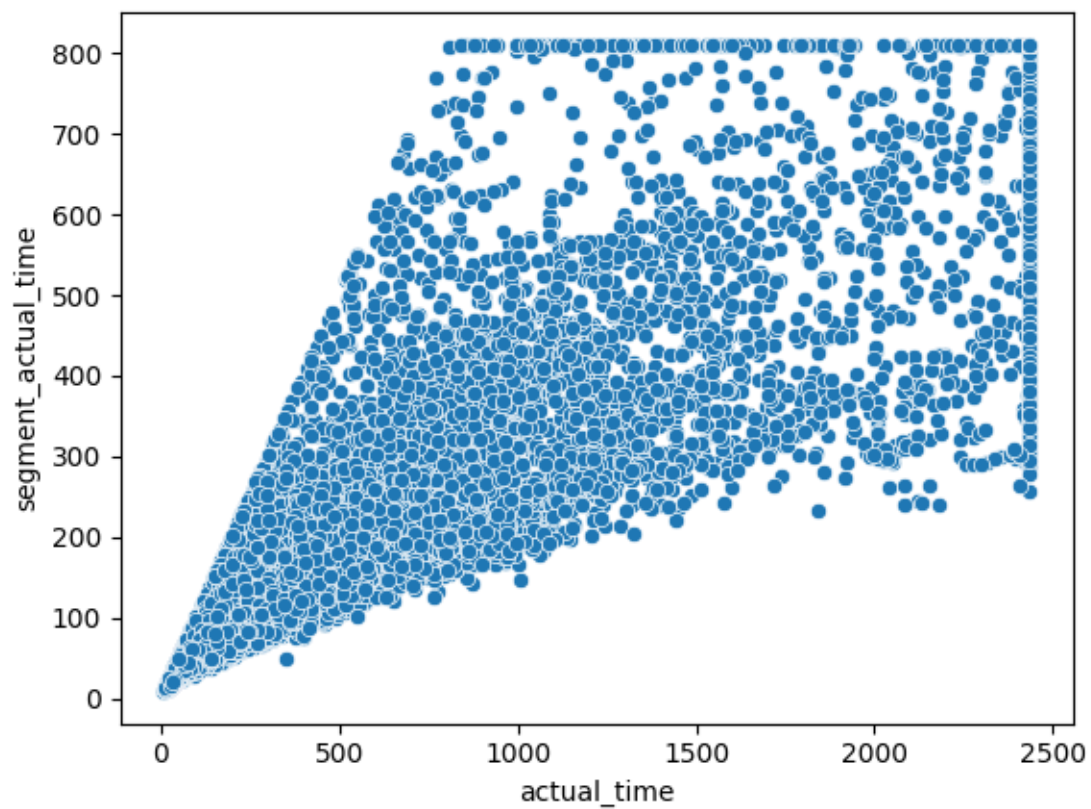
```
[260]: sns.kdeplot(data = trip["actual_time"]-trip["segment_actual_time"])
```

```
[260]: <Axes: ylabel='Density'>
```



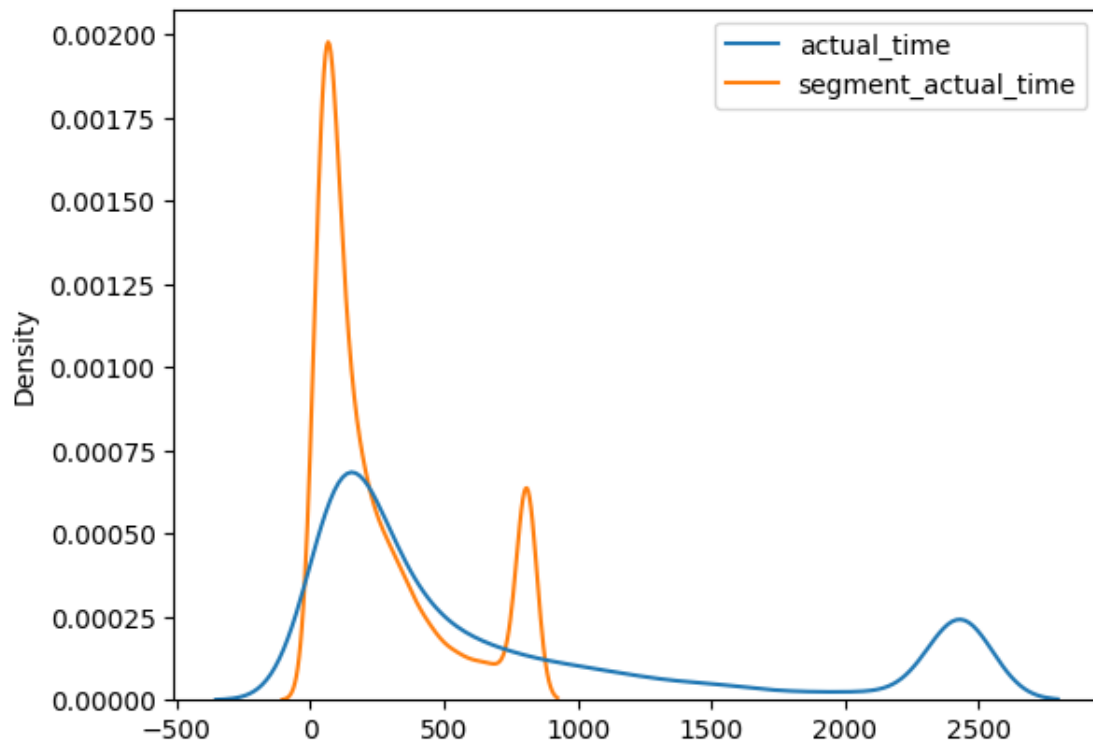
```
[261]: sns.scatterplot(data = trip, x = "actual_time",y ="segment_actual_time")
```

```
[261]: <Axes: xlabel='actual_time', ylabel='segment_actual_time'>
```



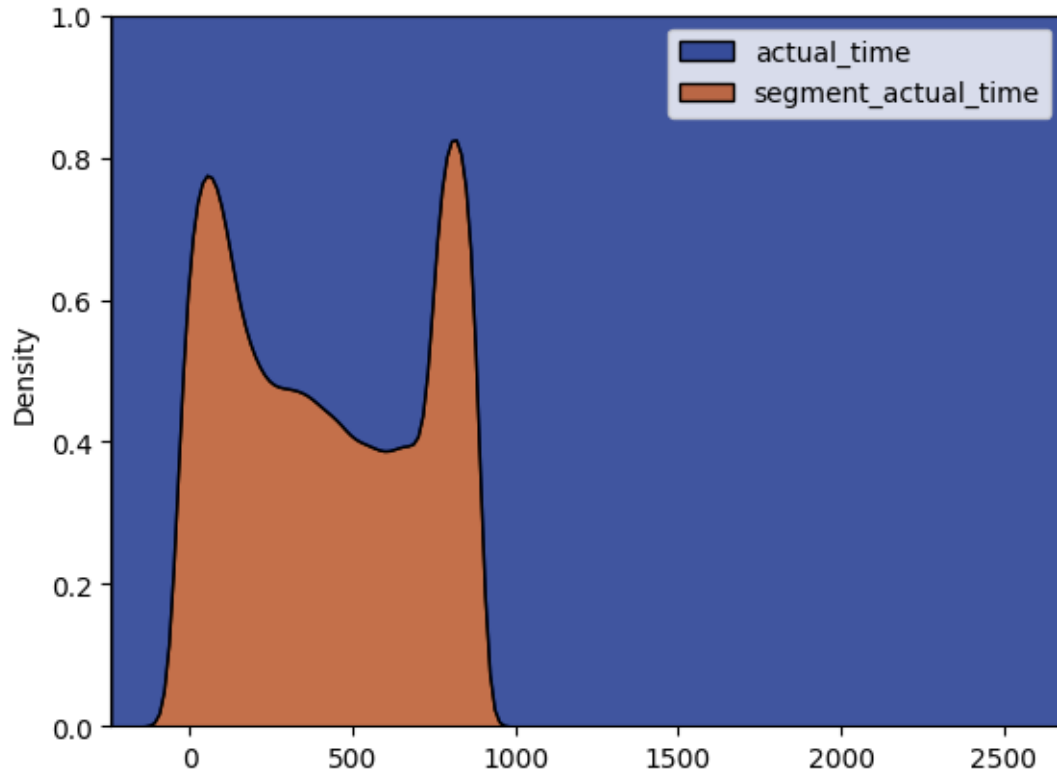
```
[262]: sns.kdeplot(data = trip[["actual_time","segment_actual_time"]])
```

```
[262]: <Axes: ylabel='Density'>
```



```
[263]: sns.kdeplot(data = trip[["actual_time","segment_actual_time"]],fill =  
↳ True,palette="dark",multiple="fill")
```

```
[263]: <Axes: ylabel='Density'>
```

Graph indicates that there is no much difference between “actual_time” and “segment_actual_time”

6.3.2 Hypothesis formulation

Null Hypothesis H_0 : No difference between Mean of actual_time and segment_actual_time

$$\mu_{actual-time} = \mu_{segment-actual-time} \quad (5)$$

Alternate Hypothesis H_a : There is difference between Mean of actual_time and segment_actual_time

$$\mu_{actual-time} \neq \mu_{segment-actual-time} \quad (6)$$

two-tailed test

Significance level: 0.05

```
[264]: alpha = 0.05
```

6.3.3 Selection of appropriate test

actual_time and segment_actual_time are independent as they are gathered in different manner.

So here two independent samples are tested. samples are numerical and continuous.

ttest comparing means of two independent samples is required so `ttest_ind` is appropriate (2sample ttest)

6.3.4 Check the test assumptions

The two-samples independent t-test assume the following characteristics about the data:

```
[265]: data_group1 = trip["actual_time"].values  
data_group2 = trip["segment_actual_time"].values
```

Assumption 1: Independence of the observations- Each subject should belong to only one group.

There is no relationship between the observations in each group. (gathered two columns in different manner, so independent)

Assumption 2: Data groups should follow Normal distribution (atleast approximately)

Shapiro test for normality check

```
[266]: #Normality by shapiro test  
shapiro(data_group1)
```

```
[266]: ShapiroResult(statistic=0.7551202774047852, pvalue=0.0)
```

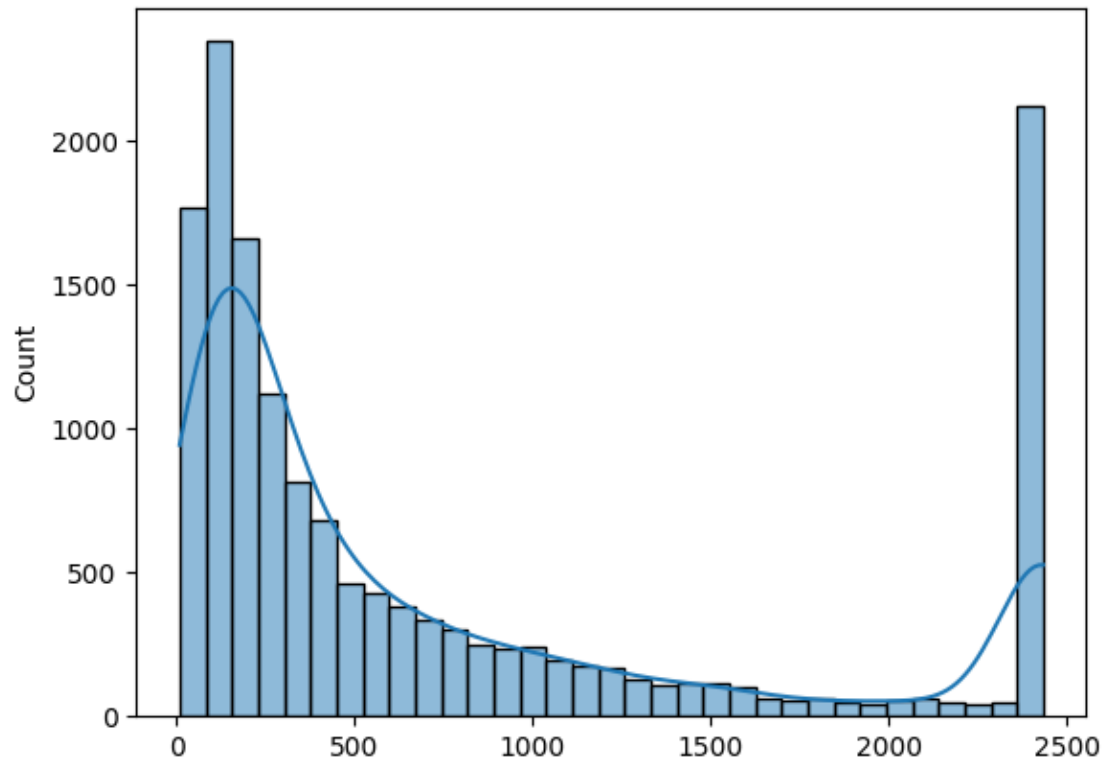
```
[267]: shapiro(data_group2)
```

```
[267]: ShapiroResult(statistic=0.7881296873092651, pvalue=0.0)
```

p = 0 indicates that distribution is not normal. So Box cox transformation may require

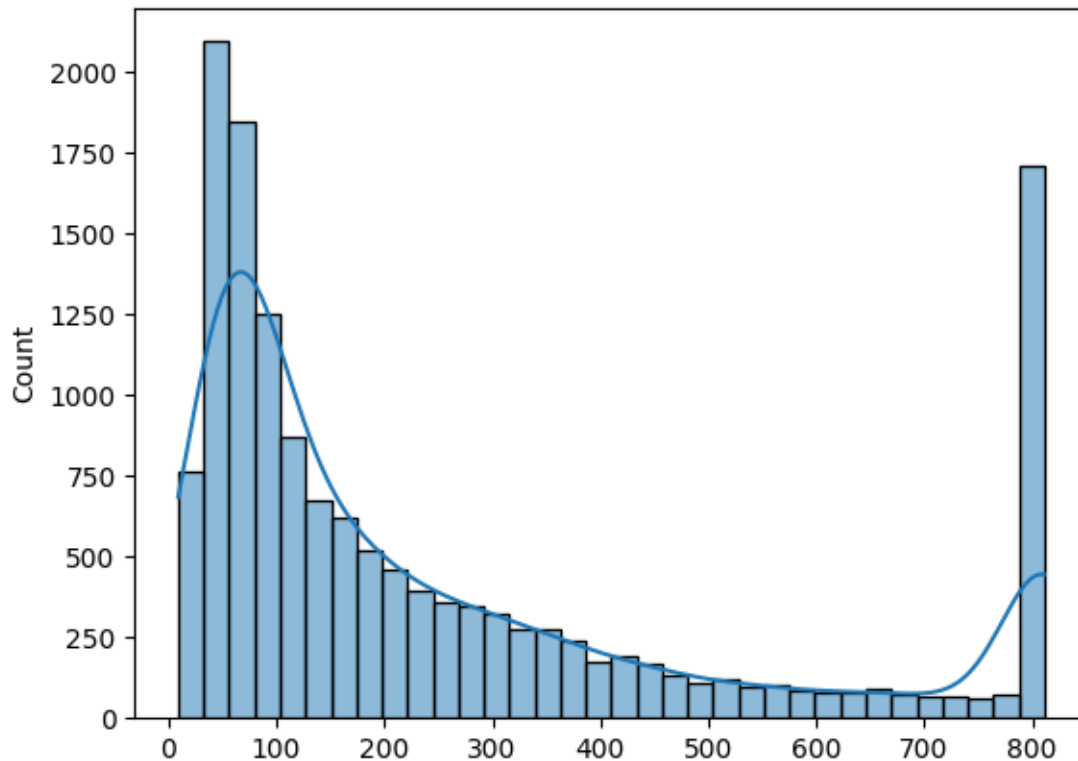
```
[268]: sns.histplot(data = data_group1,kde = True)
```

```
[268]: <Axes: ylabel='Count'>
```



```
[269]: sns.histplot(data = data_group2,kde = True)
```

```
[269]: <Axes: ylabel='Count'>
```



Above graph and shapiro test tells that data groups are not following NORMAL distribution

Box Cox Transformation

```
[270]: # generate non-normal data
original_data = trip["actual_time"]

# transform training data & save lambda value
fitted_actual_time, fitted_actual_time_lambda = boxcox(original_data)

# creating axes to draw plots
fig, ax = plt.subplots(1, 2)

# plotting the original data(non-normal) and
# fitted data (normal)
sns.distplot(original_data, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Non-Normal", color = "green", ax = ax[0])

sns.distplot(fitted_actual_time, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Normal", color = "green", ax = ax[1])
```

```

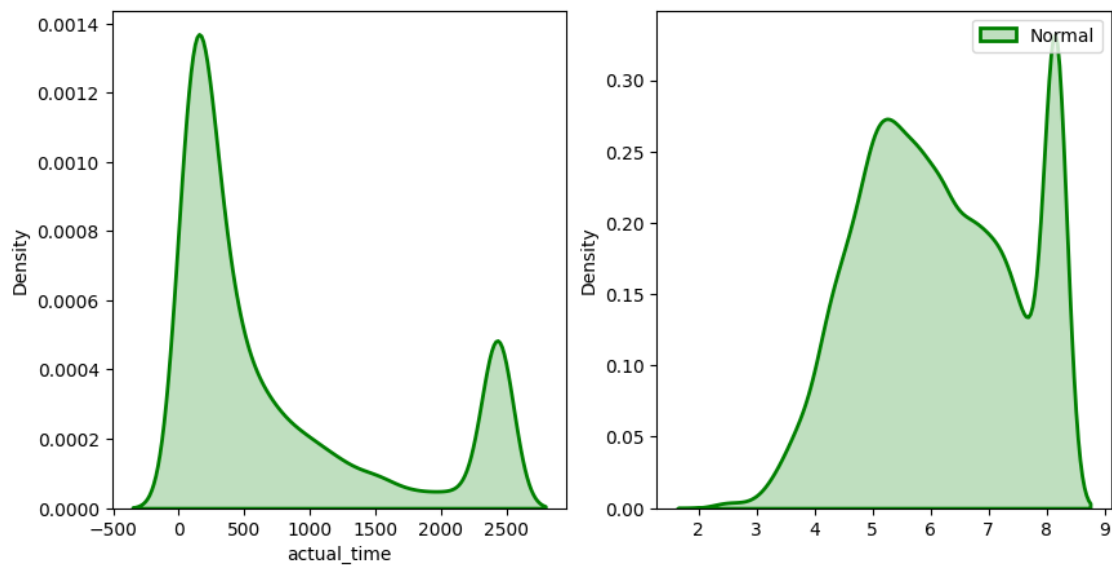
# adding legends to the subplots
plt.legend(loc = "upper right")

# rescaling the subplots
fig.set_figheight(5)
fig.set_figwidth(10)

print(f"Lambda value used for Transformation: {fitted_actual_time_lambda}")

```

Lambda value used for Transformation: 0.011661865710665452



```

[271]: # generate non-normal data
original_data = trip["segment_actual_time"]

# transform training data & save lambda value
fitted_segment_actual_time, fitted_segment_actual_time_lambda = \
    boxcox(original_data)

# creating axes to draw plots
fig, ax = plt.subplots(1, 2)

# plotting the original data(non-normal) and
# fitted data (normal)
sns.distplot(original_data, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Non-Normal", color = "green", ax = ax[0])

sns.distplot(fitted_segment_actual_time, hist = False, kde = True,

```

```

kde_kws = {'shade': True, 'linewidth': 2},
label = "Normal", color = "green", ax = ax[1])

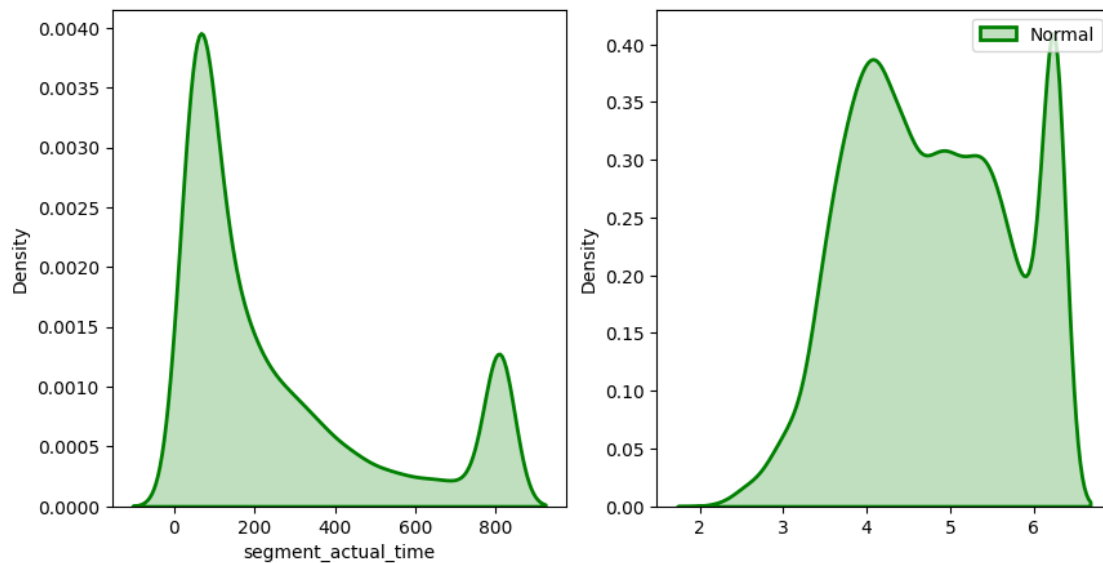
# adding legends to the subplots
plt.legend(loc = "upper right")

# rescaling the subplots
fig.set_figheight(5)
fig.set_figwidth(10)

print(f"Lambda value used for Transformation:␣
↪{fitted_segment_actual_time_lambda}")

```

Lambda value used for Transformation: -0.0204494176331651



```

[272]: data_group1 = fitted_actual_time
data_group2 = fitted_segment_actual_time

```

Assumption 3: No significant outliers in the two groups (No outliers according to box plots after bounding)

```

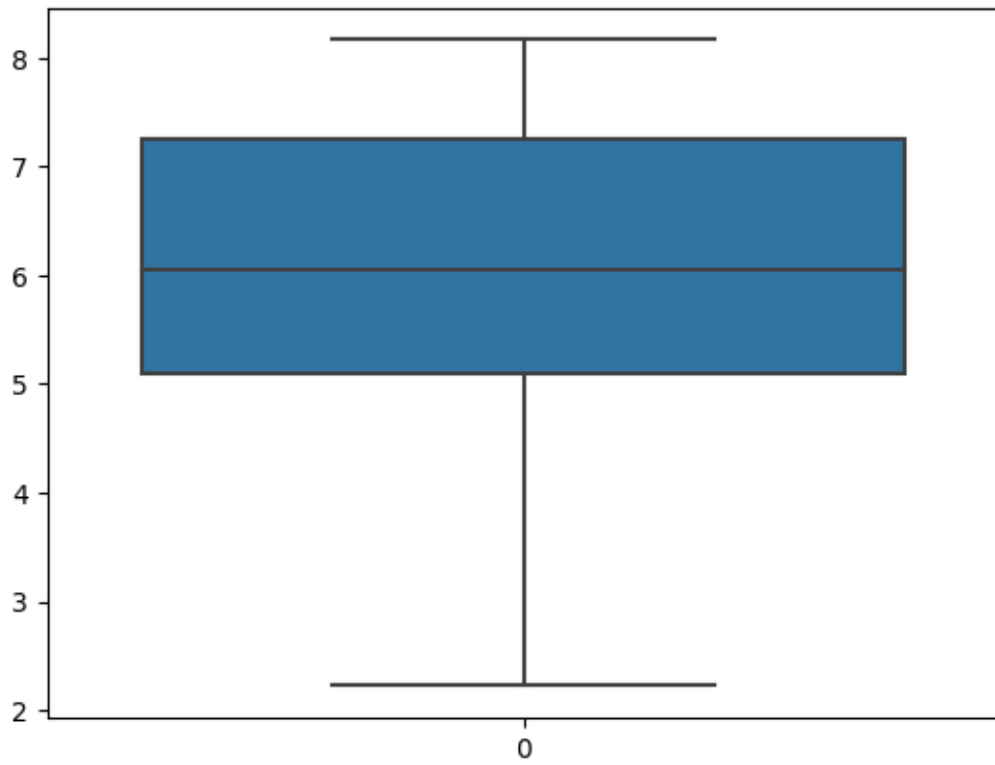
[273]: sns.boxplot(data_group1)

```

```

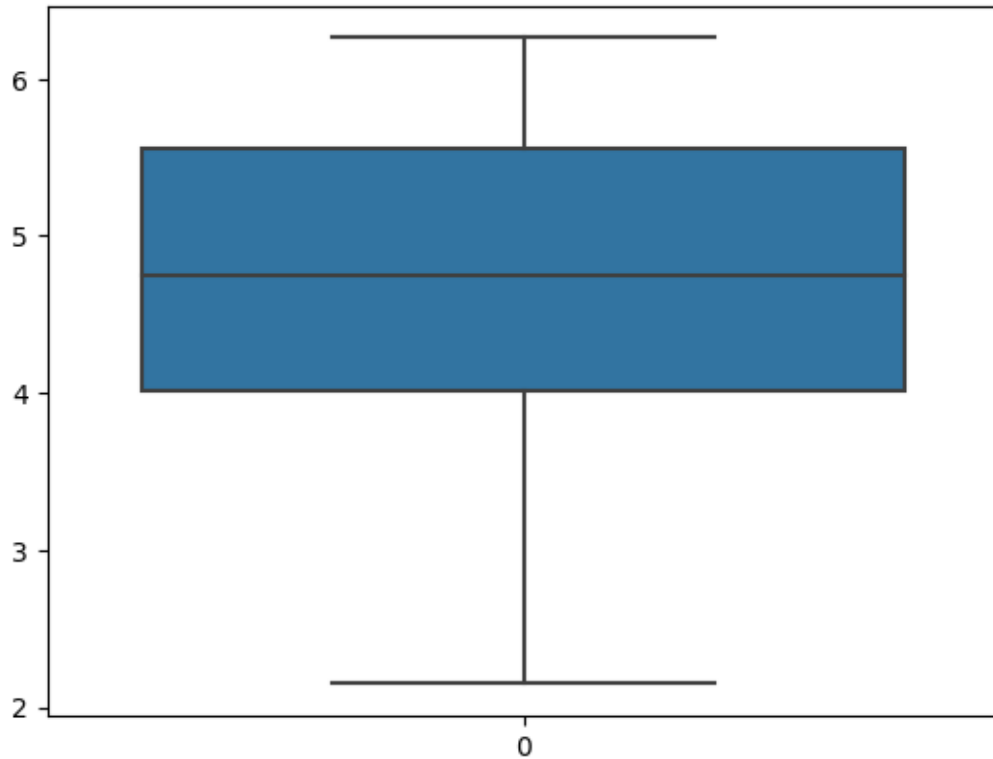
[273]: <Axes: >

```



```
[274]: sns.boxplot(data_group2)
```

```
[274]: <Axes: >
```



No outliers are present in both box plots

Assumption 4: Equal variances should be observed between two data groups

```
[275]: #homogeneity of variances
print("variance of actual_time", np.var(data_group1), "\nvariance of_
      ↪segment_actual_time", np.var(data_group2))
```

```
variance of actual_time 1.7942706805535242
variance of segment_actual_time 0.9015998536012519
```

Before conducting the two-sample T-Test we need to find if the given data groups have the same variance. If the ratio of the larger data groups to the small data group is less than 4:1 then we can consider that the given data groups have equal variance.

Levene Test

```
[276]: levene(data_group1, data_group2)
```

```
[276]: LeveneResult(statistic=2065.7663648965936, pvalue=0.0)
```

p value < 0.05 indicates that data groups have un-equal variances

6.3.5 Finding the p-value

```
[277]: tstat,p_val = ttest_ind(a=data_group1, b=data_group2,
    ↪equal_var=False,alternative = "two-sided")
```

```
[278]: print("test statistic",tstat)
    print("p value",p_val)
```

```
test statistic 100.65127174349226
p value 0.0
```

6.3.6 Conclusion based on the p-value

```
[279]: if p_val <= alpha:
    print("\nSince p-value is less than the alpha 0.05, We reject the Null
    ↪Hypothesis. Meaning that\n\
        There is difference between Mean of actual_time and
    ↪segment_actual_time")
else:
    print("Since p-value is greater than the alpha 0.05, We do not reject the
    ↪Null Hypothesis\n\
        i.e, No difference between Mean of actual_time and segment_actual_time")
```

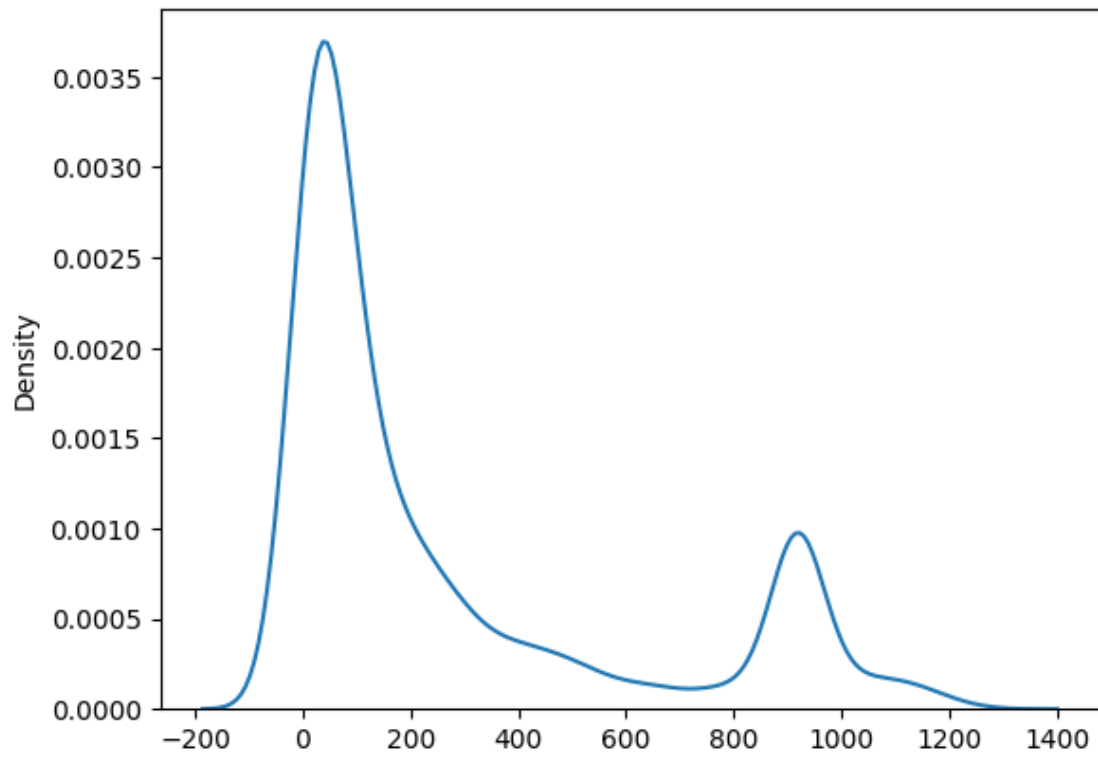
```
Since p-value is less than the alpha 0.05, We reject the Null Hypothesis.
Meaning that
    There is difference between Mean of actual_time and
segment_actual_time
```

6.4 Do hypothesis testing/ visual analysis between osrm distance aggregated value and segment osrm distance aggregated value (aggregated values are the values you'll get after merging the rows on the basis of trip_uuid)

6.4.1 Visual analysis

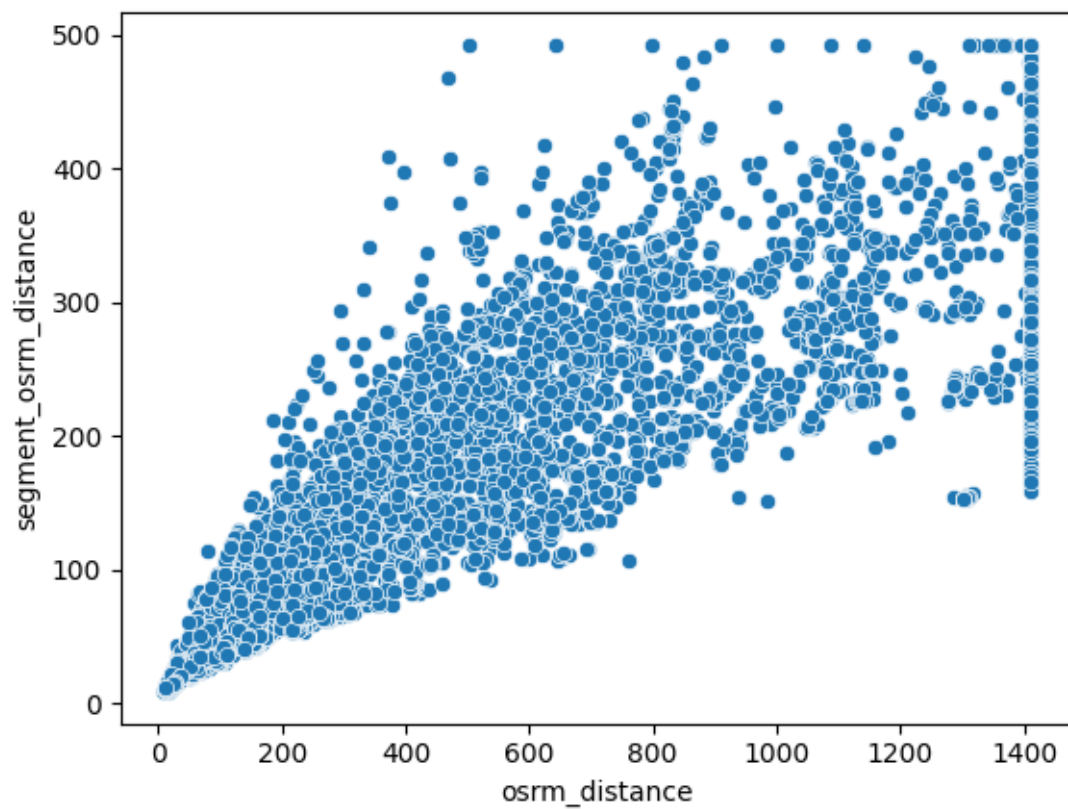
```
[280]: sns.kdeplot(data = trip["osrm_distance"]-trip["segment_osrm_distance"])
```

```
[280]: <Axes: ylabel='Density'>
```



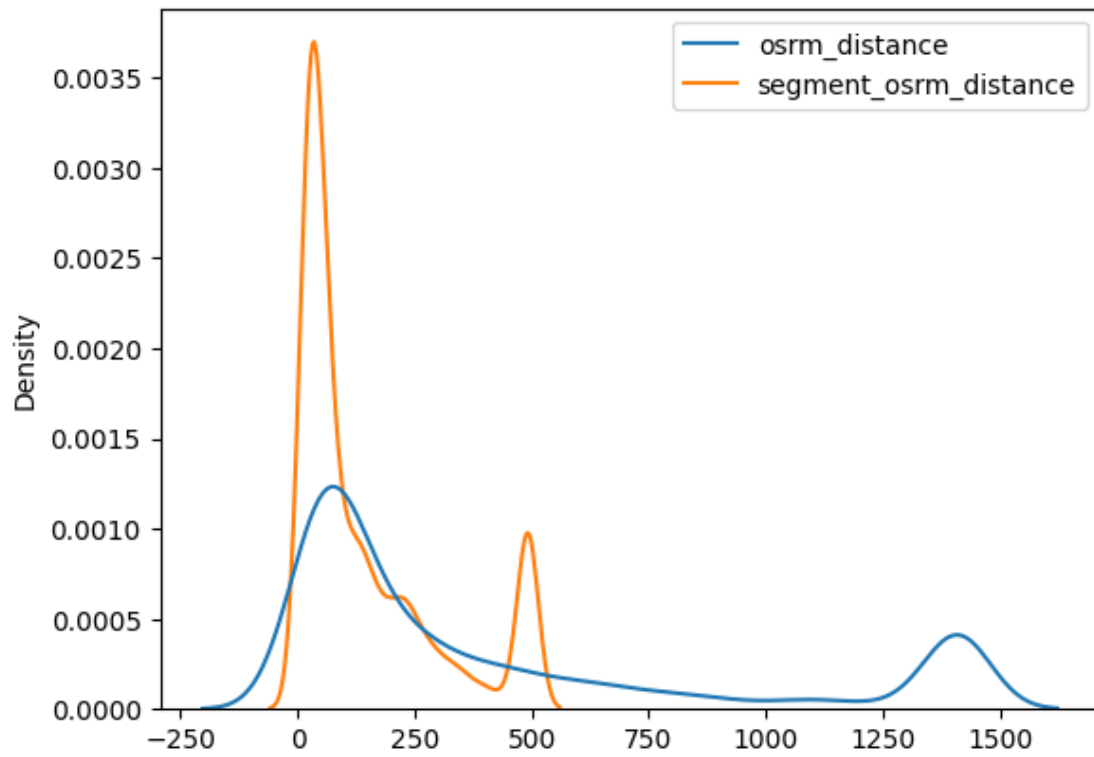
```
[281]: sns.scatterplot(data = trip, x = "osrm_distance",y ="segment_osrm_distance")
```

```
[281]: <Axes: xlabel='osrm_distance', ylabel='segment_osrm_distance'>
```



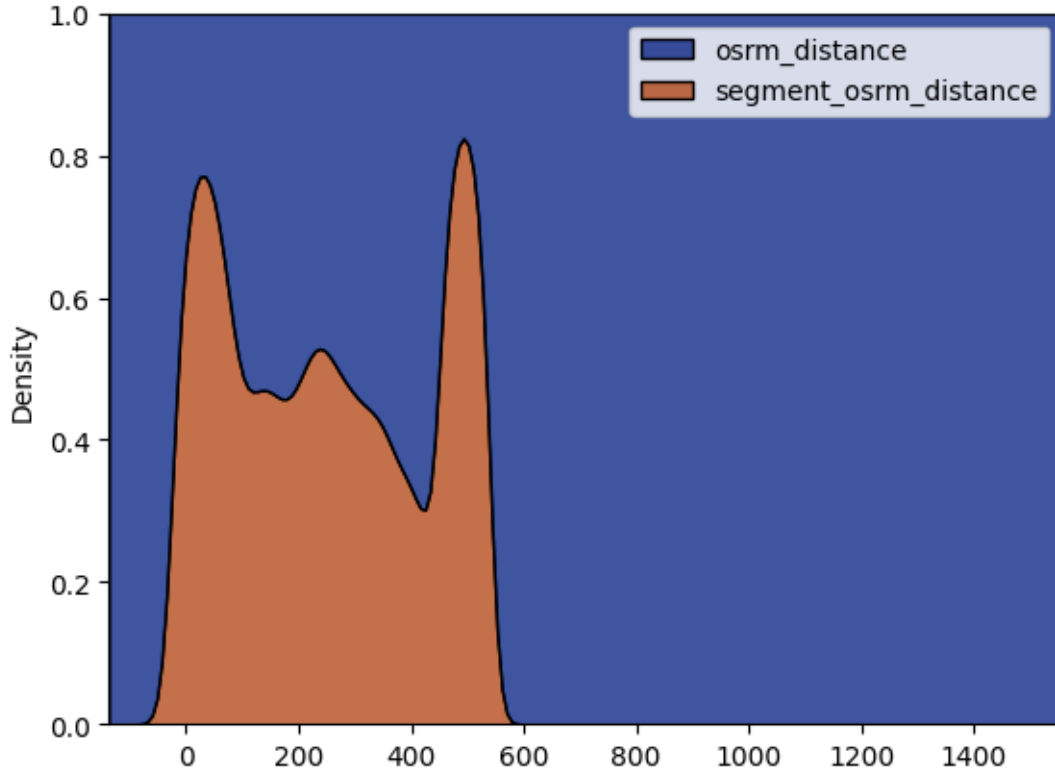
```
[282]: sns.kdeplot(data = trip[["osrm_distance","segment_osrm_distance"]])
```

```
[282]: <Axes: ylabel='Density'>
```



```
[283]: sns.kdeplot(data = trip[["osrm_distance","segment_osrm_distance"]],fill =  
↳ True,palette="dark",multiple="fill")
```

```
[283]: <Axes: ylabel='Density'>
```



Graph indicates that there is no much difference between “osrm_distance” and “segment_osrm_distance”

6.4.2 Hypothesis formulation

Null Hypothesis H0: No difference between Mean of osrm_distance and segment_osrm_distance

$$\mu_{osrm-distance} = \mu_{segment-osrm-distance} \quad (7)$$

Alternate Hypothesis Ha: There is difference between Mean of osrm_distance and segment_osrm_distance

$$\mu_{osrm-distance} \neq \mu_{segment-osrm-distance} \quad (8)$$

two-tailed test

Significance level: 0.05

[284]: `alpha = 0.05`

6.4.3 Selection of appropriate test

osrm_distance and segment_osrm_distance are independent as they are gathered in different manner.

So here two independent samples are tested. samples are numerical and continuous.

ttest comparing means of two independent samples is required so `ttest_ind` is appropriate (2sample ttest)

6.4.4 Check the test assumptions

The two-samples independent t-test assume the following characteristics about the data:

```
[285]: data_group1 = trip["osrm_distance"].values  
data_group2 = trip["segment_osrm_distance"].values
```

Assumption 1: Independence of the observations- Each subject should belong to only one group.

There is no relationship between the observations in each group. (gathered two columns in different manner, so independent)

Assumption 2: Data groups should follow Normal distribution (atleast approximately)

Shapiro test for normality check

```
[286]: #Normality by shapiro test  
shapiro(data_group1)
```

```
[286]: ShapiroResult(statistic=0.7446017265319824, pvalue=0.0)
```

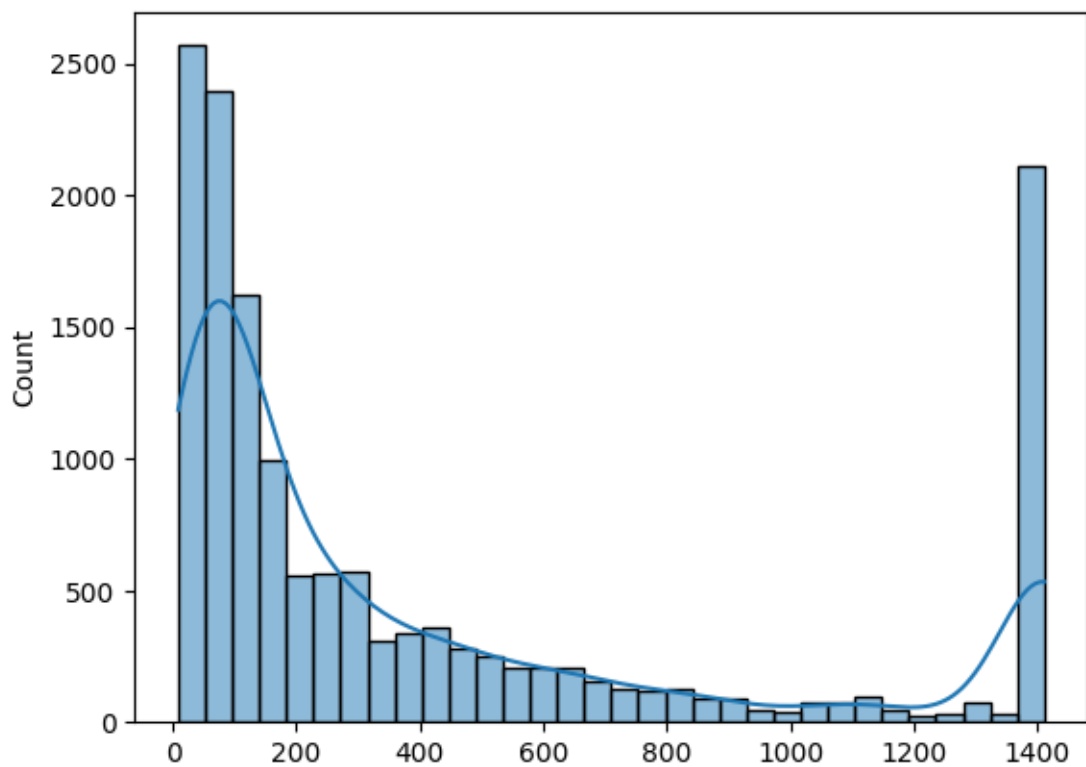
```
[287]: shapiro(data_group2)
```

```
[287]: ShapiroResult(statistic=0.774498701095581, pvalue=0.0)
```

p = 0 indicates that distribution is not normal. So Box cox transformation may require

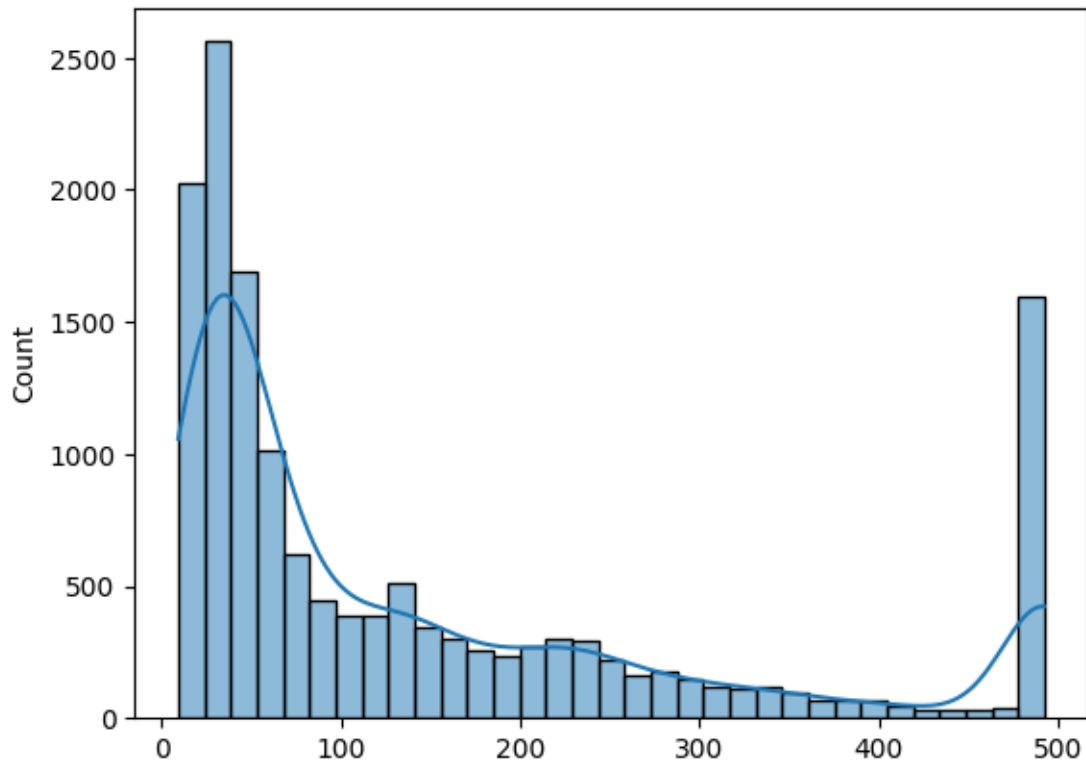
```
[288]: sns.histplot(data = data_group1,kde = True)
```

```
[288]: <Axes: ylabel='Count'>
```



```
[289]: sns.histplot(data = data_group2,kde = True)
```

```
[289]: <Axes: ylabel='Count'>
```



Above graph and shapiro test tells that data groups are not following NORMAL distribution

Box Cox Transformation

```
[290]: # generate non-normal data
original_data = trip["osrm_distance"]

# transform training data & save lambda value
fitted_osrm_distance, fitted_osrm_distance_lambda = boxcox(original_data)

# creating axes to draw plots
fig, ax = plt.subplots(1, 2)

# plotting the original data(non-normal) and
# fitted data (normal)
sns.distplot(original_data, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Non-Normal", color = "green", ax = ax[0])

sns.distplot(fitted_osrm_distance, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Normal", color = "green", ax = ax[1])
```



```

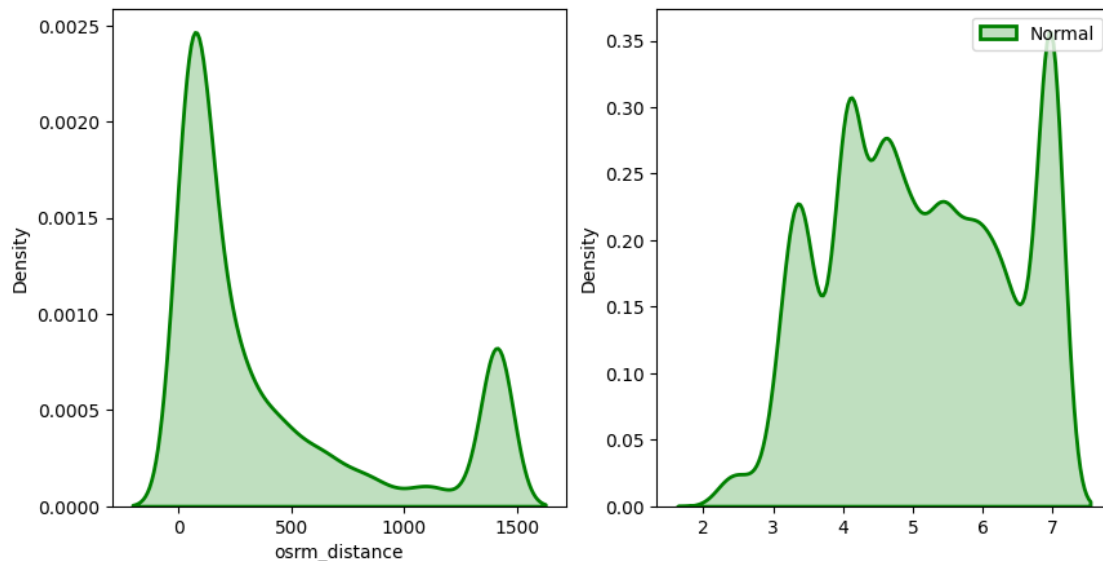
# adding legends to the subplots
plt.legend(loc = "upper right")

# rescaling the subplots
fig.set_figheight(5)
fig.set_figwidth(10)

print(f"Lambda value used for Transformation: {fitted_osrm_distance_lambda}")

```

Lambda value used for Transformation: -0.010384880737814343



```

[291]: # generate non-normal data
original_data = trip["segment_osrm_distance"]

# transform training data & save lambda value
fitted_segment_osrm_distance, fitted_segment_osrm_distance_lambda =
    ↪boxcox(original_data)

# creating axes to draw plots
fig, ax = plt.subplots(1, 2)

# plotting the original data(non-normal) and
# fitted data (normal)
sns.distplot(original_data, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Non-Normal", color = "green", ax = ax[0])

sns.distplot(fitted_segment_osrm_distance, hist = False, kde = True,

```

```

kde_kws = {'shade': True, 'linewidth': 2},
label = "Normal", color = "green", ax = ax[1])

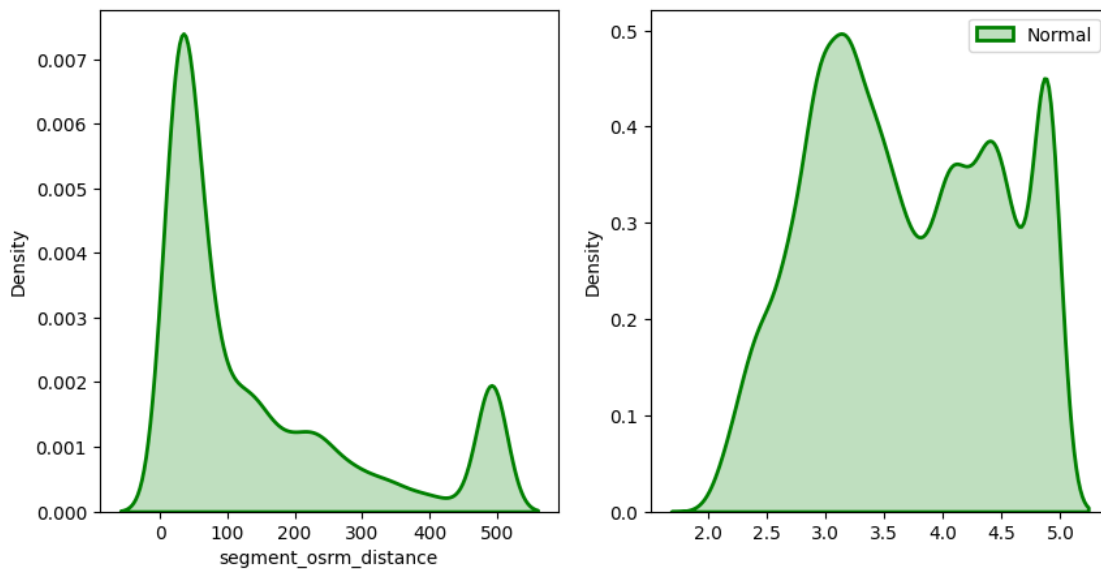
# adding legends to the subplots
plt.legend(loc = "upper right")

# rescaling the subplots
fig.set_figheight(5)
fig.set_figwidth(10)

print(f"Lambda value used for Transformation:␣
↪{fitted_segment_osrm_distance_lambda}")

```

Lambda value used for Transformation: -0.07951251519098043



```

[292]: data_group1 = fitted_osrm_distance
data_group2 = fitted_segment_osrm_distance

```

Assumption 3: No significant outliers in the two groups (No outliers according to box plots after bounding)

```

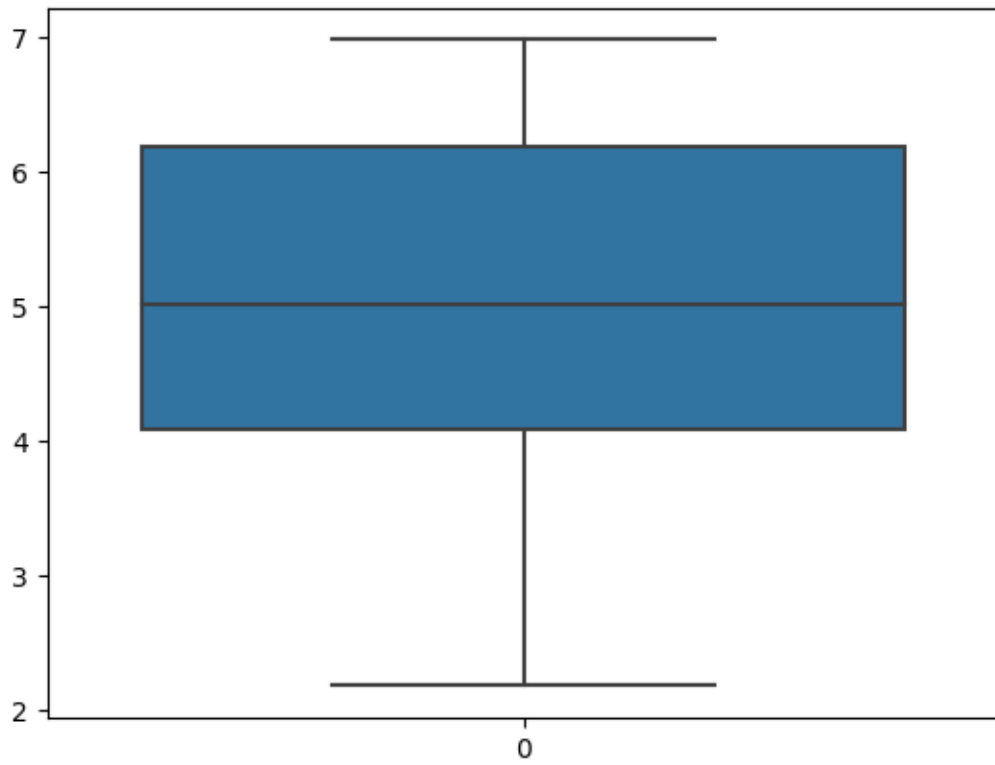
[293]: sns.boxplot(data_group1)

```

```

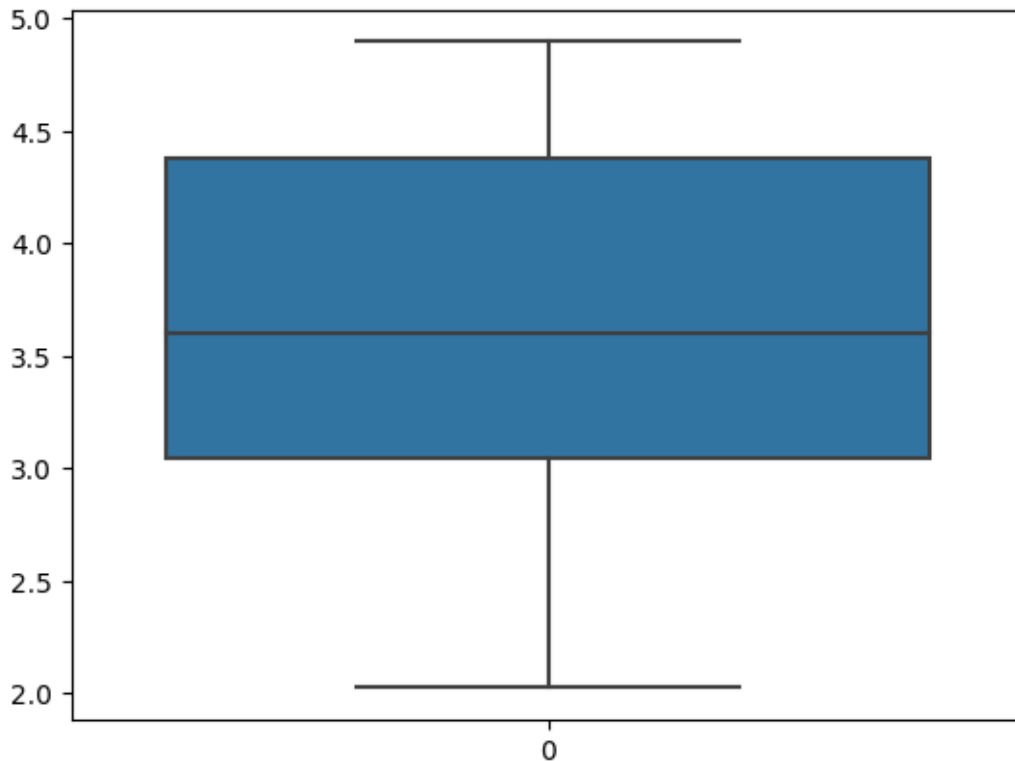
[293]: <Axes: >

```



```
[294]: sns.boxplot(data_group2)
```

```
[294]: <Axes: >
```



No outliers are present in both box plots

Assumption 4: Equal variances should be observed between two data groups

```
[295]: #homogeneity of variances
print("variance of osrm_distance", np.var(data_group1), "\nvariance of_
      ↪ segment_osrm_distance", np.var(data_group2))
```

```
variance of osrm_distance 1.5789901882982178
variance of segment_osrm_distance 0.6073281259815023
```

Before conducting the two-sample T-Test we need to find if the given data groups have the same variance. If the ratio of the larger data groups to the small data group is less than 4:1 then we can consider that the given data groups have equal variance.

Levene Test

```
[296]: levene(data_group1, data_group2)
```

```
[296]: LeveneResult(statistic=4127.7603033333585, pvalue=0.0)
```

p value > 0.05 indicates that data groups have equal variances

6.4.5 Finding the p-value

```
[297]: tstat,p_val = ttest_ind(a=data_group1, b=data_group2,
    ↪equal_var=True,alternative = "two-sided")
```

```
[298]: print("test statistic",tstat)
    print("p value",p_val)
```

```
test statistic 117.64922395212125
p value 0.0
```

6.4.6 Conclusion based on the p-value

```
[299]: if p_val <= alpha:
    print("\nSince p-value is less than the alpha 0.05, We reject the Null
    ↪Hypothesis. Meaning that\n\
        There is difference between Mean of osrm_distance and
    ↪segment_osrm_distance")
else:
    print("Since p-value is greater than the alpha 0.05, We do not reject the
    ↪Null Hypothesis\n\
        i.e, No difference between Mean of osrm_distance and
    ↪segment_osrm_distance")
```

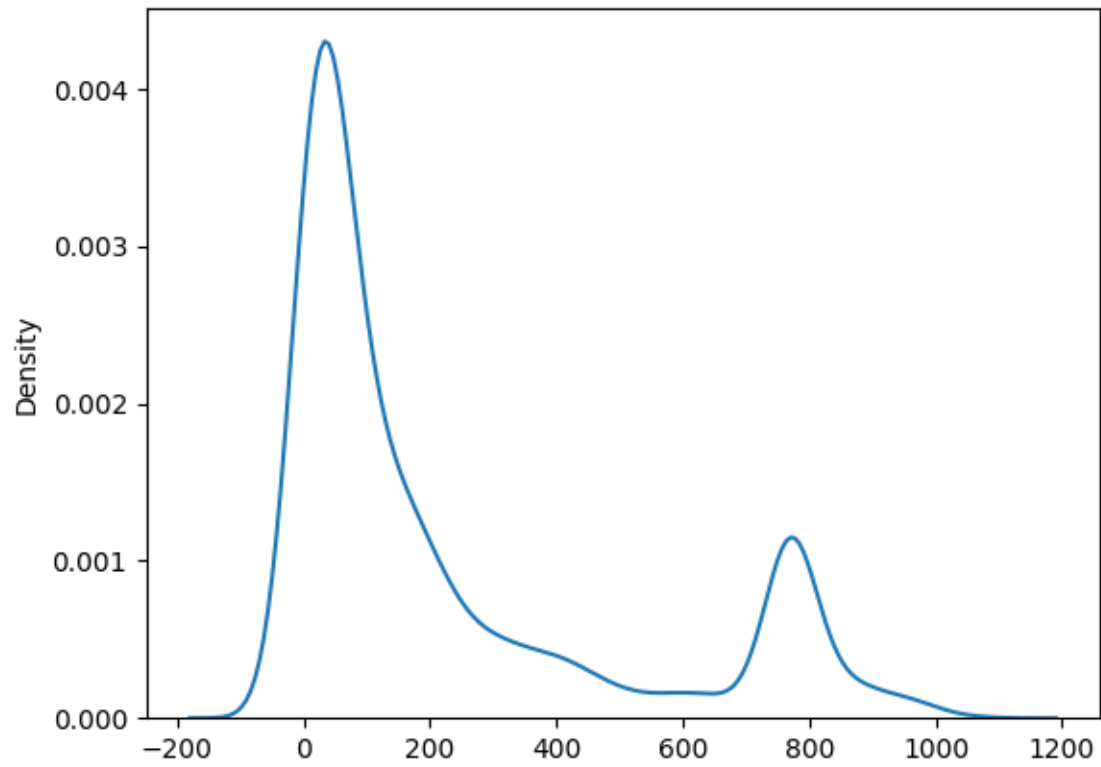
```
Since p-value is less than the alpha 0.05, We reject the Null Hypothesis.
Meaning that
    There is difference between Mean of osrm_distance and
segment_osrm_distance
```

6.5 Do hypothesis testing/ visual analysis between osrm time aggregated value and segment osrm time aggregated value (aggregated values are the values you'll get after merging the rows on the basis of trip_uuid)

6.5.1 Visual analysis

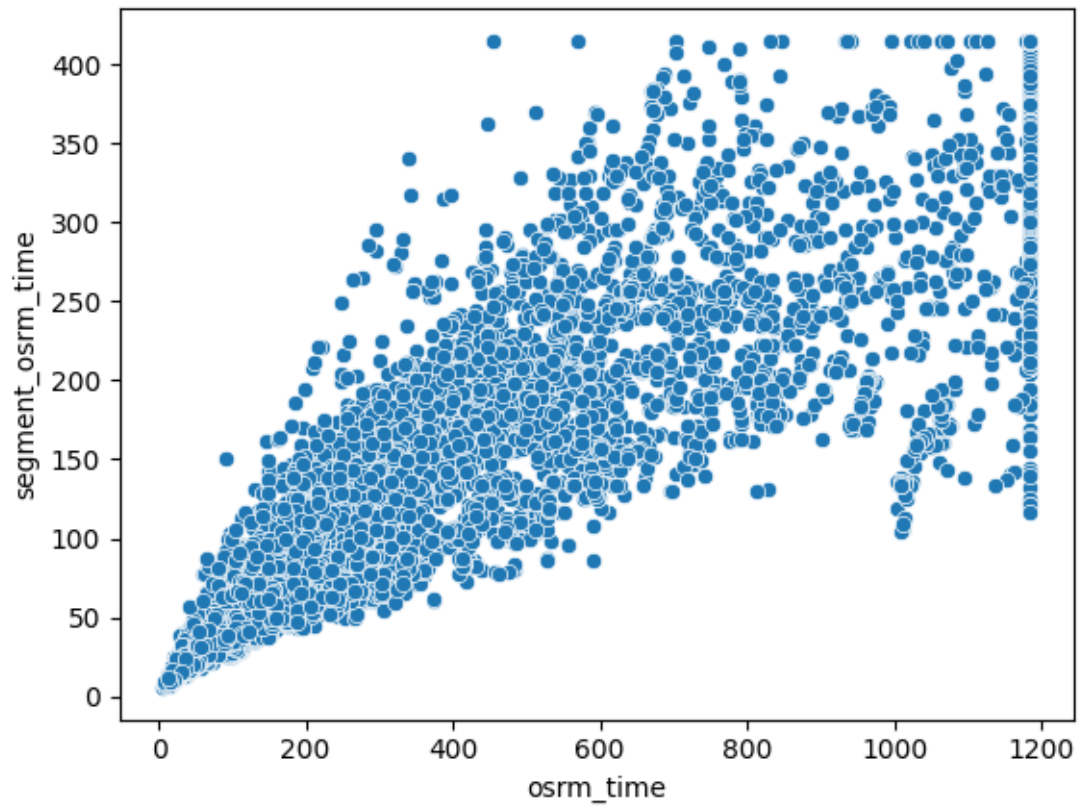
```
[300]: sns.kdeplot(data = trip["osrm_time"]-trip["segment_osrm_time"])
```

```
[300]: <Axes: ylabel='Density'>
```



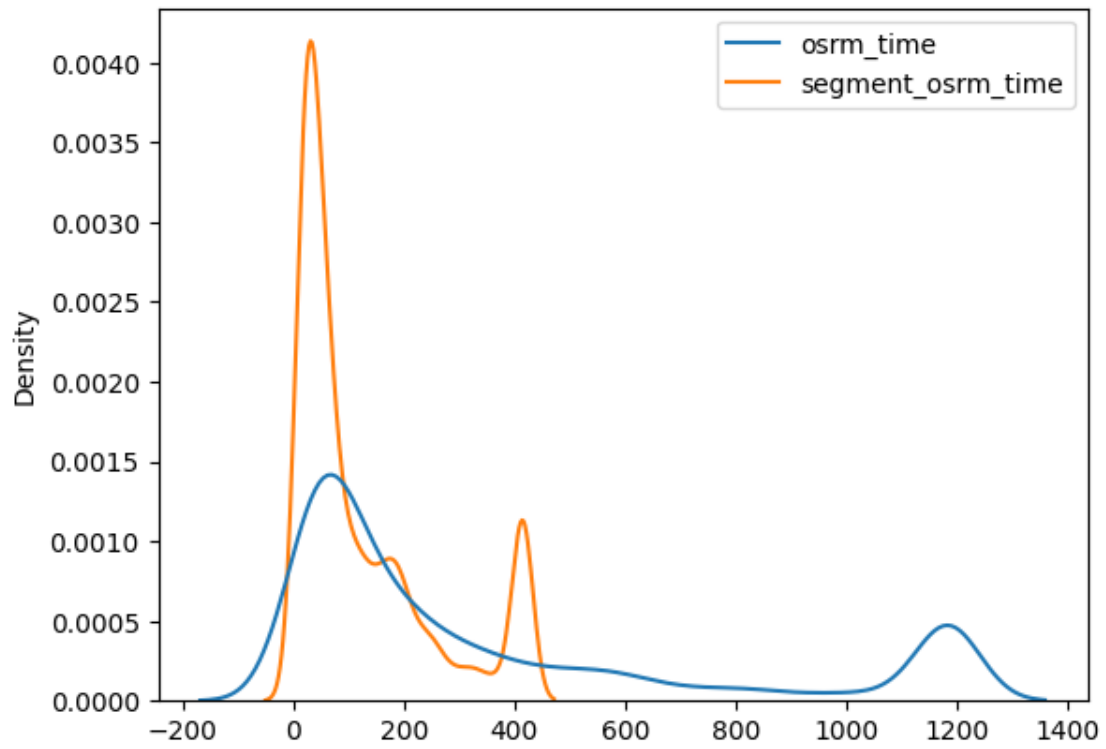
```
[301]: sns.scatterplot(data = trip, x = "osrm_time",y ="segment_osrm_time")
```

```
[301]: <Axes: xlabel='osrm_time', ylabel='segment_osrm_time'>
```



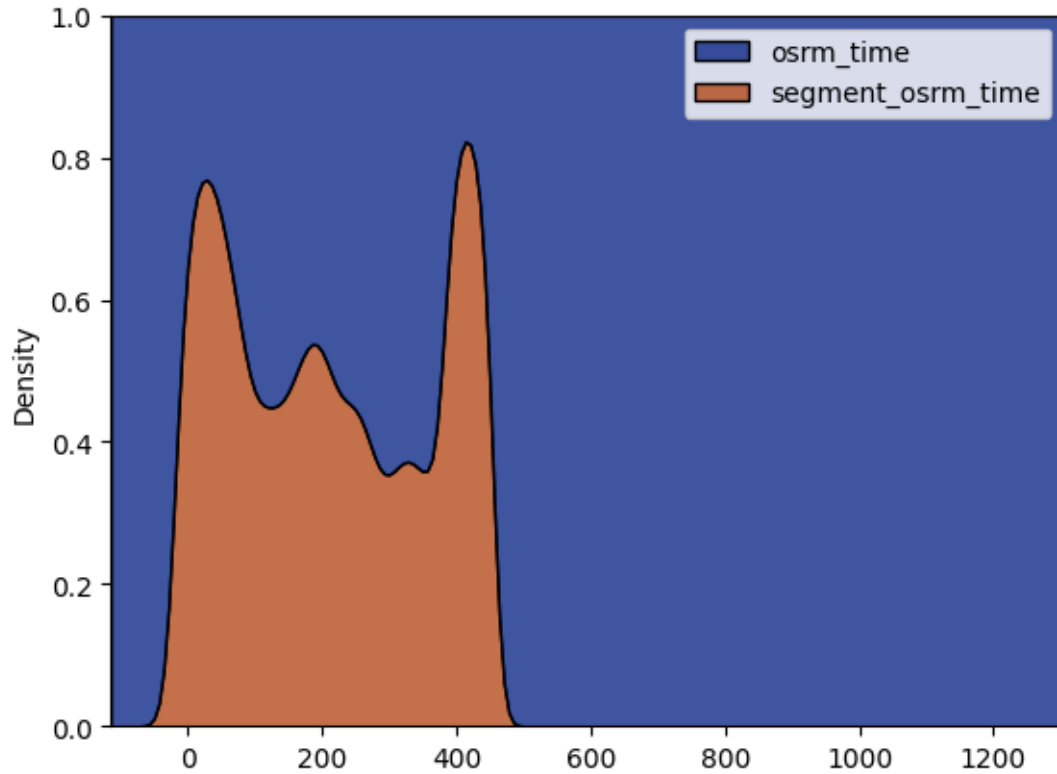
```
[302]: sns.kdeplot(data = trip[["osrm_time","segment_osrm_time"]])
```

```
[302]: <Axes: ylabel='Density'>
```



```
[303]: sns.kdeplot(data = trip[["osrm_time","segment_osrm_time"]],fill =  
↳ True,palette="dark",multiple="fill")
```

```
[303]: <Axes: ylabel='Density'>
```

Graph indicates that there is difference between “osrm_time” and “segment_osrm_time”

6.5.2 Hypothesis formulation

Null Hypothesis H0: No difference between Mean of osrm_time and segment_osrm_time

$$\mu_{osrm-time} = \mu_{segment-osrm-time} \quad (9)$$

Alternate Hypothesis Ha: There is difference between Mean of osrm_time and segment_osrm_time

$$\mu_{osrm-time} \neq \mu_{segment-osrm-time} \quad (10)$$

two-tailed test

Significance level: 0.05

[304]: `alpha = 0.05`

6.5.3 Selection of appropriate test

osrm_time and segment_osrm_time are independent as they are gathered in different manner.

So here two independent samples are tested. samples are numerical and continuous.

ttest comparing means of two independent samples is required so `ttest_ind` is appropriate (2sample ttest)

6.5.4 Check the test assumptions

The two-samples independent t-test assume the following characteristics about the data:

```
[305]: data_group1 = trip["osrm_time"].values
       data_group2 = trip["segment_osrm_time"].values
```

Assumption 1: Independence of the observations- Each subject should belong to only one group.

There is no relationship between the observations in each group. (gathered two columns in different manner, so independent)

Assumption 2: Data groups should follow Normal distribution (atleast approximately)

Shapiro test for normality check

```
[306]: #Normality by shapiro test
       shapiro(data_group1)
```

```
[306]: ShapiroResult(statistic=0.7560504078865051, pvalue=0.0)
```

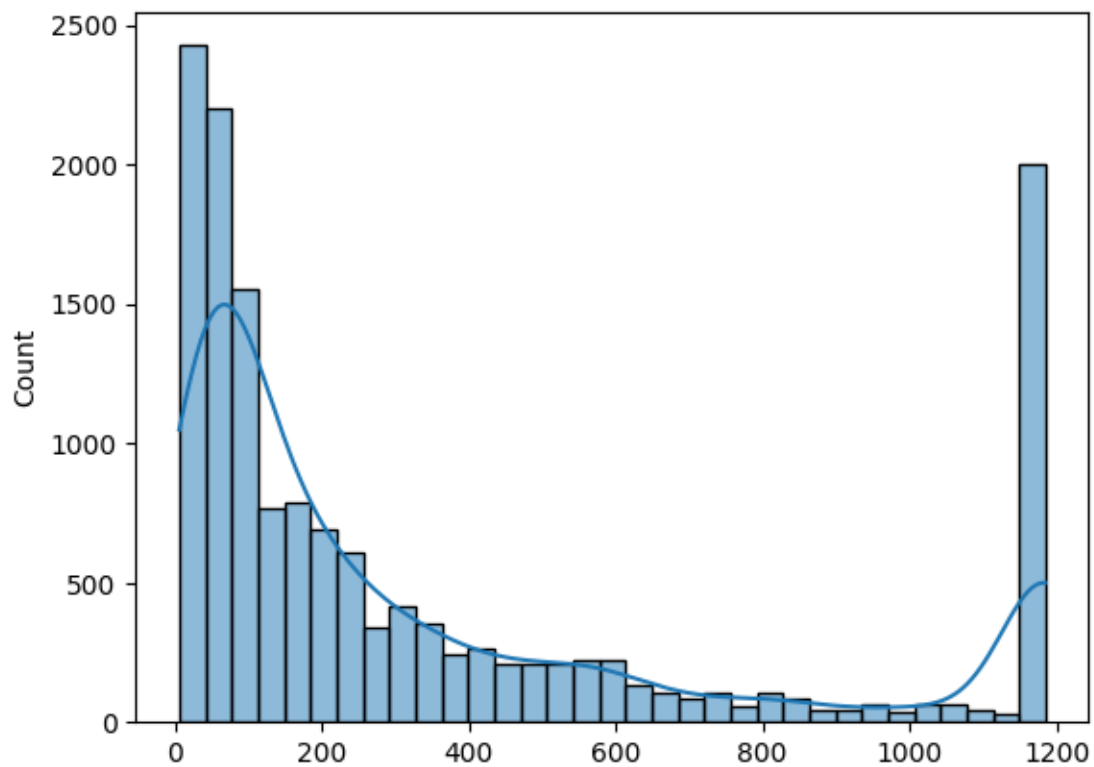
```
[307]: shapiro(data_group2)
```

```
[307]: ShapiroResult(statistic=0.7843230962753296, pvalue=0.0)
```

p = 0 indicates that distribution is not normal. So Box cox transformation may require

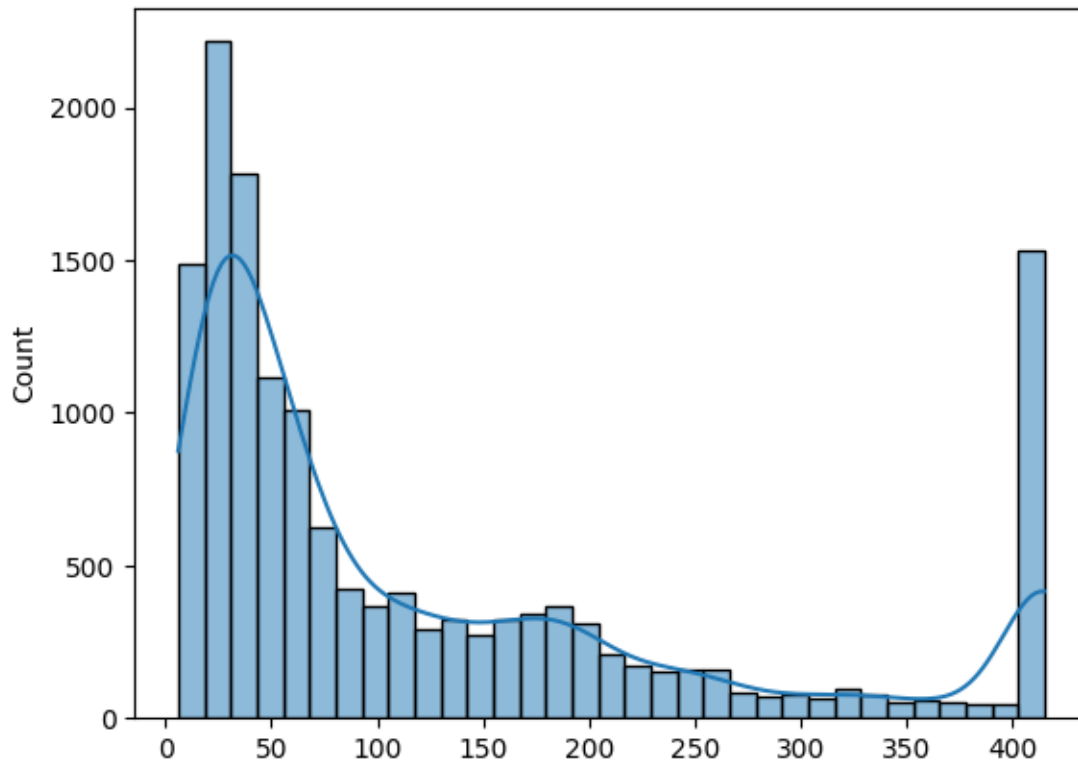
```
[308]: sns.histplot(data = data_group1, kde = True)
```

```
[308]: <Axes: ylabel='Count'>
```



```
[309]: sns.histplot(data = data_group2,kde = True)
```

```
[309]: <Axes: ylabel='Count'>
```



Above graph and shapiro test tells that data groups are not following NORMAL distribution

Box Cox Transformation

```
[310]: # generate non-normal data
original_data = trip["osrm_time"]

# transform training data & save lambda value
fitted_osrm_time, fitted_osrm_time_lambda = boxcox(original_data)

# creating axes to draw plots
fig, ax = plt.subplots(1, 2)

# plotting the original data(non-normal) and
# fitted data (normal)
sns.distplot(original_data, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Non-Normal", color = "green", ax = ax[0])

sns.distplot(fitted_osrm_time, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Normal", color = "green", ax = ax[1])
```

```

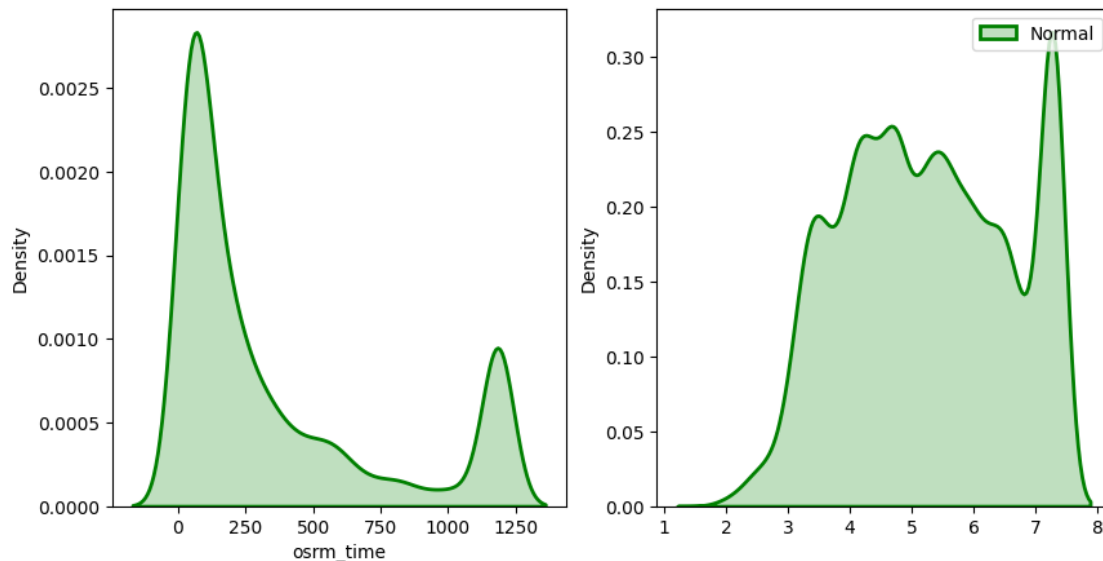
# adding legends to the subplots
plt.legend(loc = "upper right")

# rescaling the subplots
fig.set_figheight(5)
fig.set_figwidth(10)

print(f"Lambda value used for Transformation: {fitted_osrm_time_lambda}")

```

Lambda value used for Transformation: 0.008528277972301913



```

[311]: # generate non-normal data
original_data = trip["segment_osrm_time"]

# transform training data & save lambda value
fitted_segment_osrm_time, fitted_segment_osrm_time_lambda = \
    boxcox(original_data)

# creating axes to draw plots
fig, ax = plt.subplots(1, 2)

# plotting the original data(non-normal) and
# fitted data (normal)
sns.distplot(original_data, hist = False, kde = True,
              kde_kws = {'shade': True, 'linewidth': 2},
              label = "Non-Normal", color = "green", ax = ax[0])

sns.distplot(fitted_segment_osrm_time, hist = False, kde = True,

```

```

kde_kws = {'shade': True, 'linewidth': 2},
label = "Normal", color = "green", ax = ax[1])

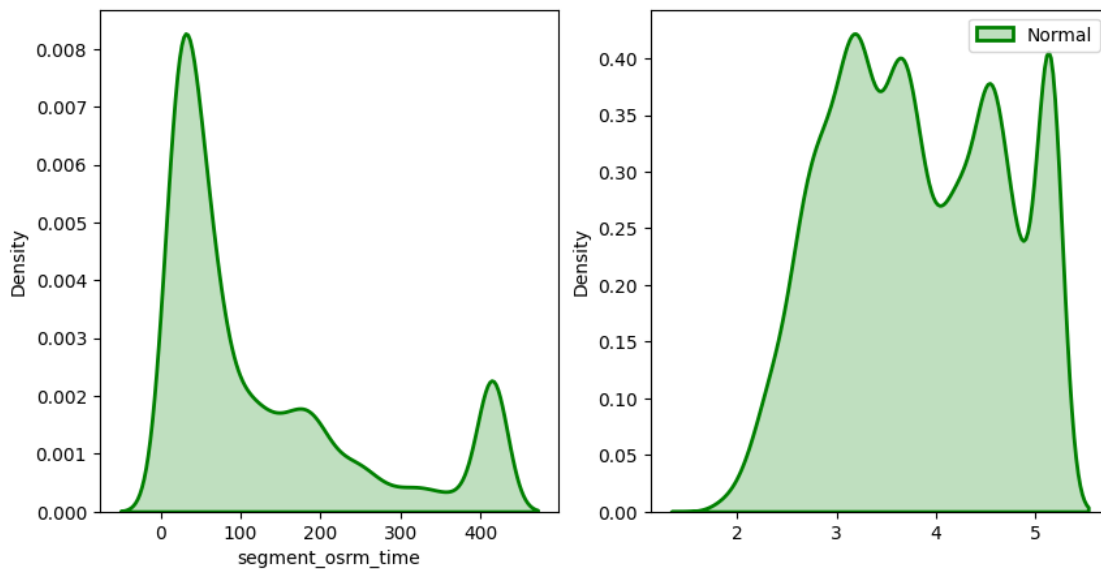
# adding legends to the subplots
plt.legend(loc = "upper right")

# rescaling the subplots
fig.set_figheight(5)
fig.set_figwidth(10)

print(f"Lambda value used for Transformation:␣
↪{fitted_segment_osrm_time_lambda}")

```

Lambda value used for Transformation: -0.0534982654860404



```

[312]: data_group1 = fitted_osrm_time
data_group2 = fitted_segment_osrm_time

```

Assumption 3: No significant outliers in the two groups (No outliers according to box plots after bounding)

```

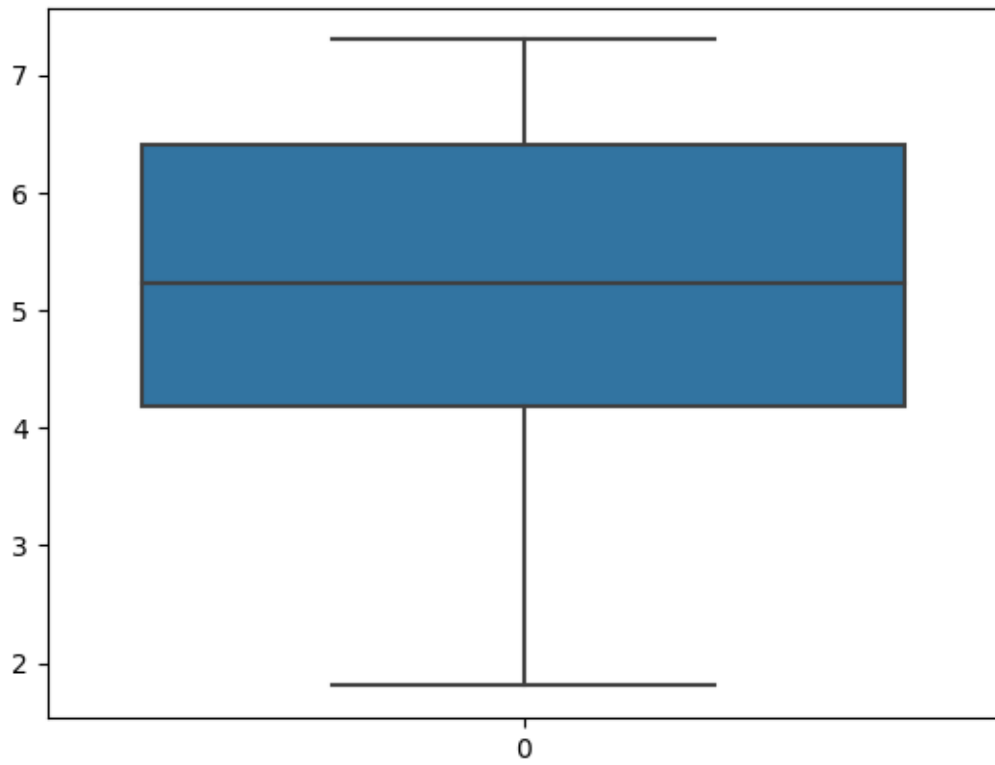
[313]: sns.boxplot(data_group1)

```

```

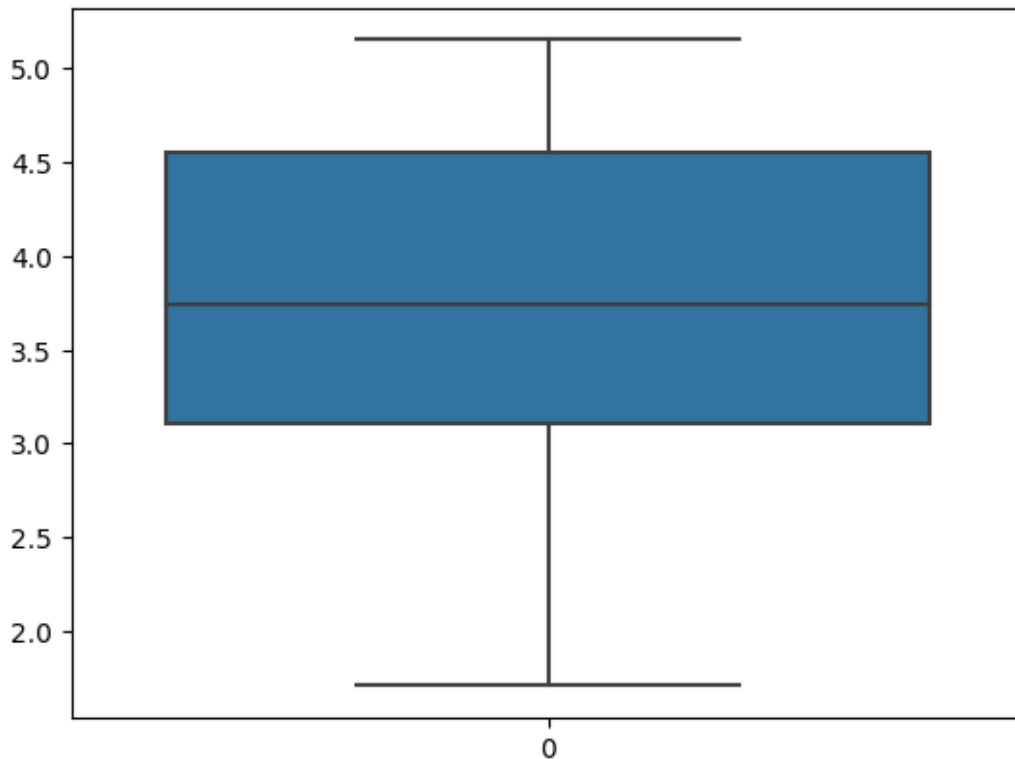
[313]: <Axes: >

```



```
[314]: sns.boxplot(data_group2)
```

```
[314]: <Axes: >
```



No outliers are present in both box plots

Assumption 4: Equal variances should be observed between two data groups

```
[315]: #homogeneity of variances
print("variance of osrm_time", np.var(data_group1), "\nvariance of_
↪segment_osrm_time", np.var(data_group2))
```

```
variance of osrm_time 1.8028476626407721
variance of segment_osrm_time 0.7268752705977594
```

Before conducting the two-sample T-Test we need to find if the given data groups have the same variance. If the ratio of the larger data groups to the small data group is less than 4:1 then we can consider that the given data groups have equal variance.

Levene Test

```
[316]: levene(data_group1, data_group2)
```

```
[316]: LeveneResult(statistic=3703.8685880738626, pvalue=0.0)
```

p value < 0.05 indicates that data groups have un-equal variances

6.5.5 Finding the p-value

```
[317]: tstat,p_val = ttest_ind(a=data_group1, b=data_group2,
    ↪equal_var=False,alternative = "two-sided")
```

```
[318]: print("test statistic",tstat)
    print("p value",p_val)
```

```
test statistic 111.25234272829276
p value 0.0
```

6.5.6 Conclusion based on the p-value

```
[319]: if p_val <= alpha:
    print("\nSince p-value is less than the alpha 0.05, We reject the Null
    ↪Hypothesis. Meaning that\n\
        There is difference between Mean of osrm_time and segment_osrm_time")
else:
    print("Since p-value is greater than the alpha 0.05, We do not reject the
    ↪Null Hypothesis\n\
        i.e, No difference between Mean of osrm_time and segment_osrm_time")
```

Since p-value is less than the alpha 0.05, We reject the Null Hypothesis.
Meaning that

There is difference between Mean of osrm_time and segment_osrm_time

7 CHAPTER 7: HANDLING CATEGORICAL VARIABLES

7.1 Do label and one-hot encoding of categorical variables (like route_type,states)

7.1.1 Can use Label encoder to route_type encoding

```
[320]: #remove unwanted columns for encoding and standardization
trip_reduced = trip.drop(['trip_creation_time',
    ↪'route_schedule_uuid','source_center', 'source_name', 'destination_center',
        'destination_name','source_city', 'source_place',
    ↪'source_code','destination_city', 'destination_place',
    ↪'destination_code','source_city_place',
        'destination_city_place','od_start_time', 'od_end_time'],axis = 1)
```

```
[321]: # convert trip_uuid to category datatype
trip_reduced["trip_uuid"]=trip_reduced["trip_uuid"].str.
    ↪replace('trip-',"",regex=True)
trip_reduced["trip_uuid"] = trip_reduced["trip_uuid"].astype('category')
```

```
[322]: # Encoding the route_type
labelencoder = LabelEncoder()
# creating the instance
trip_reduced["route_type_cat"] = labelencoder.
    ↪fit_transform(trip_reduced["route_type"])
#convert to category dtypes
trip_reduced["route_type"] = trip_reduced["route_type"].astype('category')
# get cat.codes
trip_reduced["route_type_cat"] = trip_reduced["route_type"].cat.codes
# Do onehot encoding
enc = OneHotEncoder(handle_unknown='ignore')
#create encoding dataframe
enc_df = pd.DataFrame(enc.fit_transform(trip_reduced[["route_type_cat"]]).
    ↪toarray())
#merge with original df
trip_reduced = trip_reduced.join(enc_df)
#rename the merge encoders
trip_reduced.rename(columns = {0:"route_0",1:"route_1"},inplace=True)
```

```
[323]: #respective unique encodes
trip_reduced.groupby("route_type")["route_type_cat"].mean()
```

```
[323]: route_type
Carting    0.0
FTL        1.0
Name: route_type_cat, dtype: float64
```

```
[324]: #remove route type
trip_reduced = trip_reduced.drop(columns = ["route_type"])
```

```
[325]: trip_reduced.head()
```

```
[325]:      trip_uuid  start_scan_to_end_scan  actual_distance_to_destination \
0  153671041653548748                6426.0                1077.146338
1  153671042288605164                 906.0                 240.208306
2  153671043369099517                6426.0                1077.146338
3  153671046011330457                 200.0                 28.529648
4  153671052974046625                1586.0                 239.007304

      actual_time  osrm_time  osrm_distance  segment_actual_time \
0         2434.5    1184.75    1411.435175             811.0
1          399.0     210.00     269.430800             141.0
2         2434.5    1184.75    1411.435175             811.0
3          82.0      24.00      31.647500              59.0
4         556.0     207.00     266.291400             340.0

      segment_osrm_distance  segment_osrm_time  source_state destination_state \
```

0	492.533225	415.0	Madhya Pradesh	Haryana
1	84.189400	65.0	Karnataka	Karnataka
2	492.533225	415.0	Karnataka	Punjab
3	19.876600	16.0	Maharashtra	Maharashtra
4	146.791900	115.0	Karnataka	Karnataka

	trip_year	trip_month	trip_day	trip_time	trip_hour	trip_week	\
0	2018	9	12	00:00:16.535741	0	37	
1	2018	9	12	00:00:22.886430	0	37	
2	2018	9	12	00:00:33.691250	0	37	
3	2018	9	12	00:01:00.113710	0	37	
4	2018	9	12	00:02:09.740725	0	37	

	trip_day_of_week	od_start_to_end	diff_actual&osrm_time	\
0	2	6445.853574	1249.75	
1	2	913.174079	189.00	
2	2	6445.853574	1249.75	
3	2	200.989870	58.00	
4	2	1588.710998	349.00	

	diff_actual&osrm_distance	route_type_cat	route_0	route_1
0	-334.288837	1	0.0	1.0
1	-29.222494	0	1.0	0.0
2	-334.288837	1	0.0	1.0
3	-3.117852	0	1.0	0.0
4	-27.284096	1	0.0	1.0

7.1.2 Can use dummy encoding for states as well as route type

```
[326]: #remove unwanted columns for encoding and standardization
trip_reduced = trip.drop(['trip_creation_time',
    ↳ 'route_schedule_uuid', 'source_center', 'source_name', 'destination_center',
    ↳ 'destination_name', 'source_city', 'source_place',
    ↳ 'source_code', 'destination_city', 'destination_place',
    ↳ 'destination_code', 'source_city_place',
    ↳ 'destination_city_place', 'od_start_time', 'od_end_time'], axis = 1)
```

```
[327]: # convert trip_uuid to category datatype
trip_reduced["trip_uuid"] = trip_reduced["trip_uuid"].str.
    ↳ replace('trip-', "", regex=True)
trip_reduced["trip_uuid"] = trip_reduced["trip_uuid"].astype('category')
```

```
[328]: categorical_cols = ["route_type", "source_state", "destination_state"]

trip_dummy_encoded = pd.get_dummies(trip_reduced, columns=categorical_cols)
```

```
[329]: trip_dummy_encoded.head()
```

```
[329]:
```

	trip_uuid	start_scan_to_end_scan	actual_distance_to_destination	\
0	153671041653548748	6426.0	1077.146338	
1	153671042288605164	906.0	240.208306	
2	153671043369099517	6426.0	1077.146338	
3	153671046011330457	200.0	28.529648	
4	153671052974046625	1586.0	239.007304	

	actual_time	osrm_time	osrm_distance	segment_actual_time	\
0	2434.5	1184.75	1411.435175	811.0	
1	399.0	210.00	269.430800	141.0	
2	2434.5	1184.75	1411.435175	811.0	
3	82.0	24.00	31.647500	59.0	
4	556.0	207.00	266.291400	340.0	

	segment_osrm_distance	segment_osrm_time	trip_year	trip_month	trip_day	\
0	492.533225	415.0	2018	9	12	
1	84.189400	65.0	2018	9	12	
2	492.533225	415.0	2018	9	12	
3	19.876600	16.0	2018	9	12	
4	146.791900	115.0	2018	9	12	

	trip_time	trip_hour	trip_week	trip_day_of_week	od_start_to_end	\
0	00:00:16.535741	0	37	2	6445.853574	
1	00:00:22.886430	0	37	2	913.174079	
2	00:00:33.691250	0	37	2	6445.853574	
3	00:01:00.113710	0	37	2	200.989870	
4	00:02:09.740725	0	37	2	1588.710998	

	diff_actual&osrm_time	diff_actual&osrm_distance	route_type_Carting	\
0	1249.75	-334.288837	0	
1	189.00	-29.222494	1	
2	1249.75	-334.288837	0	
3	58.00	-3.117852	1	
4	349.00	-27.284096	0	

	route_type_FTL	source_state_Andhra Pradesh	\
0	1	0	
1	0	0	
2	1	0	
3	0	0	
4	1	0	

	source_state_Arunachal Pradesh	source_state_Assam	source_state_Bihar	\
0	0	0	0	
1	0	0	0	

2	0	0	0
3	0	0	0
4	0	0	0

	source_state_Chandigarh	source_state_Chhattisgarh	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	source_state_Dadra and Nagar Haveli	source_state_Delhi	source_state_Goa	\
0	0	0	0	
1	0	0	0	
2	0	0	0	
3	0	0	0	
4	0	0	0	

	source_state_Gujarat	source_state_Haryana	source_state_Himachal Pradesh	\
0	0	0	0	
1	0	0	0	
2	0	0	0	
3	0	0	0	
4	0	0	0	

	source_state_Jammu & Kashmir	source_state_Jharkhand	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	source_state_Karnataka	source_state_Kerala	source_state_Madhya Pradesh	\
0	0	0	1	
1	1	0	0	
2	1	0	0	
3	0	0	0	
4	1	0	0	

	source_state_Maharashtra	source_state_Mizoram	source_state_Nagaland	\
0	0	0	0	
1	0	0	0	
2	0	0	0	
3	1	0	0	
4	0	0	0	

	source_state_Orissa	source_state_Pondicherry	source_state_Punjab	\
--	---------------------	--------------------------	---------------------	---

0	0	0	0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0

	source_state_Rajasthan	source_state_Tamil Nadu	source_state_Telangana \
0	0	0	0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0

	source_state_Uttar Pradesh	source_state_Uttarakhand \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	source_state_West Bengal	destination_state_Andhra Pradesh \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Arunachal Pradesh	destination_state_Assam \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Bihar	destination_state_Chandigarh \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Chhattisgarh	destination_state_Dadra and Nagar Haveli \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Daman & Diu	destination_state_Delhi \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Goa	destination_state_Gujarat \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Haryana	destination_state_Himachal Pradesh \
0	1	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Jammu & Kashmir	destination_state_Jharkhand \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Karnataka	destination_state_Kerala \
0	0	0
1	1	0
2	0	0
3	0	0
4	1	0

	destination_state_Madhya Pradesh	destination_state_Maharashtra \
0	0	0
1	0	0
2	0	0
3	0	1
4	0	0

	destination_state_Meghalaya	destination_state_Mizoram \
0	0	0
1	0	0
2	0	0

3	0	0
4	0	0

	destination_state_Nagaland	destination_state_Orissa	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	destination_state_Pondicherry	destination_state_Punjab	\
0	0	0	
1	0	0	
2	0	1	
3	0	0	
4	0	0	

	destination_state_Rajasthan	destination_state_Tamil Nadu	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	destination_state_Telangana	destination_state_Tripura	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	destination_state_Uttar Pradesh	destination_state_Uttarakhand	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	destination_state_West Bengal
0	0
1	0
2	0
3	0
4	0

8 CHAPTER 8: COLUMN NORMALIZATION / COLUMN STANDARDIZATION

8.1 Normalize/ Standardize the numerical features using MinMaxScaler or StandardScaler.

```
[330]: num_cols
```

```
[330]: ['start_scan_to_end_scan',  
        'actual_distance_to_destination',  
        'actual_time',  
        'osrm_time',  
        'osrm_distance',  
        'segment_actual_time',  
        'segment_osrm_time',  
        'segment_osrm_distance',  
        'od_start_to_end']
```

```
[331]: trip_dummy_encoded[trip_dummy_encoded.select_dtypes("object").  
        ↪columns]=trip_dummy_encoded[trip_dummy_encoded.select_dtypes("object").  
        ↪columns].astype("category")
```

```
[332]: trip_dummy_encoded.select_dtypes("object").columns
```

```
[332]: Index([], dtype='object')
```

```
[333]: scaler = StandardScaler()  
        scaler.fit(trip_dummy_encoded[num_cols])
```

```
[333]: StandardScaler()
```

```
[334]: trip_dummy_encoded[num_cols] = scaler.transform(trip_dummy_encoded[num_cols])
```

```
[335]: trip_dummy_encoded.head()
```

```
[335]:      trip_uid  start_scan_to_end_scan  actual_distance_to_destination \  
0  153671041653548748          2.053505          2.026268  
1  153671042288605164         -0.499871         -0.225054  
2  153671043369099517          2.053505          2.026268  
3  153671046011330457         -0.826444         -0.794459  
4  153671052974046625         -0.185325         -0.228284  
  
      actual_time  osrm_time  osrm_distance  segment_actual_time \  
0      2.048228   2.095603      2.062086      2.141970  
1     -0.420272  -0.360525     -0.306451     -0.462704  
2      2.048228   2.095603      2.062086      2.141970  
3     -0.804706  -0.829198     -0.799618     -0.781485
```

4	-0.229875	-0.368084	-0.312962	0.310923
---	-----------	-----------	-----------	----------

	segment_osrm_distance	segment_osrm_time	trip_year	trip_month	trip_day \
0	2.254747	2.259726	2018	9	12
1	-0.401315	-0.473161	2018	9	12
2	2.254747	2.259726	2018	9	12
3	-0.819635	-0.855766	2018	9	12
4	0.005882	-0.082749	2018	9	12

	trip_time	trip_hour	trip_week	trip_day_of_week	od_start_to_end \
0	00:00:16.535741	0	37	2	2.054949
1	00:00:22.886430	0	37	2	-0.497666
2	00:00:33.691250	0	37	2	2.054949
3	00:01:00.113710	0	37	2	-0.826246
4	00:02:09.740725	0	37	2	-0.185993

	diff_actual&osrm_time	diff_actual&osrm_distance	route_type_Carting \
0	1249.75	-334.288837	0
1	189.00	-29.222494	1
2	1249.75	-334.288837	0
3	58.00	-3.117852	1
4	349.00	-27.284096	0

	route_type_FTL	source_state_Andhra Pradesh \
0	1	0
1	0	0
2	1	0
3	0	0
4	1	0

	source_state_Arunachal Pradesh	source_state_Assam	source_state_Bihar \
0	0	0	0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0

	source_state_Chandigarh	source_state_Chhattisgarh \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	source_state_Dadra and Nagar Haveli	source_state_Delhi	source_state_Goa \
0	0	0	0
1	0	0	0

2		0	0	0
3		0	0	0
4		0	0	0

	source_state_Gujarat	source_state_Haryana	source_state_Himachal Pradesh	\
0	0	0	0	
1	0	0	0	
2	0	0	0	
3	0	0	0	
4	0	0	0	

	source_state_Jammu & Kashmir	source_state_Jharkhand	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	source_state_Karnataka	source_state_Kerala	source_state_Madhya Pradesh	\
0	0	0	1	
1	1	0	0	
2	1	0	0	
3	0	0	0	
4	1	0	0	

	source_state_Maharashtra	source_state_Mizoram	source_state_Nagaland	\
0	0	0	0	
1	0	0	0	
2	0	0	0	
3	1	0	0	
4	0	0	0	

	source_state_Orissa	source_state_Pondicherry	source_state_Punjab	\
0	0	0	0	
1	0	0	0	
2	0	0	0	
3	0	0	0	
4	0	0	0	

	source_state_Rajasthan	source_state_Tamil Nadu	source_state_Telangana	\
0	0	0	0	
1	0	0	0	
2	0	0	0	
3	0	0	0	
4	0	0	0	

	source_state_Uttar Pradesh	source_state_Uttarakhand	\
--	----------------------------	--------------------------	---

0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	source_state_West Bengal	destination_state_Andhra Pradesh	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	destination_state_Arunachal Pradesh	destination_state_Assam	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	destination_state_Bihar	destination_state_Chandigarh	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	destination_state_Chhattisgarh	destination_state_Dadra and Nagar Haveli	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	destination_state_Daman & Diu	destination_state_Delhi	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	destination_state_Goa	destination_state_Gujarat	\
0	0	0	
1	0	0	
2	0	0	
3	0	0	
4	0	0	

	destination_state_Haryana	destination_state_Himachal Pradesh \
0	1	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Jammu & Kashmir	destination_state_Jharkhand \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Karnataka	destination_state_Kerala \
0	0	0
1	1	0
2	0	0
3	0	0
4	1	0

	destination_state_Madhya Pradesh	destination_state_Maharashtra \
0	0	0
1	0	0
2	0	0
3	0	1
4	0	0

	destination_state_Meghalaya	destination_state_Mizoram \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Nagaland	destination_state_Orissa \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Pondicherry	destination_state_Punjab \
0	0	0
1	0	0
2	0	1

3	0	0
4	0	0

	destination_state_Rajasthan	destination_state_Tamil Nadu \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Telangana	destination_state_Tripura \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_Uttar Pradesh	destination_state_Uttarakhand \
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0

	destination_state_West Bengal
0	0
1	0
2	0
3	0
4	0

```
[336]: trip_dummy_encoded.describe(include = "all")
```

```
[336]:
```

	trip_uuid	start_scan_to_end_scan \
count	14787	1.478700e+04
unique	14787	NaN
top	153671041653548748	NaN
freq	1	NaN
mean	NaN	-6.535052e-17
std	NaN	1.000034e+00
min	NaN	-9.069307e-01
25%	NaN	-7.311548e-01
50%	NaN	-4.656408e-01
75%	NaN	3.827090e-01
max	NaN	2.053505e+00

	actual_distance_to_destination	actual_time	osrm_time \
--	--------------------------------	-------------	-------------

count	1.478700e+04	1.478700e+04	1.478700e+04
unique	NaN	NaN	NaN
top	NaN	NaN	NaN
freq	NaN	NaN	NaN
mean	-6.150637e-17	-7.688296e-17	-9.610370e-17
std	1.000034e+00	1.000034e+00	1.000034e+00
min	-8.469861e-01	-8.932347e-01	-8.745539e-01
25%	-7.378342e-01	-7.319424e-01	-7.359676e-01
50%	-5.109276e-01	-4.845467e-01	-4.688740e-01
75%	3.678066e-01	3.801257e-01	3.966605e-01
max	2.026268e+00	2.048228e+00	2.095603e+00

	osrm_distance	segment_actual_time	segment_osrm_distance	\
count	1.478700e+04	1.478700e+04	1.478700e+04	
unique	NaN	NaN	NaN	
top	NaN	NaN	NaN	
freq	NaN	NaN	NaN	
mean	-8.072711e-17	-1.326231e-16	-1.287790e-16	
std	1.000034e+00	1.000034e+00	1.000034e+00	
min	-8.464379e-01	-9.758633e-01	-8.899078e-01	
25%	-7.291260e-01	-7.542717e-01	-7.370140e-01	
50%	-5.066860e-01	-4.393783e-01	-4.950128e-01	
75%	3.873589e-01	4.042250e-01	4.596904e-01	
max	2.062086e+00	2.141970e+00	2.254747e+00	

	segment_osrm_time	trip_year	trip_month	trip_day	trip_time	\
count	1.478700e+04	14787.0	14787.0	14787.0	14787	
unique	NaN	1.0	2.0	22.0	14787	
top	NaN	2018.0	9.0	18.0	00:00:03.999520	
freq	NaN	14787.0	13011.0	791.0	1	
mean	-7.496089e-17	NaN	NaN	NaN	NaN	
std	1.000034e+00	NaN	NaN	NaN	NaN	
min	-9.338480e-01	NaN	NaN	NaN	NaN	
25%	-7.464500e-01	NaN	NaN	NaN	NaN	
50%	-4.731613e-01	NaN	NaN	NaN	NaN	
75%	4.560203e-01	NaN	NaN	NaN	NaN	
max	2.259726e+00	NaN	NaN	NaN	NaN	

	trip_hour	trip_week	trip_day_of_week	od_start_to_end	\
count	14787.0	14787.0	14787.0	1.478700e+04	
unique	24.0	4.0	7.0	NaN	
top	22.0	38.0	2.0	NaN	
freq	1123.0	5001.0	2731.0	NaN	
mean	NaN	NaN	NaN	-6.535052e-17	
std	NaN	NaN	NaN	1.000034e+00	
min	NaN	NaN	NaN	-9.067512e-01	
25%	NaN	NaN	NaN	-7.307523e-01	

50%	NaN	NaN	NaN	-4.655021e-01
75%	NaN	NaN	NaN	3.835283e-01
max	NaN	NaN	NaN	2.054949e+00

	diff_actual&osrm_time	diff_actual&osrm_distance	route_type_Carting \
count	14787.000000	14787.000000	14787.000000
unique	NaN	NaN	NaN
top	NaN	NaN	NaN
freq	NaN	NaN	NaN
mean	392.472713	-93.315031	0.602286
std	457.780940	117.020309	0.489442
min	-207.000000	-712.773937	0.000000
25%	64.000000	-118.204846	0.000000
50%	173.000000	-34.238225	1.000000
75%	547.000000	-13.822265	1.000000
max	2336.500000	-0.018915	1.000000

	route_type_FTL	source_state_Andhra Pradesh \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.397714	0.027524
std	0.489442	0.163611
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	1.000000	0.000000
max	1.000000	1.000000

	source_state_Arunachal Pradesh	source_state_Assam \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.000271	0.018462
std	0.016445	0.134620
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	source_state_Bihar	source_state_Chandigarh \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN

freq	NaN	NaN
mean	0.024210	0.003246
std	0.153707	0.056884
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	source_state_Chhattisgarh	source_state_Dadra and Nagar Haveli \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.002908	0.001014
std	0.053849	0.031835
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	source_state_Delhi	source_state_Goa	source_state_Gujarat \
count	14787.000000	14787.000000	14787.000000
unique	NaN	NaN	NaN
top	NaN	NaN	NaN
freq	NaN	NaN	NaN
mean	0.053425	0.004396	0.050450
std	0.224888	0.066157	0.218878
min	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000

	source_state_Haryana	source_state_Himachal Pradesh \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.112869	0.002299
std	0.316444	0.047898
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	source_state_Jammu & Kashmir	source_state_Jharkhand \
count	14787.000000	14787.00000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.001150	0.01082
std	0.033888	0.10346
min	0.000000	0.00000
25%	0.000000	0.00000
50%	0.000000	0.00000
75%	0.000000	0.00000
max	1.000000	1.00000

	source_state_Karnataka	source_state_Kerala \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.150741	0.019544
std	0.357808	0.138432
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	source_state_Madhya Pradesh	source_state_Maharashtra \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.022520	0.181376
std	0.148372	0.385342
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	source_state_Mizoram	source_state_Nagaland	source_state_Orissa \
count	14787.000000	14787.000000	14787.000000
unique	NaN	NaN	NaN
top	NaN	NaN	NaN
freq	NaN	NaN	NaN
mean	0.000271	0.000338	0.007236
std	0.016445	0.018386	0.084760

min	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000

	source_state_Pondicherry	source_state_Punjab	source_state_Rajasthan \
count	14787.000000	14787.000000	14787.000000
unique	NaN	NaN	NaN
top	NaN	NaN	NaN
freq	NaN	NaN	NaN
mean	0.000812	0.042605	0.033340
std	0.028477	0.201972	0.179529
min	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000

	source_state_Tamil Nadu	source_state_Telangana \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.073375	0.052681
std	0.260760	0.223404
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	source_state_Uttar Pradesh	source_state_Uttarakhand \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.048624	0.007709
std	0.215088	0.087467
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	source_state_West Bengal	destination_state_Andhra Pradesh \
count	14787.000000	14787.000000

unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.045783	0.027592
std	0.209022	0.163806
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Arunachal Pradesh	destination_state_Assam \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.001555	0.015825
std	0.039409	0.124801
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Bihar	destination_state_Chandigarh \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.024549	0.001961
std	0.154750	0.044243
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Chhattisgarh \
count	14787.000000
unique	NaN
top	NaN
freq	NaN
mean	0.002908
std	0.053849
min	0.000000
25%	0.000000
50%	0.000000

75%	0.000000
max	1.000000

	destination_state_Dadra and Nagar Haveli \
count	14787.000000
unique	NaN
top	NaN
freq	NaN
mean	0.001150
std	0.033888
min	0.000000
25%	0.000000
50%	0.000000
75%	0.000000
max	1.000000

	destination_state_Daman & Diu	destination_state_Delhi \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.000068	0.045581
std	0.008224	0.208581
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Goa	destination_state_Gujarat \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.004396	0.050450
std	0.066157	0.218878
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Haryana	destination_state_Himachal Pradesh \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN

mean	0.112531	0.002705
std	0.316030	0.051942
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Jammu & Kashmir	destination_state_Jharkhand \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.001014	0.011361
std	0.031835	0.105986
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Karnataka	destination_state_Kerala \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.153919	0.018462
std	0.360883	0.134620
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Madhya Pradesh	destination_state_Maharashtra \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.022249	0.175221
std	0.147498	0.380169
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Meghalaya	destination_state_Mizoram \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.000541	0.000406
std	0.023254	0.020140
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Nagaland	destination_state_Orissa \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.000068	0.008048
std	0.008224	0.089350
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Pondicherry	destination_state_Punjab \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.000676	0.046865
std	0.025997	0.211358
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Rajasthan	destination_state_Tamil Nadu \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.035369	0.072496
std	0.184717	0.259316
min	0.000000	0.000000

25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Telangana	destination_state_Tripura \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.057010	0.000068
std	0.231869	0.008224
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_Uttar Pradesh	destination_state_Uttarakhand \
count	14787.000000	14787.000000
unique	NaN	NaN
top	NaN	NaN
freq	NaN	NaN
mean	0.049435	0.007642
std	0.216782	0.087086
min	0.000000	0.000000
25%	0.000000	0.000000
50%	0.000000	0.000000
75%	0.000000	0.000000
max	1.000000	1.000000

	destination_state_West Bengal
count	14787.000000
unique	NaN
top	NaN
freq	NaN
mean	0.047880
std	0.213519
min	0.000000
25%	0.000000
50%	0.000000
75%	0.000000
max	1.000000

9 CHAPTER 9: BUSINESS INSIGHTS

OBSERVATIONS:

14787 trips are registered in 2018 between september and october.

In spearman Correlation is best fit for the data

FTL has more effectiveness than Carting. It is better to prefer FTL route_type

Maharastra, Karnataka and Haryana are TOP 3 States in the frequency of orders according to both sources and destinations. Busiest states

Bengaluru, Gurgaon, Mumbai are TOP 3 Cities in the frequency of orders according to both sources and destinations. Busiest cities

Gurgaon_Bilaspur, Bhiwandi_Mankoli, Bengaluru_Nelmngle are TOP 3 City_places in the frequency of orders according to both sources and destinations. Busiest places

During Afternoons, Less number of orders are observed

Day 2 : Monday has little spike in number of orders

No difference between Mean of od_start_to_end and Start_scan_to_end_scan

There is difference between Mean of actual_time and osrm_time

There is difference between Mean of actual_time and segment_actual_time

There is difference between Mean of osrm_distance and segment_osrm_distance

There is difference between Mean of osrm_time and segment_osrm_time

Final data set is good fit for Machine learning applications

10 CHAPTER 10: RECOMMENDATIONS

Facilities, Infrastructure should be improved in Maharastra, Karnataka and Haryana states as they are Busiest.

Facilities, Infrastructure should be improved in Bengaluru, Gurgaon, Mumbai cities as they are Busiest.

Facilities, Infrastructure should be improved in Gurgaon_Bilaspur, Bhiwandi_Mankoli, Bengaluru_Nelmngle city_places as they are Busiest.

More work force is needed during mornings and evenings of MONDAY

Should plan for FTL infrastructure

osrm machine should be updated such that it is well sync with actual time.

segment data and actual data has mis-match. Should identify the faults and modify them.