ANALYSING IMPACT OF USING CURRENT OSRM AND INSIGHTS ON NON-EFFICIENT TRIPS

April 2024

TRIPS THAT ARE NOT EFFICIENT

Non-Efficient trips are those where deliveries cover a relatively small distance but take significantly longer time compared to others, as indicated by the shaded region in the plot (Average trip time>8.3 hrs and Average trip distance<300 Km)

Following are the triggered areas:

Source-Destination States	Total Routes	Average Stops per Route
Madhya Pradesh-Gujarat	1	13
Jammu & Kashmir-Punjab	1	13
Maharashtra-Madhya Pradesh	4	11
Telangana-Andhra Pradesh	12	11
Meghalaya-Assam	2	7
Nagaland-Assam	1	7
Himachal Pradesh-Punjab	6	5
Assam-Tripura	1	4

Distibution of trips (based on Source-Destination States) across distance and time
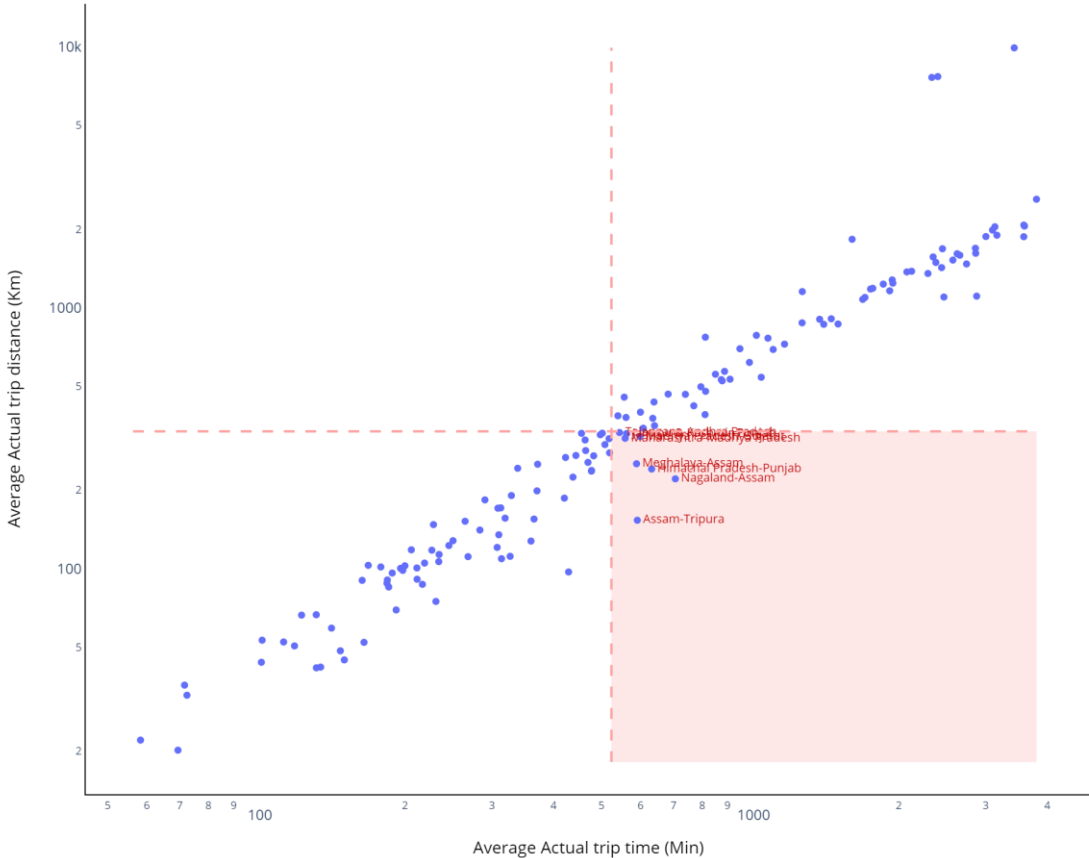
Triggered Areas:

- Non-Efficient trips are prevalent in specific regions, particularly from North and East India and trips through hilly, forested or underdeveloped roads and they happen to have frequent stops

- This trend raises questions about the efficiency of OSRM used by drivers to estimate the best routes, as actual trip times are approximately double the estimated OSRM times for the specified trips

Optimization Strategies:

- Route optimization strategies - strategically planning transit/service stops(reducing number of stops,etc) on less congested routes/better roads can lead to time savings.

TIME OF DAY THAT IS NOT EFFICIENT

Considering Full Truck Load trips, Day Type as:
- Weekend(Saturday/Sunday)
- Weekday

and Time of day as:
- Morning: 5 am till 12 pm
- Afternoon: 12 pm till 5 pm
- Evening: 5 pm till 11 pm
- Late Night: 11 pm till 5am

Insights:
- Evening Trips are the least efficient, averaging 6 stops per route.
- Optimizing routes and reducing service/transit stops during evenings, especially when traffic is heaviest, can lead to significant improvement in efficiency
- Using more accurate OSRM estimates, particularly during peak traffic times, is crucial as current estimates are overly optimistic (half the actual time) and donot adequately account for traffic conditions.

Please note: The analysis is based on training data post-missing value and outlier treatment. Also, assuming no waiting time per stop.

Distibution of trips (based on Time of Day and Day Type) across distance and time
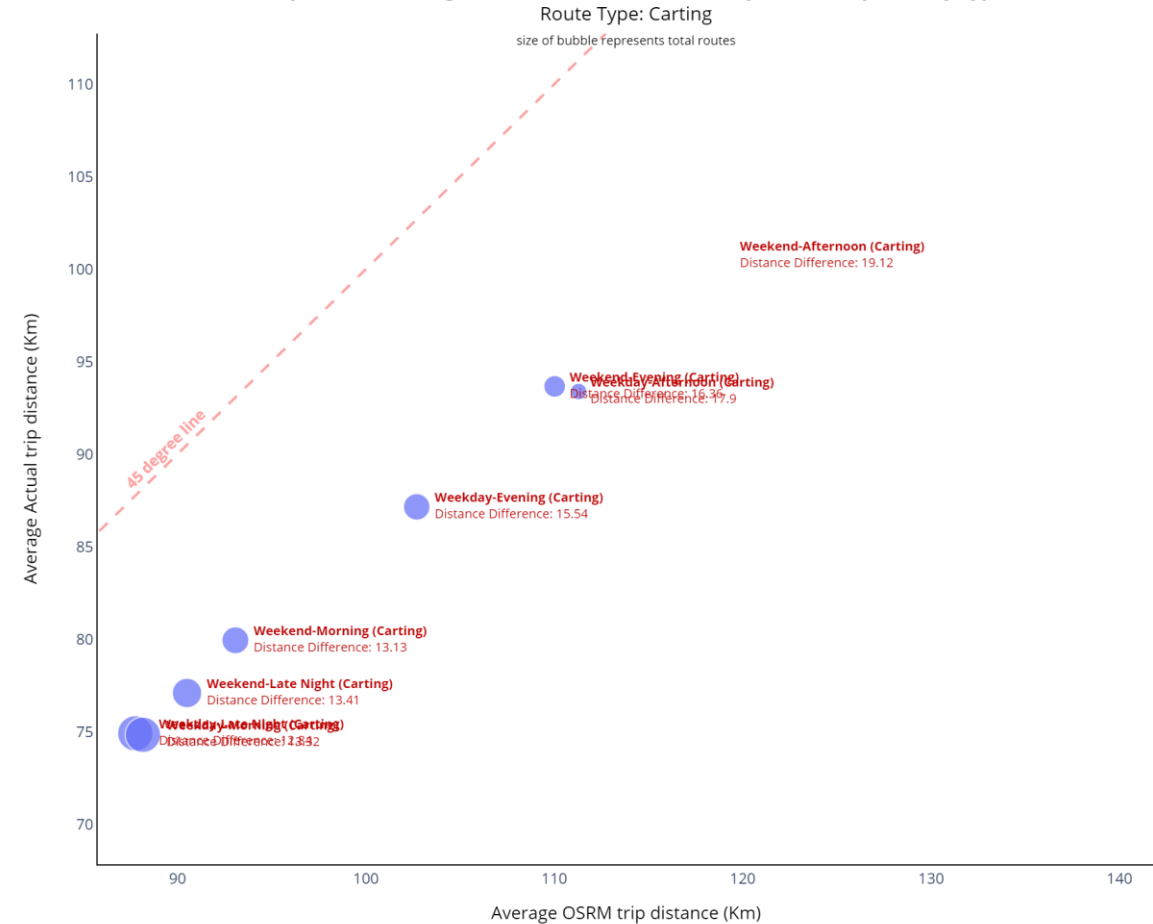Route Type: FTL
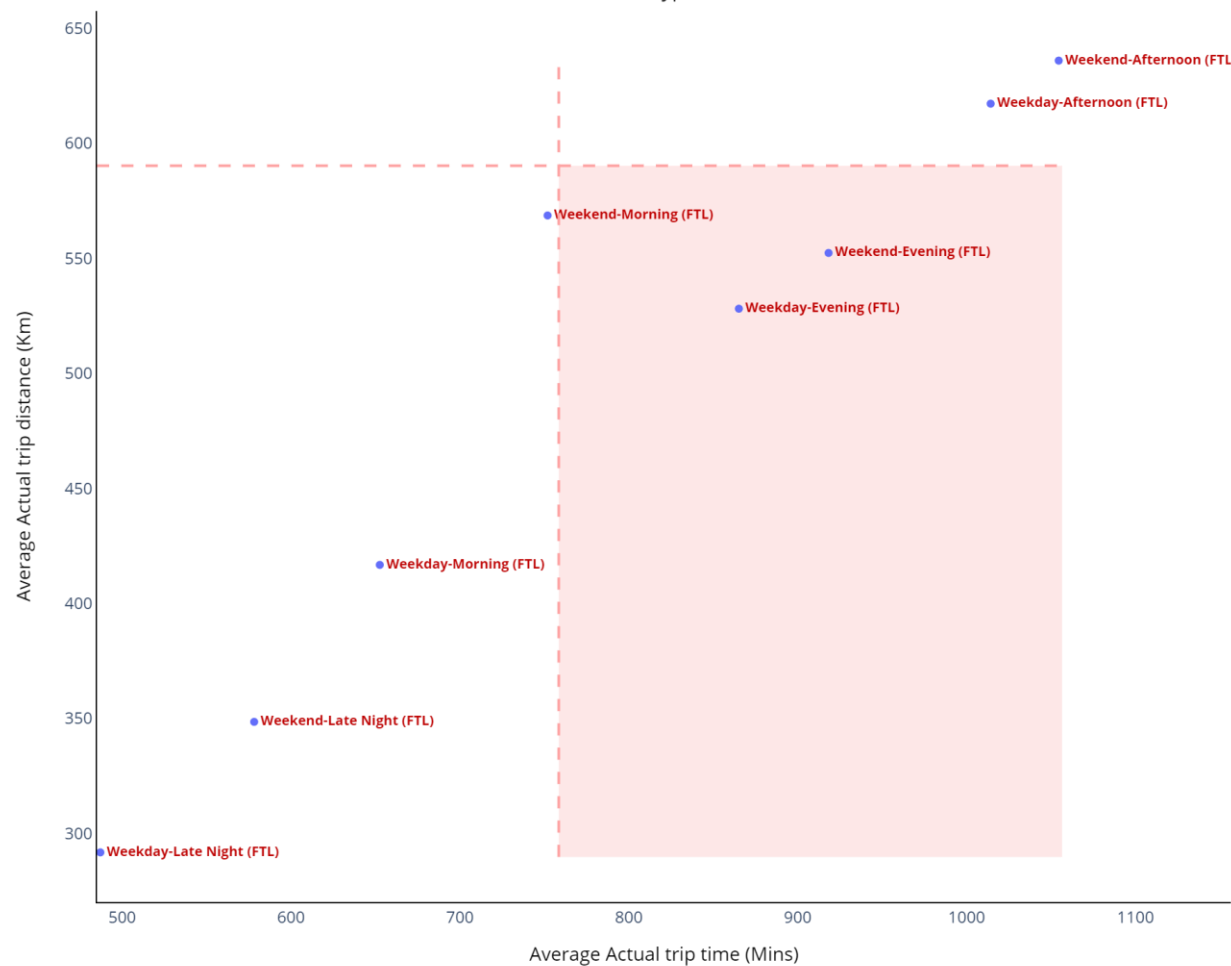
OSRM often estimates a greater distance than the actual distance travelled. To improve accuracy, selecting an OSRM version that considers stops along the route is recommended. This would result in more optimized route estimations.
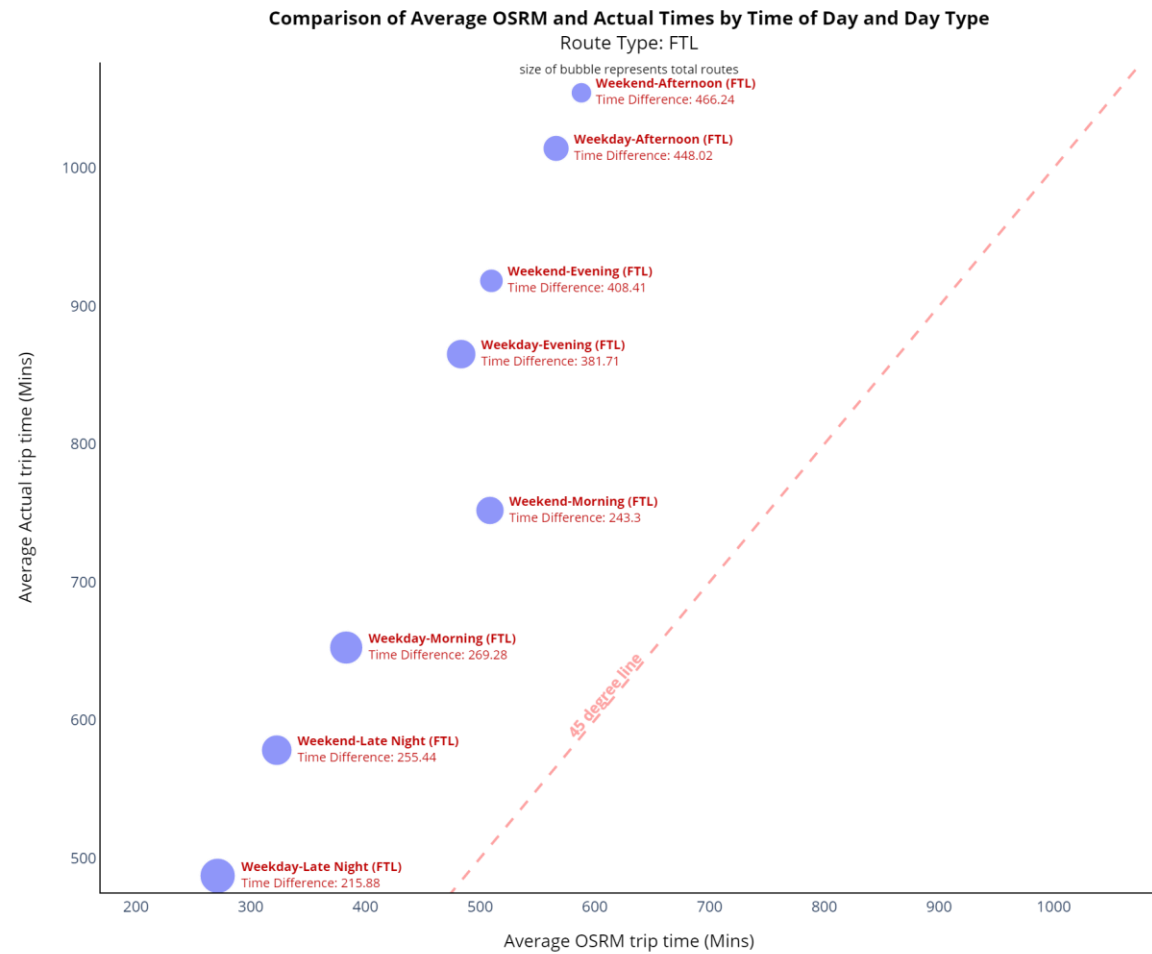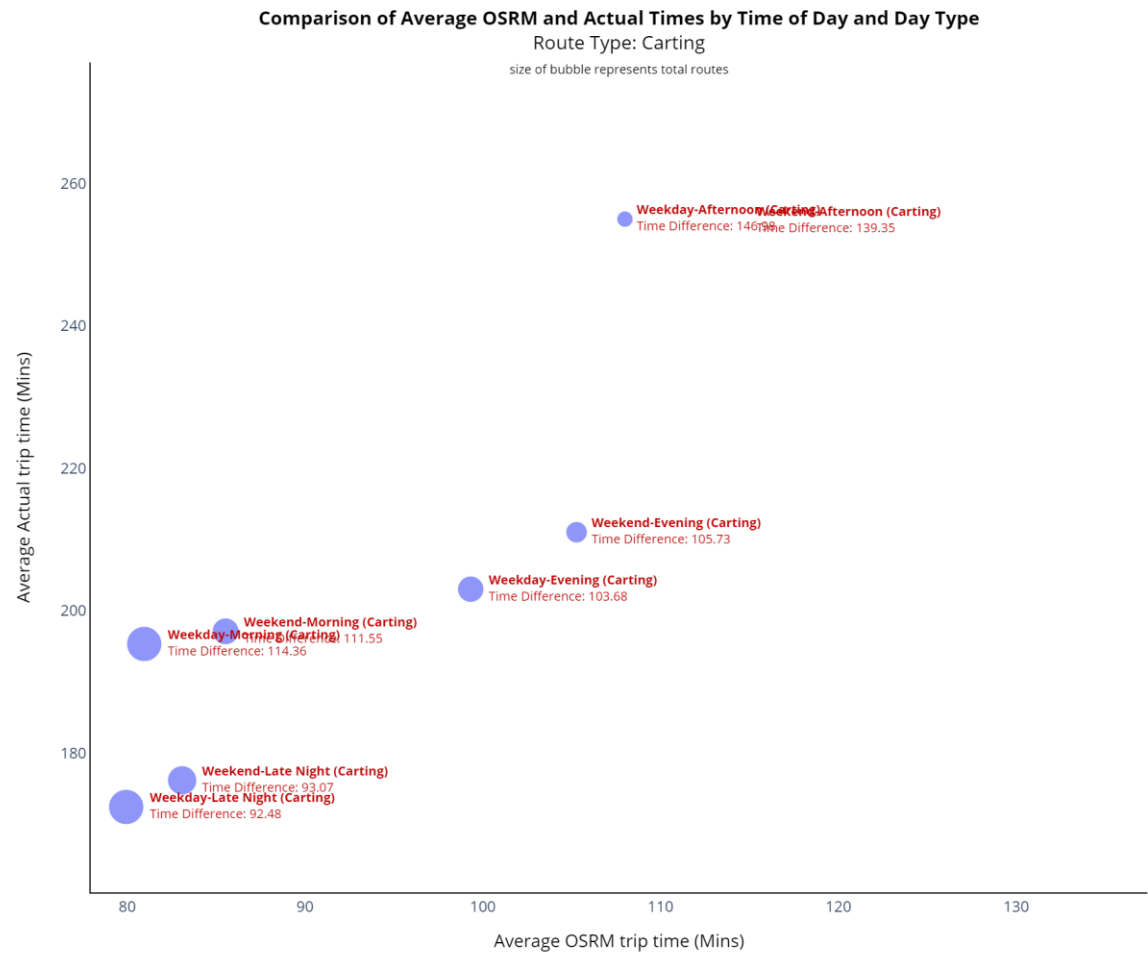

Comparison of Average OSRM and Actual Distances by Time of Day and Day Type
Route Type: Carting

Comparison of Average OSRM and Actual Distances by Time of Day and Day Type
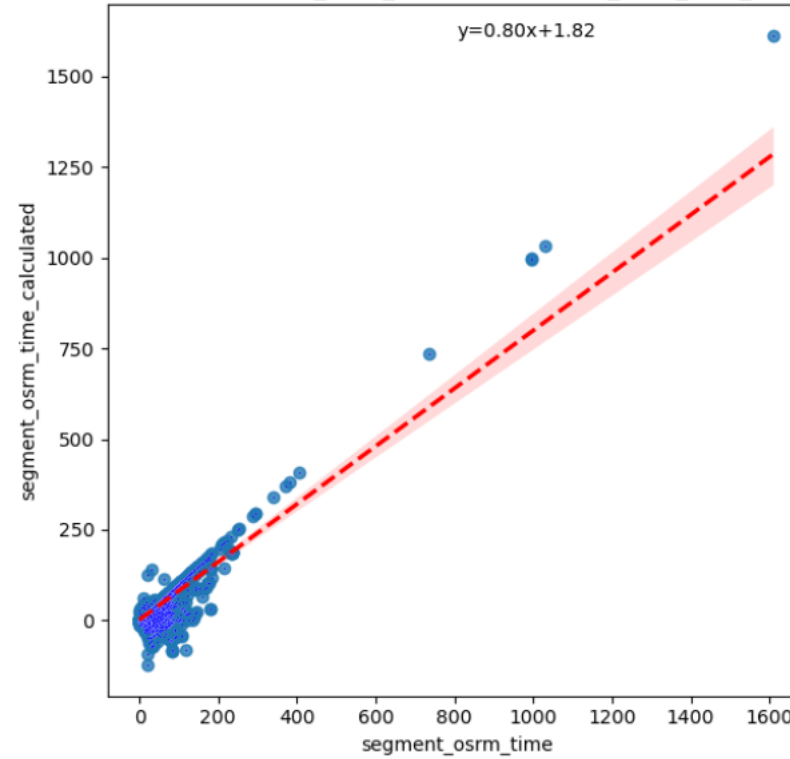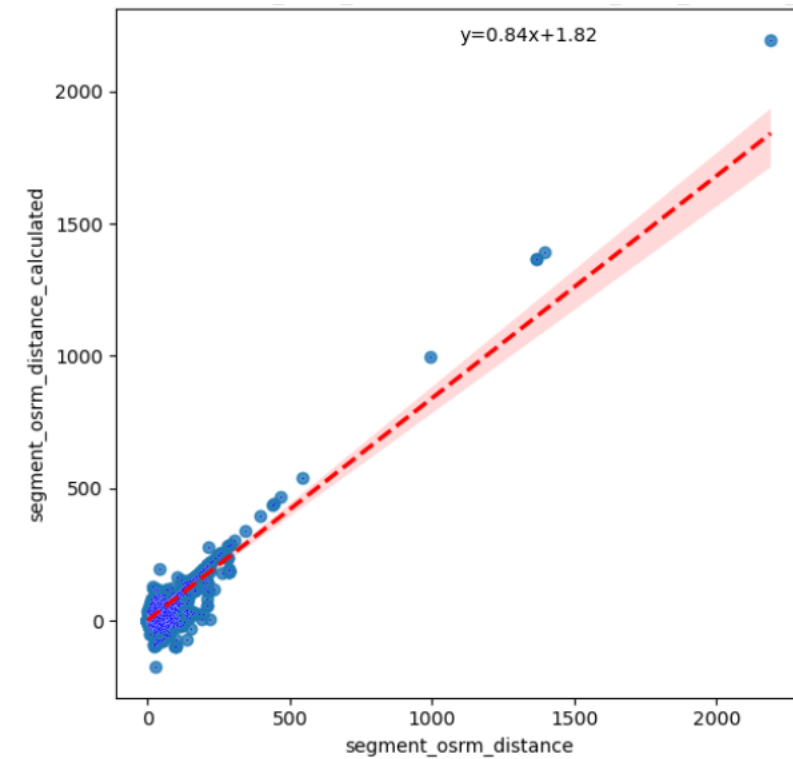Route Type: FTL

OSRM tend to underestimate trip times compared to actual trip durations. This discrepancy indicates that OSRM's estimation algorithm may not accurately factor in Indian traffic, road conditions and stops.

Comparison of Average OSRM and Actual Times by Time of Day and Day Type
Route Type: Carting

size of bubble represents total routes

Weekday-Afternoon (Carting) Weekend-Afternoon (Carting)
Time Difference: 146.98 Time Difference: 139.35

Weekend-Evening (Carting)
Time Difference: 105.73

Weekday-Evening (Carting)
Time Difference: 103.68

Weekend-Morning (Carting)
Weekday-Morning (Carting) 111.55
Time Difference: 114.36

Weekend-Late Night (Carting)
Time Difference: 93.07
Weekday-Late Night (Carting)
Time Difference: 92.48

Average OSRM trip time (Mins)
Average Actual trip time (Mins)

Comparison of Average OSRM and Actual Times by Time of Day and Day Type
Route Type: FTL

size of bubble represents total routes

Weekend-Afternoon (FTL)
Time Difference: 466.24

Weekday-Afternoon (FTL)
Time Difference: 448.02

Weekend-Evening (FTL)
Time Difference: 408.41

Weekday-Evening (FTL)
Time Difference: 381.71

Weekend-Morning (FTL)
Time Difference: 243.3

Weekday-Morning (FTL)
Time Difference: 269.28

Weekend-Late Night (FTL)
Time Difference: 255.44

45 degree line

Weekday-Late Night (FTL)
Time Difference: 215.88

Average OSRM trip time (Mins)
Average Actual trip time (Mins)

END

APPENDIX A
DISTRIBUTION PLOT BETWEEN SEGMENT OSRM METRICS AND SEGMENT METRICS AGGREGATED FROM CUMULATAIVE OSRM

Anamolies were observed in data where segment_osrm_distance exceeds segment_osrm_distance_calculated(aggregated from cumulative OSRM distances.

This discrepancy is logical as cumulative OSRM distance are not taking into consideration the stops along the route, leading to underestimated distance and time calculations