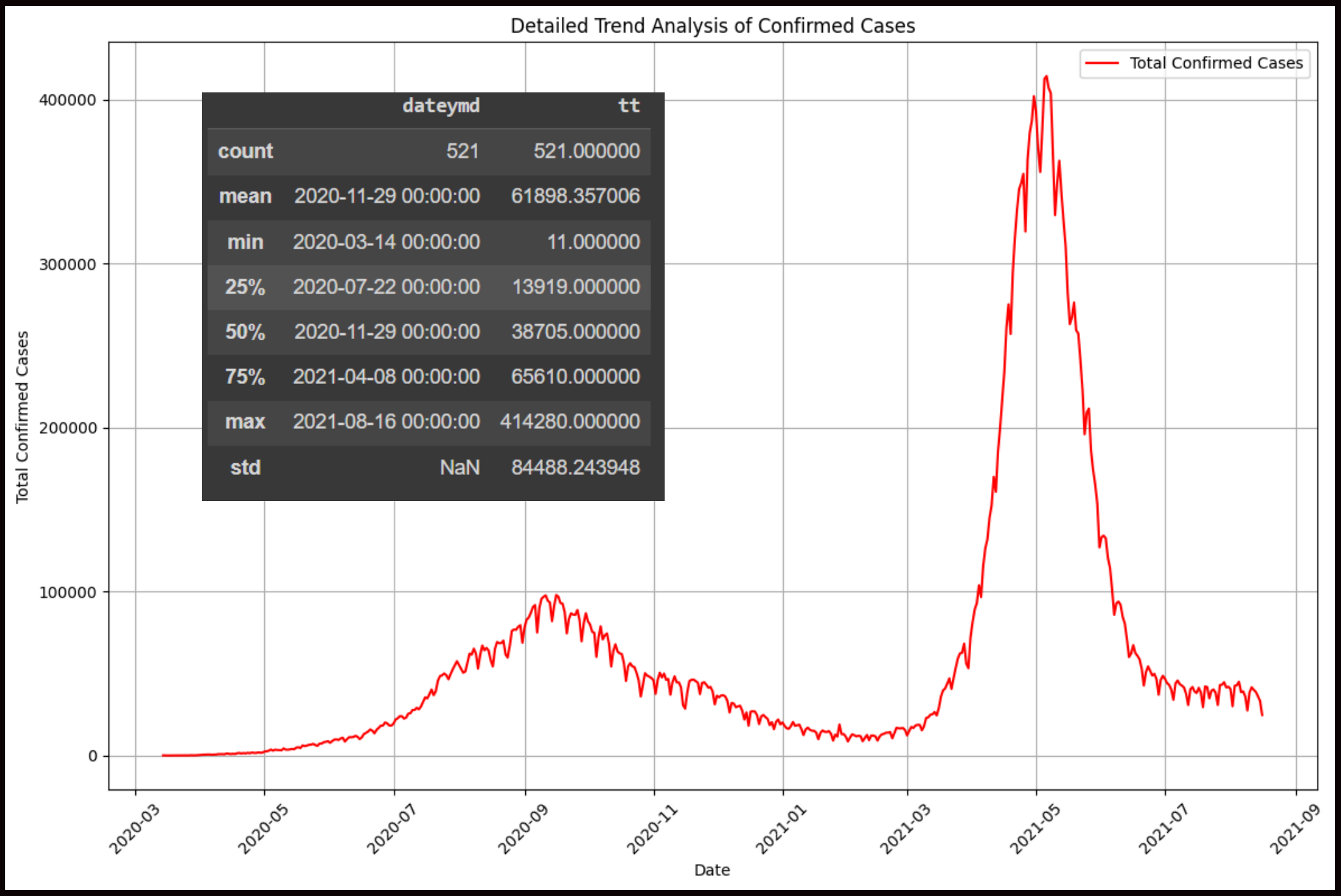
Minor in AI from IIT Ropar

IIT MINI PROJECT COVID DATA

1. Detailed Trend Analysis of Confirmed Cases



	dateymd	tt
count	521	521.000000
mean	2020-11-29 00:00:00	61898.357006
min	2020-03-14 00:00:00	11.000000
25%	2020-07-22 00:00:00	13919.000000
50%	2020-11-29 00:00:00	38705.000000
75%	2021-04-08 00:00:00	65610.000000
max	2021-08-16 00:00:00	414280.000000
std	NaN	84488.243948

Insight- The graph shows two major waves of COVID-19 cases:

First Wave (March 2020 - November 2020): A gradual rise in cases began in March 2020, peaking around September 2020. The decline from October to November suggests the effectiveness of lockdowns and preventive measures.

Second Wave (March 2021 - July 2021): A much sharper increase occurred, peaking in May 2021, likely due to new variants and reduced restrictions. A steep decline followed, driven by strict lockdowns and increased vaccinations.

Key Patterns:

Two distinct peaks, with the second being more severe. Rapid rises followed by sharp declines, indicating responsive interventions. Vaccination rollouts and stricter measures significantly influenced trends.

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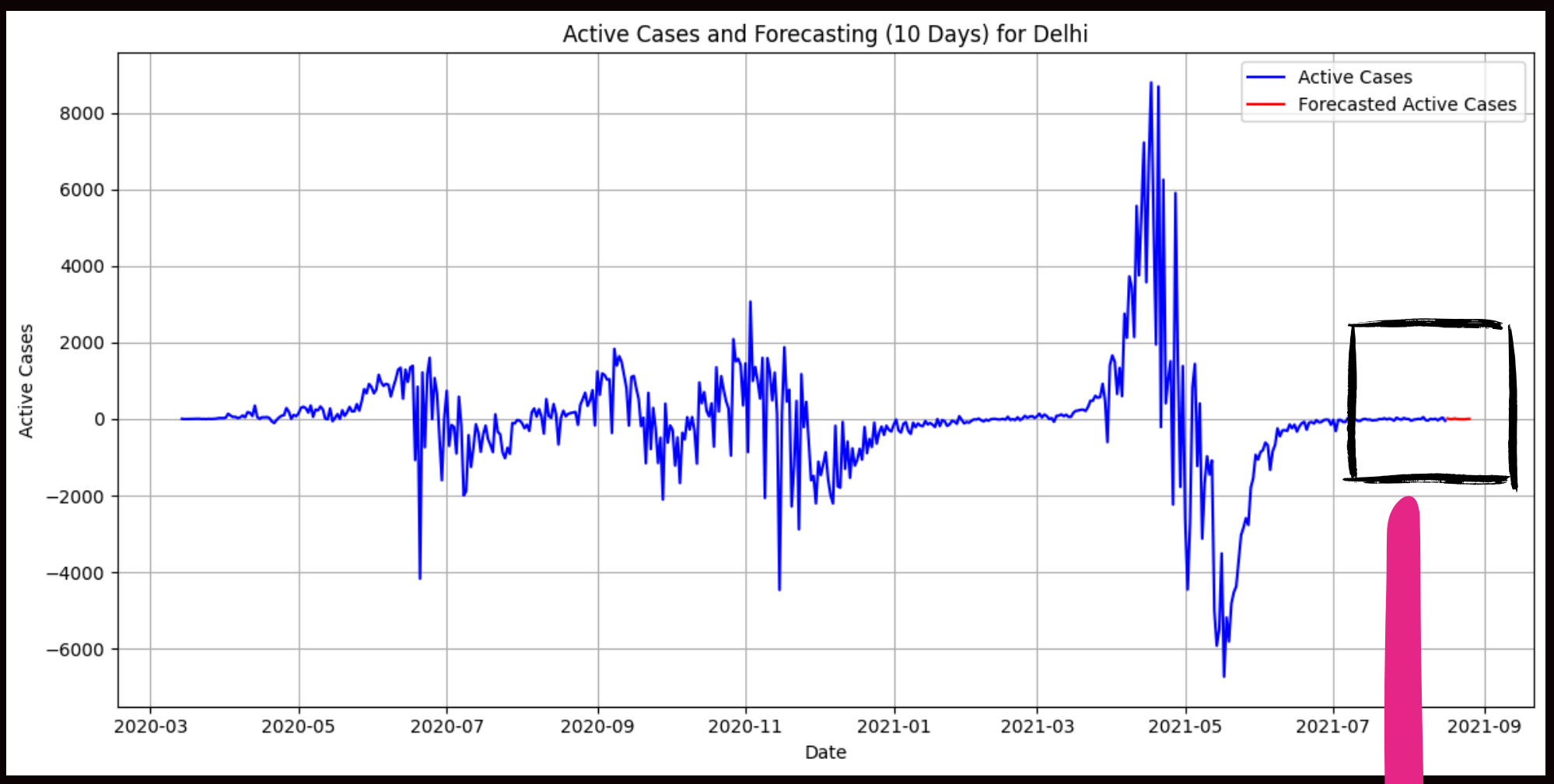
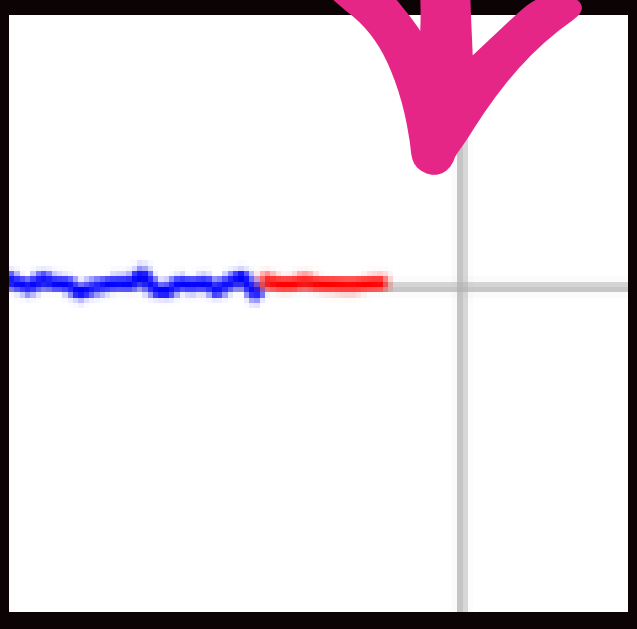
2. Predicting Future Active Cases



2021-08-17	12.496011
2021-08-18	-2.217571
2021-08-19	-1.770796
2021-08-20	13.169857
2021-08-21	-2.407507
2021-08-22	-3.325108
2021-08-23	-5.691918
2021-08-24	-6.431900
2021-08-25	0.708271
2021-08-26	3.701597

Forecasting using ARIMA model for 10 Days (Delhi)



Insight-Here are insights based on the graph:

Active Cases Calculation: The blue line shows past 515 days of active COVID-19 cases, calculated using the formula (Confirmed - Recovered - Deceased).

Stable Period (Early 2020): From March 2020 to mid-2020, active cases remain relatively stable with minor fluctuations.

Volatile Period (Mid-2020): Erratic fluctuations appear mid-2020, possibly due to testing or reporting changes.

Major Spike (Early 2021): A large surge is visible around early 2021, likely corresponding to the second COVID wave.

Sharp Decline and Stabilization (Mid-2021): After the peak, a sharp decline is followed by a period of stability around mid-2021.

10-Day Forecast (Red Line): The forecast predicts minimal change in active cases, suggesting stability for the next 10 days.

Prediction Limitations: Factors like new variants or lockdowns can affect the accuracy of this linear regression model's prediction.

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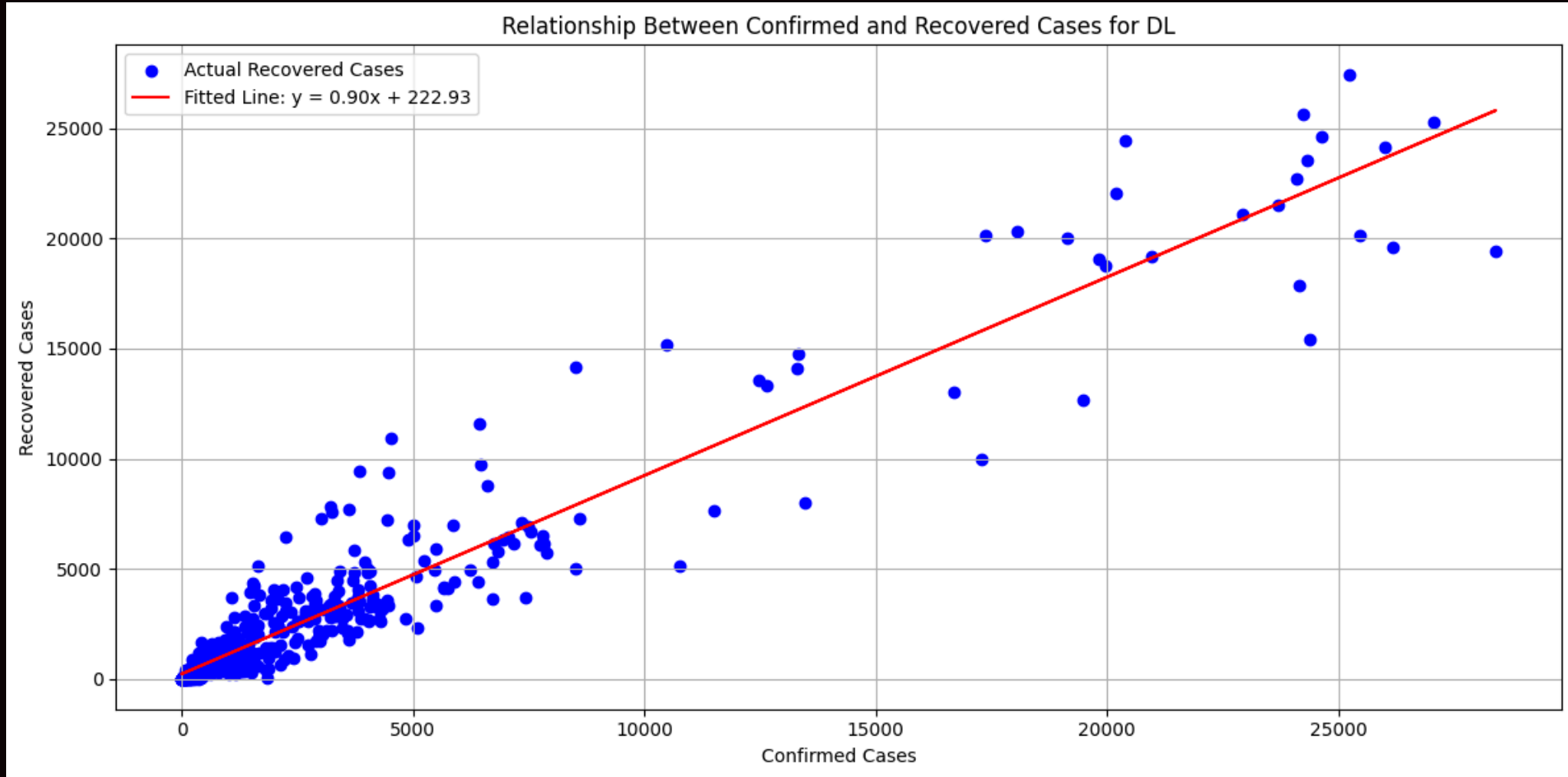
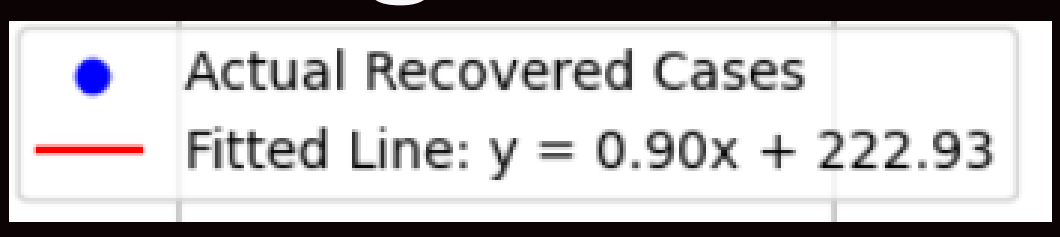
3. Examining the Relationship Between Confirmed and Recovered Cases



Linear Regression Model

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Linear Equation: y = 0.90x + 222.93
R^2 (Correlation Coefficient): 0.9140
```

Insight

- **Positive Correlation**: The slope of 0.90 suggests that for every 100 confirmed cases, approximately 90 cases are expected to recover, showing a strong recovery rate in Delhi.
- **Scatter Distribution**: Most data points cluster around the fitted line, implying consistency between confirmed and recovered cases. However, some outliers, particularly in higher confirmed cases, show a wider spread, indicating variability in recovery for larger outbreaks.
- **Intercept**: The intercept of 222.93 suggests that even with very few confirmed cases, a minimum baseline of recovered cases is observed, which could reflect early recoveries or reporting patterns.

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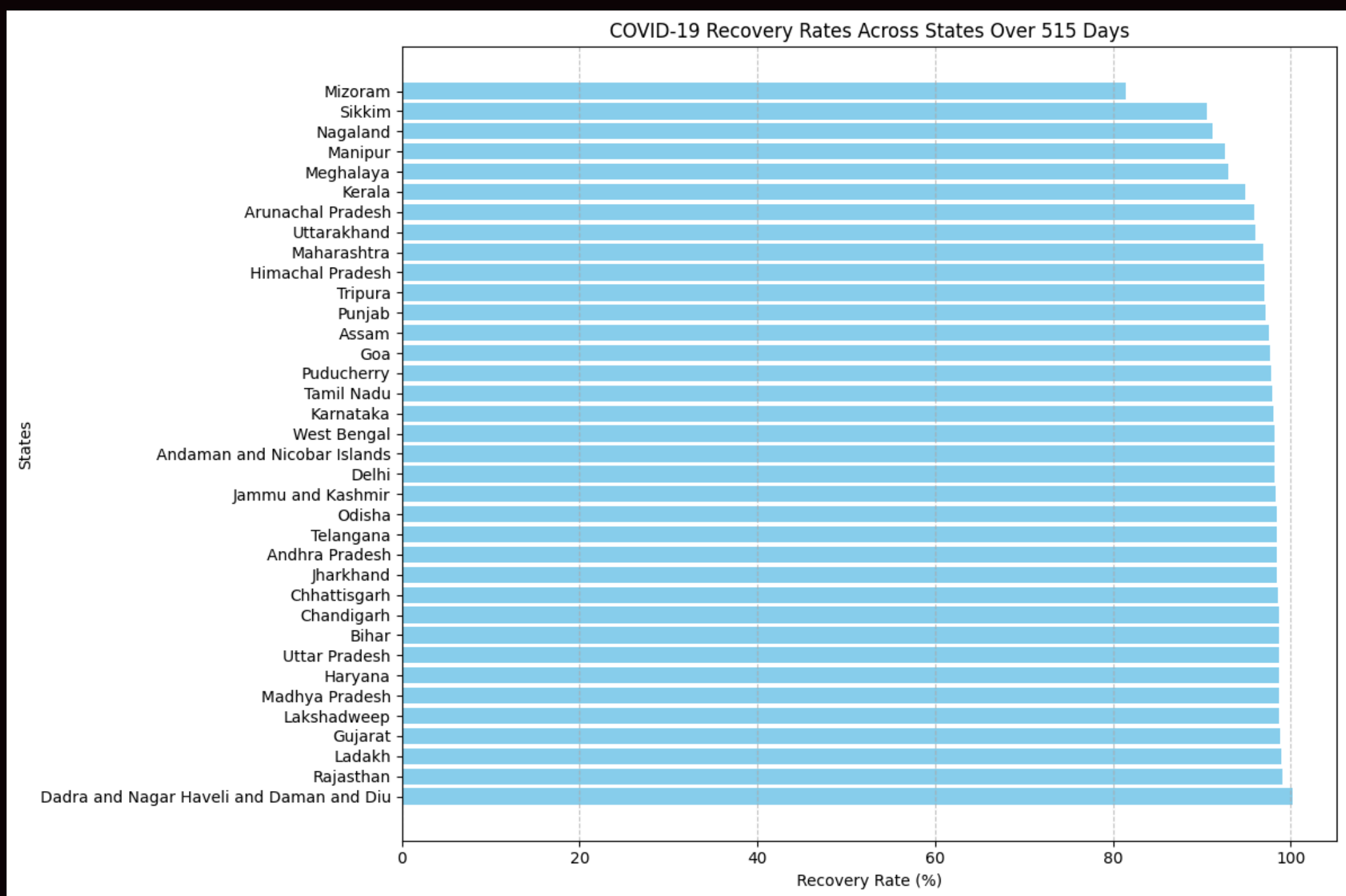
4. Comparing Recovery Rates Across States



Top 5 States by Recovery Rate:

	State	Recovery Rate
8	Dadra and Nagar Haveli and Daman and Diu	100.133080
28	Rajasthan	99.042511
17	Ladakh	98.924258
10	Gujarat	98.756658
18	Lakshadweep	98.737128

Bottom 5 States by Recovery Rate:

	State	Recovery Rate
20	Meghalaya	92.945696
21	Manipur	92.648725
24	Nagaland	91.230537
29	Sikkim	90.532359
23	Mizoram	81.392293

Insight

- Top-Performing States: Rajasthan, Dadra and Nagar Haveli, and Daman and Diu show the highest recovery rates, nearly approaching 100%. These states have effectively managed the pandemic in terms of patient recovery.
- Moderate Recovery Rates: States like Delhi, Jammu and Kashmir, and Odisha have lower recovery rates compared to the top performers but still exhibit strong outcomes, possibly due to better healthcare facilities or timely interventions.
- Lower Recovery Rates: States such as Mizoram, Sikkim, Nagaland, Manipur, and Meghalaya show the lowest recovery rates, suggesting challenges in healthcare delivery or larger outbreaks that hindered recovery.
- Consistency: Most states exhibit a recovery rate above 80%, indicating overall effective management of COVID-19 recoveries across the country, though some states lag behind.

The uniformity in high recovery rates suggests that despite challenges, most Indian states were able to handle the pandemic well in terms of patient recovery. However, there are a few outliers that might require further analysis.

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python™

Libraries used:

Pandas
Data analysis and manipulation

NumPy
Mathematical functions

Matplotlib
Data visualisations

SeaBorn
Data visualisations

StatsModels

Scikit-Learn

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