

COVID-19 Case Analysis and Forecasting

Objective

This project analyzes global COVID-19 trends and predicts future cases using Facebook Prophet, a time series forecasting model. The goal is to understand the progression of the pandemic and provide short-term predictions to assist in decision-making.

Dataset Overview

The dataset contains daily records of COVID-19 cases worldwide, including the number of confirmed cases, deaths, and recoveries from different countries. The dataset is preprocessed to focus on global trends by aggregating statistics based on dates.

Exploratory Data Analysis (EDA)

- **Data Preprocessing:** Converted the date column to datetime format for accurate time series analysis.
- **Global Trends Visualization:** Used Plotly to plot the trends of confirmed cases, recoveries, and deaths over time.
- **Insights from Data:** The visualization highlights the rapid rise in cases, recovery trends, and death rates, helping in pattern identification.

Time Series Forecasting using Facebook Prophet

1. **Data Preparation:** The dataset was formatted according to Prophet's requirements, renaming columns to ds (Date) and y (Confirmed Cases).
2. **Model Training:** A Prophet model was initialized and trained using the historical COVID-19 data.
3. **Forecasting:** The model generated a 7-day future forecast for COVID-19 case progression.
4. **Visualization:** The predicted cases were plotted alongside the actual cases to compare model accuracy.
5. **Confidence Interval:** The model provided upper and lower bounds to indicate possible variations in case predictions.

Key Findings & Insights

- The exponential rise in confirmed cases is evident in the historical data.
- Recovery rates improved over time, but confirmed cases consistently increased.
- The Prophet model provides reliable short-term forecasts, helping policymakers anticipate case surges.
- The confidence interval offers a range for possible case fluctuations, aiding in risk assessment.

Conclusion

This project showcases the power of time series forecasting in pandemic analysis. Using Prophet and interactive visualizations, we effectively analyze trends and provide data-driven predictions to

aid in decision-making. Such models can be extended for healthcare resource planning, lockdown measures, and future pandemic preparedness.