

Predict Covid-19 Spread from April-September in 2021 by using ODE and Bisection Method

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Introduction

- Let N be the population in 2021 = 70,000,000 people.
- Let γ be the recovery rate:

$$\gamma = 1/\text{recovery days}$$

Since recovery ≈ 8 days $\Rightarrow \gamma = 1/8 = 0.125$.

- Let β be the infection rate (speed of spread) $\rightarrow R_t = \beta/\gamma$.
- To find the best β , I used SSE to minimize the error:

$$\text{SSE}(\beta) = \sum_{t=0}^n (I_{\text{real}}(t) - I_{\text{model}}(t, \beta))^2$$

Where:

- **SSE(β)**: Total sum of squared errors.
- $I_{\text{real}}(t)$: Number of infected people on day t (Red dot).
- $I_{\text{model}}(t, \beta)$: Number of infected people predicted by the equation on day t (Blue line).

Data

- Use the Data from Kaggle:
`https://www.kaggle.com/sudalairajkumar/
novel-corona-virus-2019-dataset`
- Calculate the active cases:

$$\text{Active} = \text{Confirmed} - \text{Deaths} - \text{Recovered}$$