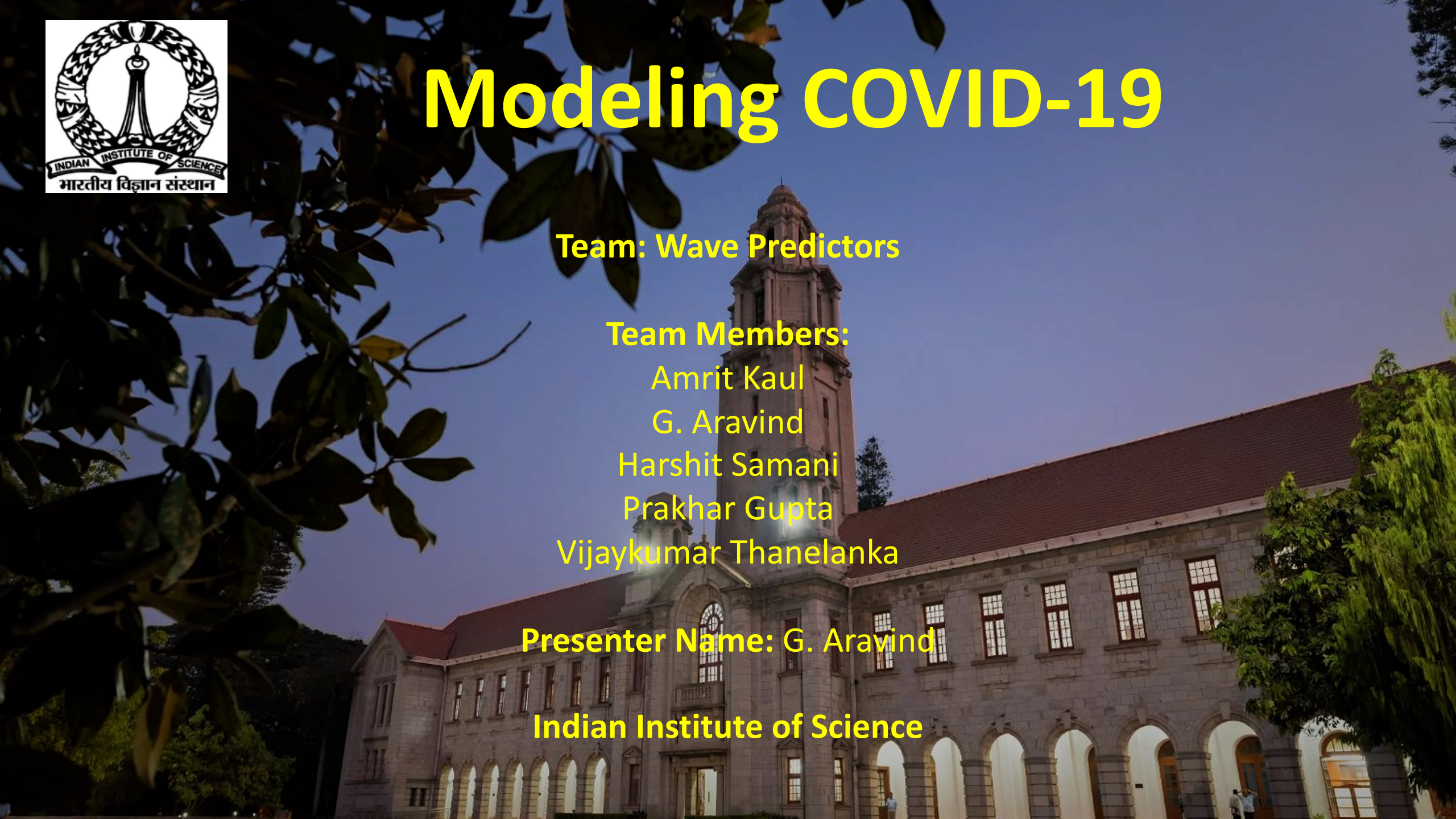

Modeling COVID-19

Team: Wave Predictors

Team Members:
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Description of Scope

- Objective is to model the different phases of the COVID-19 pandemic district-wise in the state of Karnataka, using the SEIRV model
- We try to understand the different parameters of the SEIRV model. In particular, we attempt to estimate the ”contact rates” of different districts at different phases
- In this study, we also make assumptions about factors like mobility of people between districts, efficacy of available vaccines, etc, and understand the results

Methodology

- Pre-processing the data files:
  - Extrapolated the timeseries data for BBMP areas based on population
  - From seroprevalance, we took 90% cases as exposed and 10% as infected

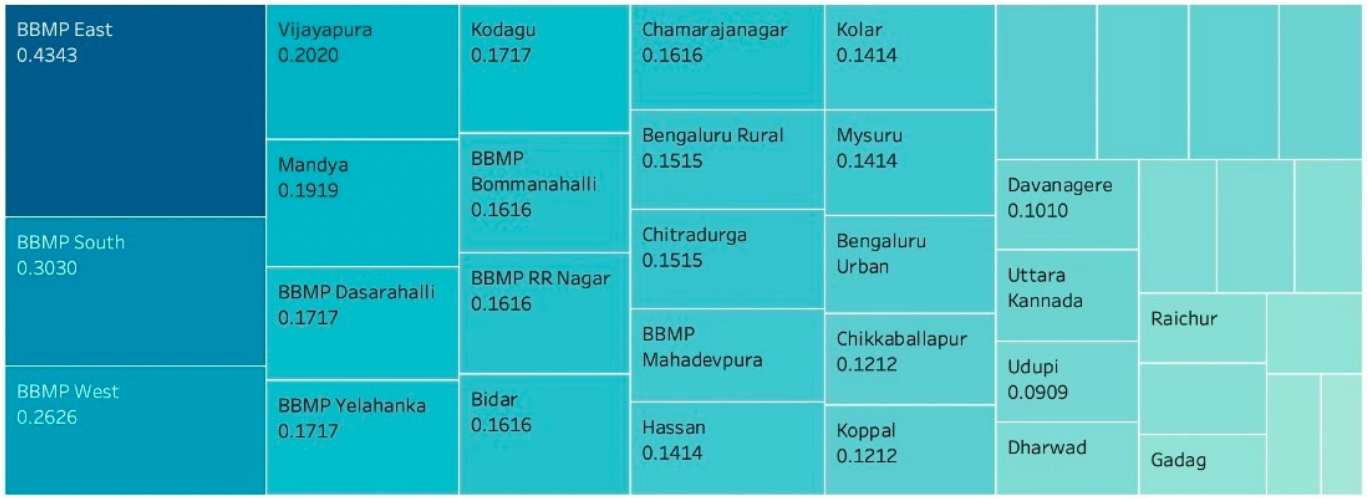
- Modelled the first phase (11th Oct 2020 – 31st Oct 2020), during the peak of the first wave of infections
  - Used grid search to compute contact rates (beta values)
  - Loss function: Absolute difference between reported and model-generated cases, against 1st Nov data

- Modelled the second phase (1st Nov 2020 – 28th February 2021)
  - Used grid search to compute beta values for each districts separately
  - Loss function: Mean Squared Error for all 120 days

- Modelled the third phase (1st March 2021 – 15th March 2021)
  - We implemented gradient-perturbation on beta for each district, along with vaccinations and immunity-waning
  - Unable to get results within 10%

Description of Results

Question1_BetaValues



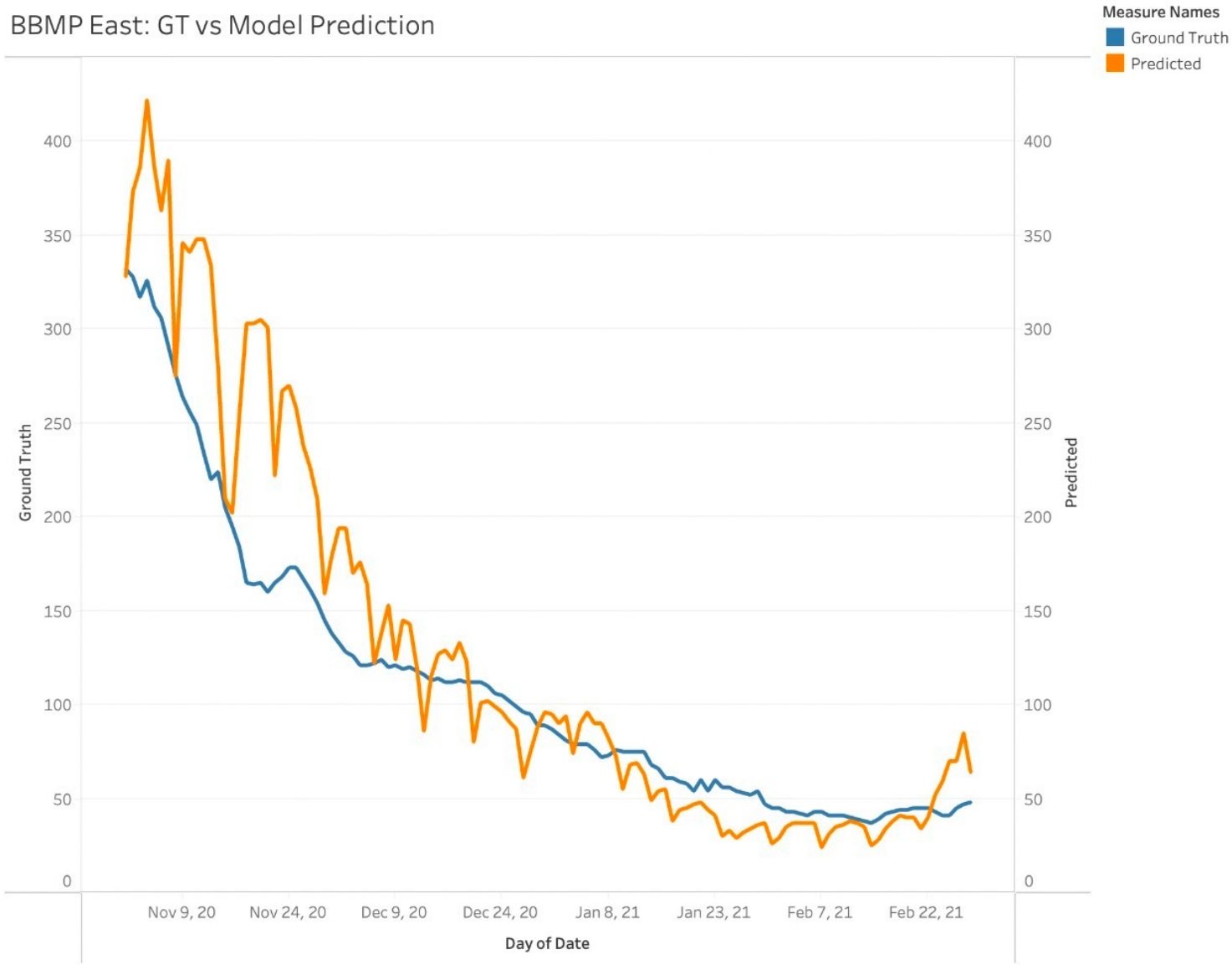
Phase1_Beta
0.0404 0.4343

Phase2_Beta
0.1414 0.3939

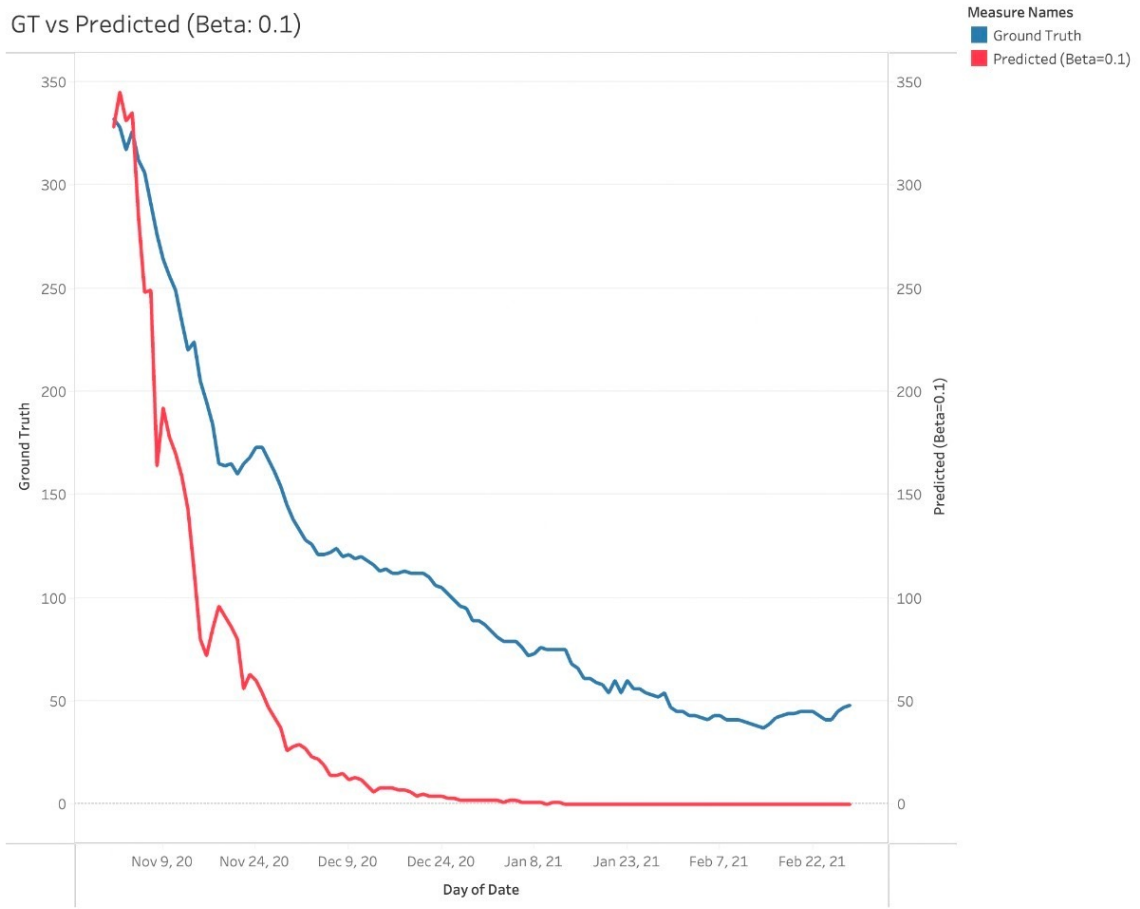
Question2_BetaValues

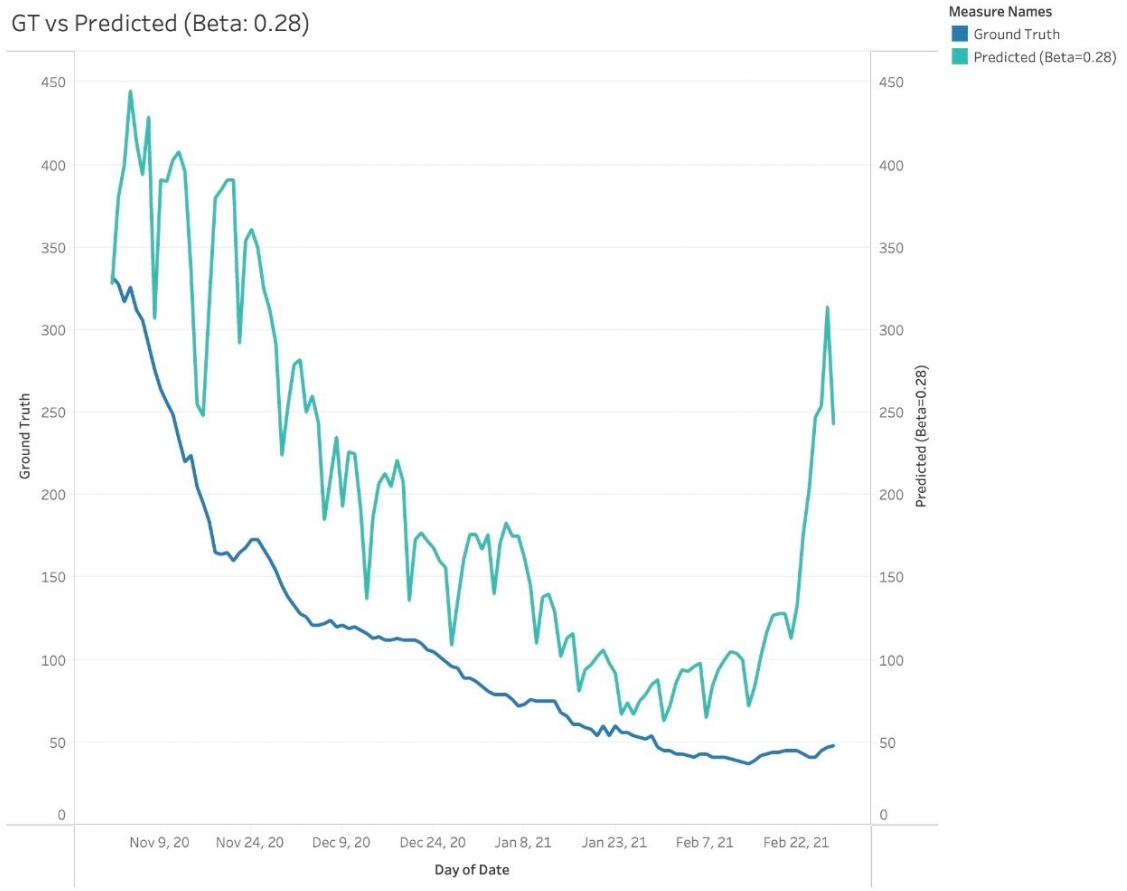
For detailed results, please click here.

Discussion and insights



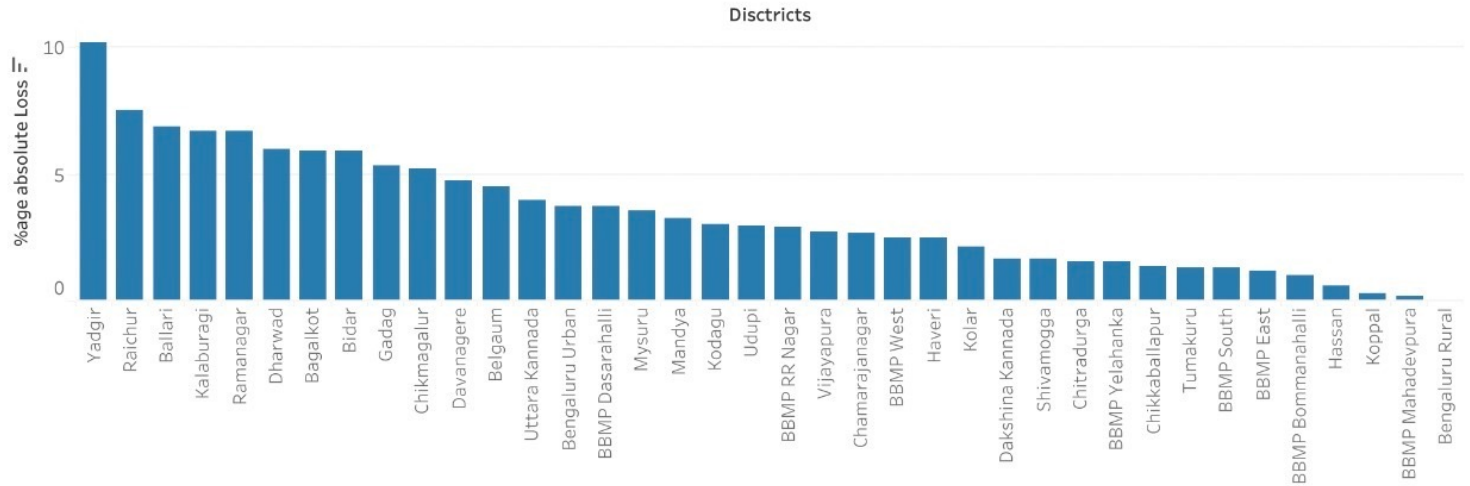
Discussion and insights



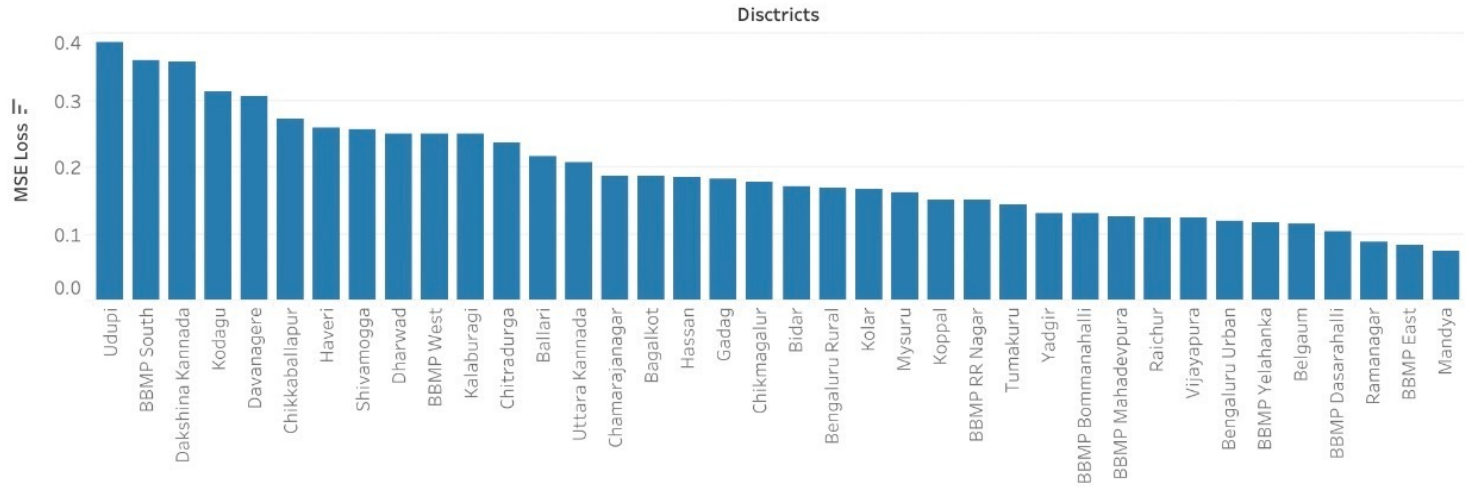


Discussion and insights

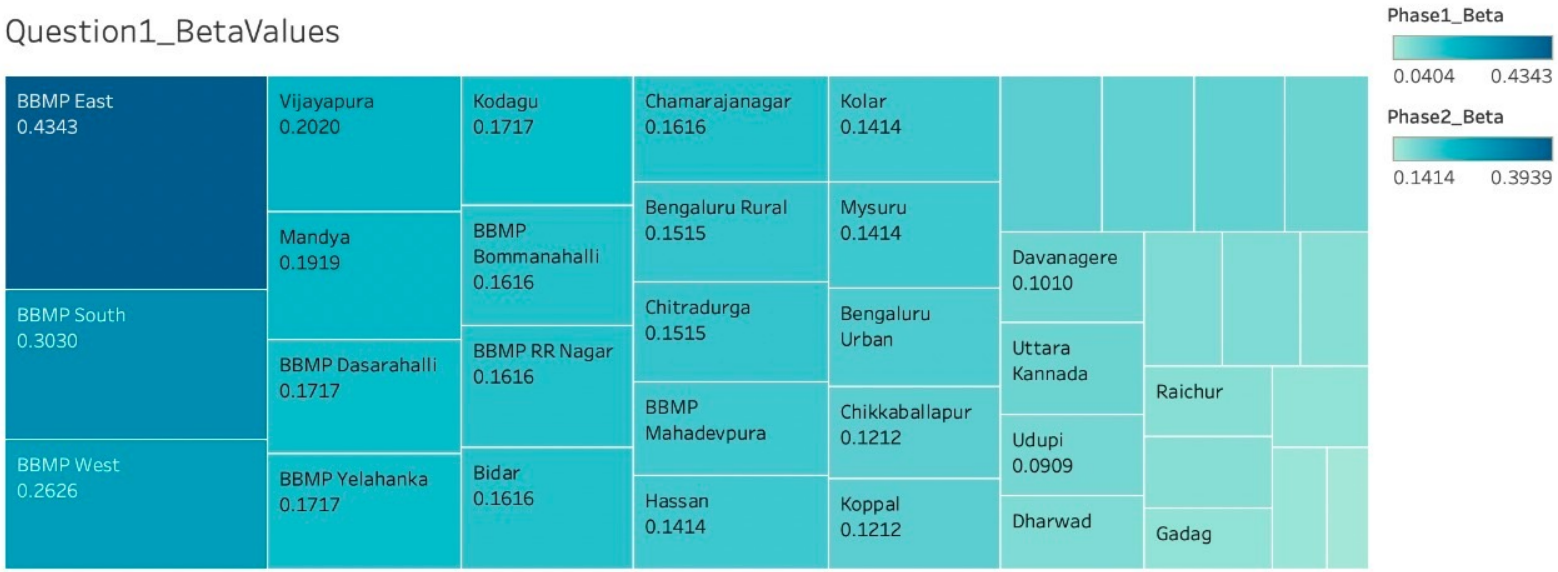
Question1_LossValues



Question2_LossValues



Discussion and insights




Thank you