

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

BBMP East 0.4343	Vijayapura 0.2020	Kodagu 0.1717	Chamarajanagar 0.1616	Kolar 0.1414		
	Market	ВВМР	Bengaluru Rural 0.1515	Mysuru 0.1414		
	Mandya 0.1919	Bommanahalli 0.1616		0.1717	Davanagere 0.1010	
BBMP South 0.3030			Chitradurga 0.1515	Bengaluru Urban	0.2020	
	BBMP Dasarahalli 0.1717	BBMP RR Nagar 0.1616			Uttara Kannada	
			ВВМР СН	Chikkaballapur	Kamada	Raichur
BBMP West 0.2626	_		Mahadevpura	0.1212	Udupi 0.0909	
	BBMP Yelahanka 0.1717	Bidar 0.1616	Hassan	Koppal	0.0303	
			0.1414	0.1212	Dharwad	Gadag

Question2_BetaValues

BBMP West 0.3939	Tumakuru 0.2828	Vijayapura 0.2727	Chikmagalur 0.2525	Raichur 0.2424	Yadgir 0.2222	ВВМР	ВВМР		
BBMP South	BBMP Bommanahalli	Bengaluru Rural	BBMP East 0.2424	Bengaluru Urban 0.2323					
0.3636	0.2727	0.2626	Belgaum 0.2424	Bidar 0.2323	ВВМР	0.1	ar 919	Haveri 0.1818	
Davanagere	BBMP RR Nagar 0.2727	Hassan 0.2626			Damanaa	or Chi	vamogga		
0.3030			Chitradurga 0.2424	Kodagu 0.2323	Ramanag 0.2020		919	Koppal 0.1717	
Ballari 0.2929	Udupi	Kalaburagi 0.2626	2020000	20000			ara		
	0.2727		Dakshina Kannada	Mysuru 0.2323		Kar	Uttara Kannada 0.1919		

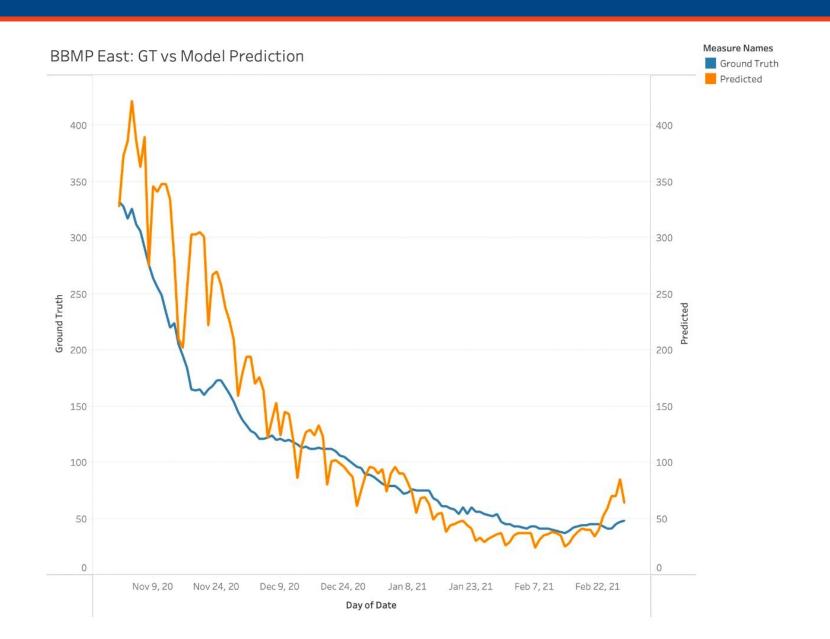
0.1414 0.3939

Phase1_Beta

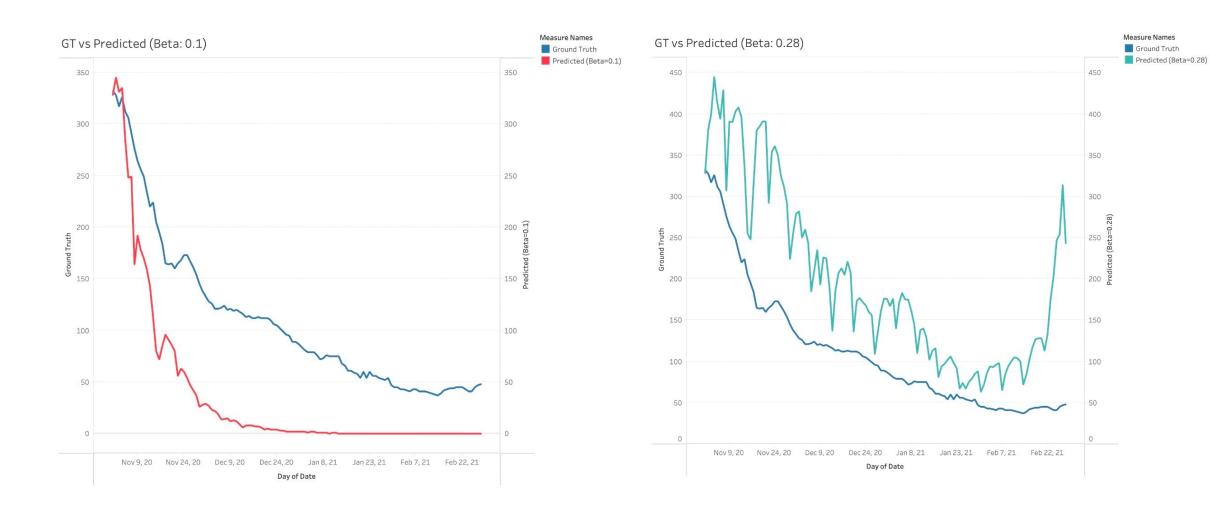
0.0404 0.4343 Phase2_Beta

For detailed results, please <u>click here</u>.



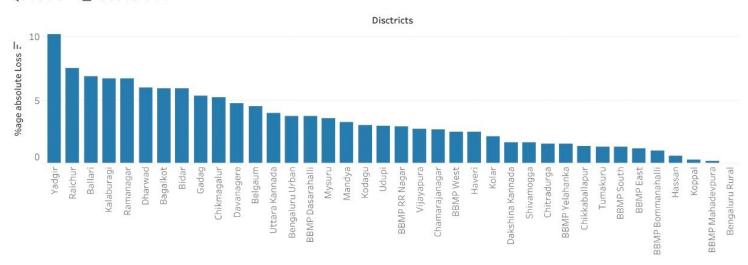




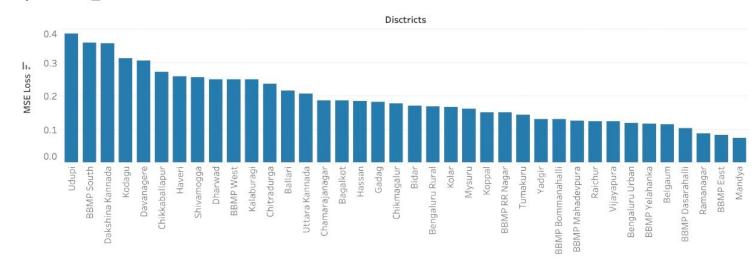




Question1_LossValues



Question2_LossValues





Phase1_Beta

0.0404 0.4343 Phase2_Beta

0.1414 0.3939

Question1_BetaValues

BBMP East 0.4343	Vijayapura 0.2020	Kodagu 0.1717	Chamarajanagar 0.1616	Kolar 0.1414			
	Mandya	ВВМР	Bengaluru Rural 0.1515	Mysuru 0.1414			
DDMD COLUM	0.1919	Bommanahalli 0.1616	Chitradurga	December 1	Davanagere 0.1010		
BBMP South 0.3030	BBMP Dasarahalli 0.1717	BBMP RR Nagar 0.1616	0.1515	Bengaluru Urban	Uttara Kannada		
			BBMP Mahadevpura	Chikkaballapur 0.1212		Raichur	
BBMP West 0.2626	BBMP Yelahanka 0.1717	Bidar 0.1616		0.1212	Udupi 0.0909		
0.2020			0.1414	Koppal 0.1212	Dharwad	Gadag	

Question2_BetaValues

BBMP West 0.3939	Tumakuru 0.2828	Vijayapura 0.2727	Chikmagalur 0.2525	Raichur 0.2424	Yadgir 0.2222	ВВМР	ВВМР		
BBMP South 0.3636	BBMP Bommanahalli	Bengaluru Rural 0.2626 Hassan 0.2626	BBMP East 0.2424	Bengaluru Urban 0.2323		16.1			
	0.2727		Belgaum 0.2424	Bidar 0.2323	ВВМР	0.19		Haveri 0.1818	
Davanagere 0.3030	BBMP RR Nagar 0.2727		Chitradurga 0.2424	Kodagu 0.2323	Ramanag 0.2020	Shive 0.19	vamogga 919	Koppal 0.1717	
Ballari 0.2929	Udupi 0.2727	Kalaburagi 0.2626	Dakshina Kannada	Mysuru 0.2323		Utta Kan 0.19	nada	Gadag 0.1515	

