- **Project Title:**

DEVELOPMENT OF ENSEMBLE MODEL FOR PREDICTING TRENDS OF COVID19

- **PI Details –**

Dr. Karan Verma – Assistant Professor, Dept. of CSE, NIT Delhi, karanverma@nitdelhi.ac.in
Dr. Ghanshyam Singh – Professor, Dept. of ECE, MNIT Jaipur, gsingh.ece@mnit.ac.in

- **Co-PI Details –**

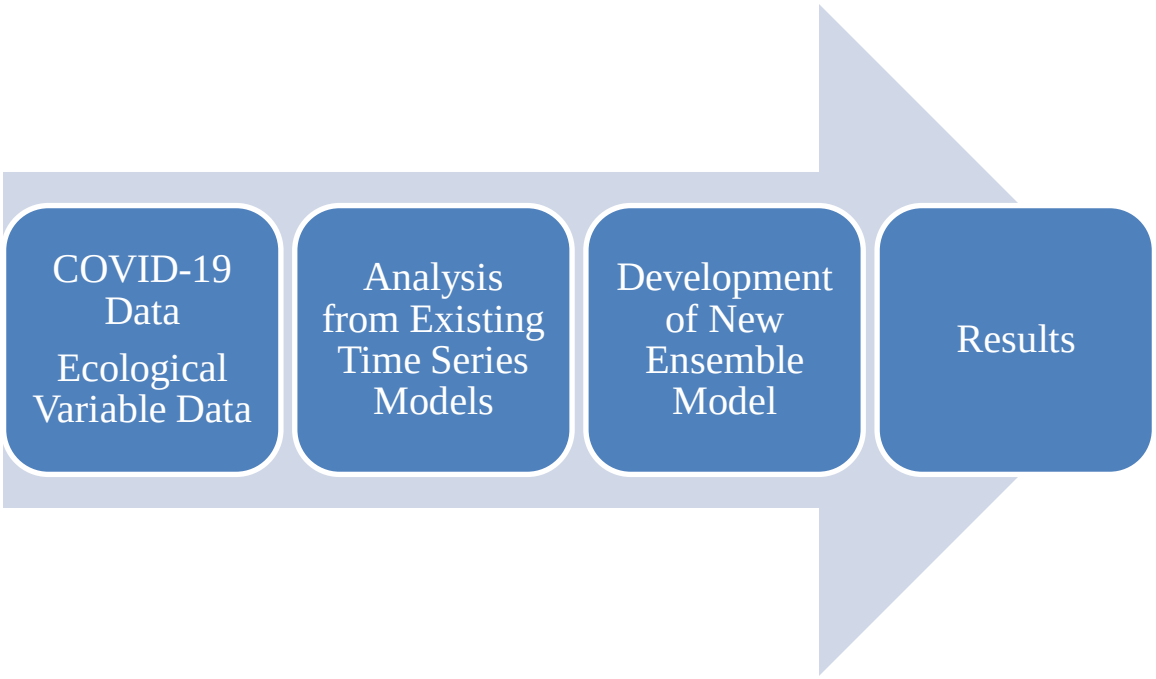
Dr. Ashok Kumar – Assistant Professor, Dept. of ECE, Govt. Women Engineering College, Ajmer, kumarashoksaini@gmail.com

1. Introduction

Coronavirus ailment 2019 (COVID-19) is an irresistible malady brought about by serious intense respiratory disorder. This ailment was originally recognized in December 2019 in Wuhan, the capital of China's Hubei region. Since, the ailment has spread all around the world. Primarily, this ailment common side effect incorporates fever, hack, and brevity of breath. Other symptoms may incorporate weariness, muscle torment, the runs, sore throat, loss of smell, and stomach pain. The period from introduction to beginning of manifestations is ordinarily around five days. However, it may run from two to fourteen days. While most of cases bring about mellow side effects, some advancement to viral pneumonia and multi-organ failure. As on 14 April 2020, more than 1.93 million cases have been accounted across 210 nations and territories along with more than 1, 20, 000 deaths whereas 4, 64, 000 individuals have been recovered.

This disease has caused a stir in all around the world and has forced governments to implement nationwide lockdowns. The most powerful indicator for any nation in context of economy has faced its wrath due to lockdown. This deadly disease is here to stay and even if is seasonal. It has been proved us that such pandemics are easily transportable thanks to ease of travelling for humans. To be able to predict cases in a huge advance in this scenario so that preventative measures can be made. This work is an effort to understand the trends in the near future and able to predict the number of cases of those infected, the number of deaths and recovery of patients. Also, we want to study if there is an existing link between the ecological variables and the spread of the disease.

2. Methodology



Time series models have been utilized with differing degrees of achievement to foresee the outbreak patterns. In this advanced era, we are prepared for what is to better fatality can be avoided. This examination intends to look at and assessed time arrangement models of COVID-19 cases and brake down defined of patterns in various countries. The time arrangement examination was directed for information gathered from the Johns Hopkings University Center for Science and Engineering starting from January 22, 2020.

We intend to utilizing different time arrangement models, in particular, autoregressive coordinated moving normal (ARIMA), support vector machine, artificial neural network (ANN) and exponential regression. Assessments of execution in forecast of number of cases is accounted as root mean square error (RMSE) and mean supreme error, low qualities, and demonstrating predominant model. Further, we plan to analyze the models on performance and build enhanced model using different ensemble methods. Finally, we plan to understand the effect of ecological variables such as temperature, humidity, and rainfall on the number of cases accounted. The data of these variables is taken from National Centers for Environmental Information (NCIE).

3. Results

Different variants of Gaussian Process Regression Exponential Model have been applied on data of different countries and results have been summarized in Table 1. In these results, we have not considered the effect of different ecological variables on the number of COVID-19 cases that have been made. These results will be further improved and analyzed while accounting the different ecological variables or other conditions.

Table 1: Results from available models using different variants

Model Name	RMSE	DATA	Validation
Gaussian_Process_Regression_Exponential_GPR	1.1145	INDIA	No validation
Gaussian_Process_Regression_Matern_5/2_GPR	91.594	INDIA	5 fold
Gaussian_Process_Regression_Matern_5/2_GPR	94.2	INDIA	10 fold
Gaussian_Process_Regression_Rational_Quadratic_GPR	529.06	ITALY	5 fold
Gaussian_Process_Regression_Rational_Quadratic_GPR	517.1	ITALY	10 fold
Gaussian_Process_Regression_Exponential_GPR	23.137	ITALY	No validation
Gaussian_Process_Regression_Squared_Exponential_GPR	1184.4	USA	5 FOLD
Gaussian_Process_Regression_Squared_Exponential_GPR	1247.4	USA	10 FOLD
Gaussian_Process_Regression_Exponential_GPR	39.836	USA	No validation
Gaussian_Process_Regression_Exponential_GPR	1488.1	HUBEI	5 fold
Gaussian_Process_Regression_Exponential_GPR	1016.7	HUBEI	10 fold
Gaussian_Process_Regression_Exponential_GPR	26.773	HUBEI	No validation

4. Expected Outcome

This model is competent to closely predict accurate trends of COVID19 cases.

5. **Expected Time:** 2 to 3 Weeks
6. **Remarks :** *Funding required Rs. 20 Lakh for 3 Weeks*