GLOBAL WARMING ANALYSIS

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***Abstract*—** The forecast of long-term global warming and weather conditions could be of huge significance in various fields, such as climate research, farming, electricity, medicine, and many more. Global temperature reduction will benefit the entire globe because not only Humans but also various animals suffer from global warming. In this regard, different techniques can be applied to evaluate the global warming dynamics. This kind of analysis allows one to make better predictions increasing our comprehension of the phenomenon. This paper involves using diagnostic analytics to analyze the impact on environment.

I. INTRODUCTION

Global warming is a major concern nowadays and it poses the highest risk to our habitats and ecologies. It is alarming that global warming has heightened in multiple locations and has intensified since the early 1970s. Since then, certain global warming patterns could guide us with an overview of what mitigation and adaptation strategies should be developed in the future decades. From the industrial revolution on, the amount of greenhouse gases in the atmosphere has significantly increased. Based on Intergovernmental Panel on Climate Change data (IPCC, 2007), carbon dioxide has increased by more than 30% and is still increasing at a rate of 0.4% per year. Other greenhouse gases are also increasing and there are shreds of evidence pointing to the anthropogenic cause of this phenomenon. During the 20th century, the Earth's surface means the temperature has increased approximately 0.4–0.8 ◦C. Most of this increase has occurred in two periods: from 1910 to 1945 (0.14 ◦C/decade) and since 1976 (0.17 ◦C/decade) (Salinger, 2005). The consequences of global warming are unpredictable; however, one could mention climate sensitivity and other changes related to the frequency and intensity of extreme weather events (IPCC, 2001).

II. RELATED WORK

A. Approach Used By others

1.Method of average mutual information and false nearest neighbours

- The idea for the determination of proper time delay for state space reconstruction is to obtain lagged variables as most independent as possible.
- Fraser and Swinney (1986) established that the time delay is related to the first local minimum of the average mutual information function I()., the analysis of the I() curve allows one to determine the best time delay to be used in the state space reconstruction
- The method of the false nearest neighbours establishes that in an embedding dimension that is too small to unfold the attractor, not all points that lie close to one another will be neighbours because of the dynamics.
- In order to use the method of the false nearest neighbours, a D-dimensional space is considered where the point Un has r-th nearest neighbours, Ur n. The square of the Euclidean distance between these points.
- Prediction is performed using the simple nonlinear prediction technique.

2. *Method to obtain representative signal using Fourier transform*

- The global warming phenomenon is analysed in the perspective of a complex system that reacts to stimuli, being the response signals studied by means of the Fourier transform.

- The methodology is to obtain a representative signal as a manifestation of the system dynamics, process it with the Fourier transform, and, given the characteristics of the resulting spectrum, to approximate its amplitude by means of a power function.

3. *Linear Regression Model*

- Analyzes the presentation of the machine learning algorithm, linear regression for prediction of global temperature and carbon emissions from previous years collected data over India.

- The forecast of long-term global warming and weather conditions could be of huge significance in various fields, such as climate research, farming, electricity, medicine, and many more.

- The data is calculated and predicted by linear regression since, of all the techniques that can be used, it obtains the highest precision for global warming and temperature.

- First ever step is to design a consistent, effective, reliable statistical data model on a broad data set and ultimately bring the relationship between average annual temperature and contributing factors to global warming.

B. Results

- The analysis reveals that climate changes are taking place in the northern hemisphere. Two large regions of Russia and Canada and, to a lesser extent, central Europe and Western Alaska are the most affected areas and the northern hemisphere has been more affected by warming. And concluded that equatorial and south hemisphere regions exhibit more “correlated” variation, while the north hemisphere and the two poles have a more “erratic” variation of the temperature.

- They have used the linear regression model to predict the average temperatures of Hyderabad., various other machine learning models can also be used. Root mean squared error can be reduced.

C. Limitations

The verification analysis shows that the average value of the forecast is close to the real time series with differences that are less than 6%. Besides, more than 50% of the daily predictions present errors less than 10%.

III. CITATIONS

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IV. PROBLEM STATEMENT

Climate change analysis is important to define different scenarios whose knowledge is important for several purposes. In the same way, global warming analysis is important to establish models that can predict the evolution of greenhouse gases and Earth’s temperature. Besides, it is

important to evaluate the consequences of the effects of these variations on global balance and life. The literature presents several efforts dealing with this kind of analysis. This contribution deals with time series analysis related to global warming dynamics. The idea is to model the system dynamics from a temperature time series that is considered a representative variable of the system. Time series from different locations of the world are investigated to characterize the global temperature

V. *APPROACH USED*

- One approach which one of the papers has taken is by using Fourier transform to analyse the perspective of a complex system that reacts to stimuli. The other paper uses the method of the false nearest neighbours which establishes that in an embedding dimension that is too small to unfold the attractor, not all points that lie close to one another will be neighbours because of the dynamics. To do this, D-dimensional space is considered and prediction is done by simple nonlinear prediction technique.
- Another paper we referred to uses Linear Regression which is a supervised learning model.
- We have approached the problem by mainly using Diagnostic Analytics. We will be making use of Plotly in our project which is an interactive open-source plotting library and covers a range of statistical, geographic and 3-dimensional use-cases. It will help in better visualization of the data.
  We will also be using other libraries like pandas, numpy,seaborn and matplotlib.

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