ABSTRACT

El Nino Southern Oscillations is a global climatic phenomenon which causes extreme climatic conditions all over the world. Various studies suggest that El Nino episodes are getting extreme and frequent with accelerating global warming. ENSO is known to be one of the reasons to cause extreme floods and droughts all over the world. The study attempts to find a relationship between El Nino and different oceaning indices based on sea surface temperature and pressure. Since ENSO brings extreme monsoons in different parts of the world and droughts in other parts, the indices are also compared with the precipitation anomaly for a period of 42 years from 1980 to 2022. The prediction of El Nino is an important part of the study which is performed by taking the oceanic indices and precipitation as an input for the model. The model is prepared using the LSTM (Long Short Term Memory) method which is famously used to work on time series because of its ability to learn and understand the patterns and trends of the temporal data provided to it. The output expected from the study is an LSTM based prediction model that can accurately predict Southern Oscillation Index by using the corresponding values of other factors. The study undertakes different methods to find out the correlation between the variables, analyzing the trends and preparation on an accurate model for prediction of SOI index. The final output shows an accurate model with 94% training and 92% validation accuracy which predicts SOI index value. The values of the SOI index are an indicator of El Nino or La Nina. If the SOI idex in consistently high with negative values then it indicates El Nino and if the values are positive high consistently, then it indicated La Nina. Thus SOI is a great way to predict ENSO. This study is very useful for weather forecasting, climatic studies, planning for agriculture and mitigation from extreme climatic conditions.

Keywords: ENSO, SOI, precipitation, LSTM, machine learning, climate, oceanic indices