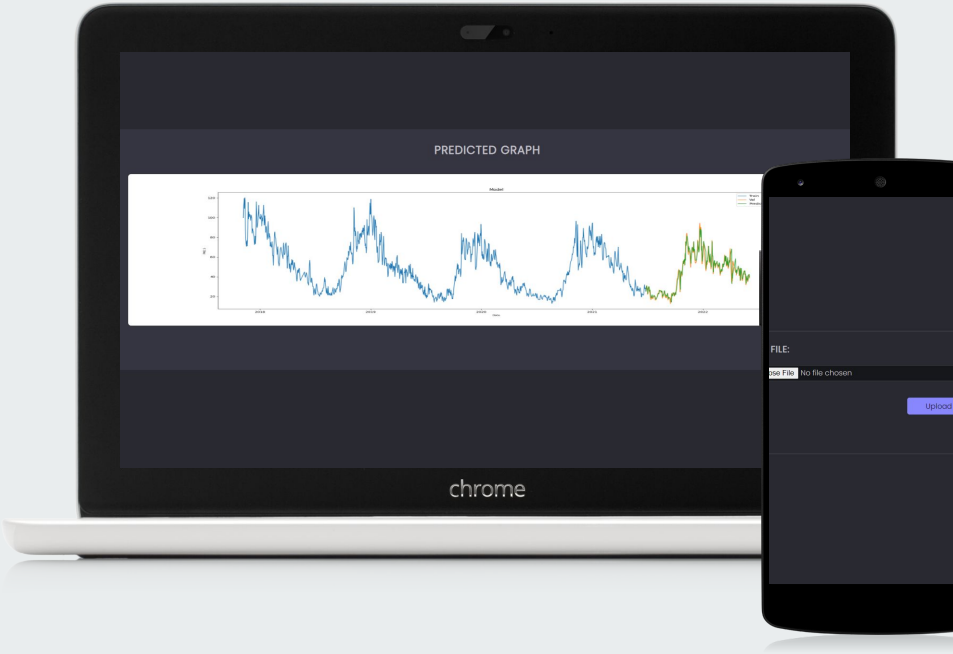
Aeromax Predictor

Predicting the future graph of air quality index



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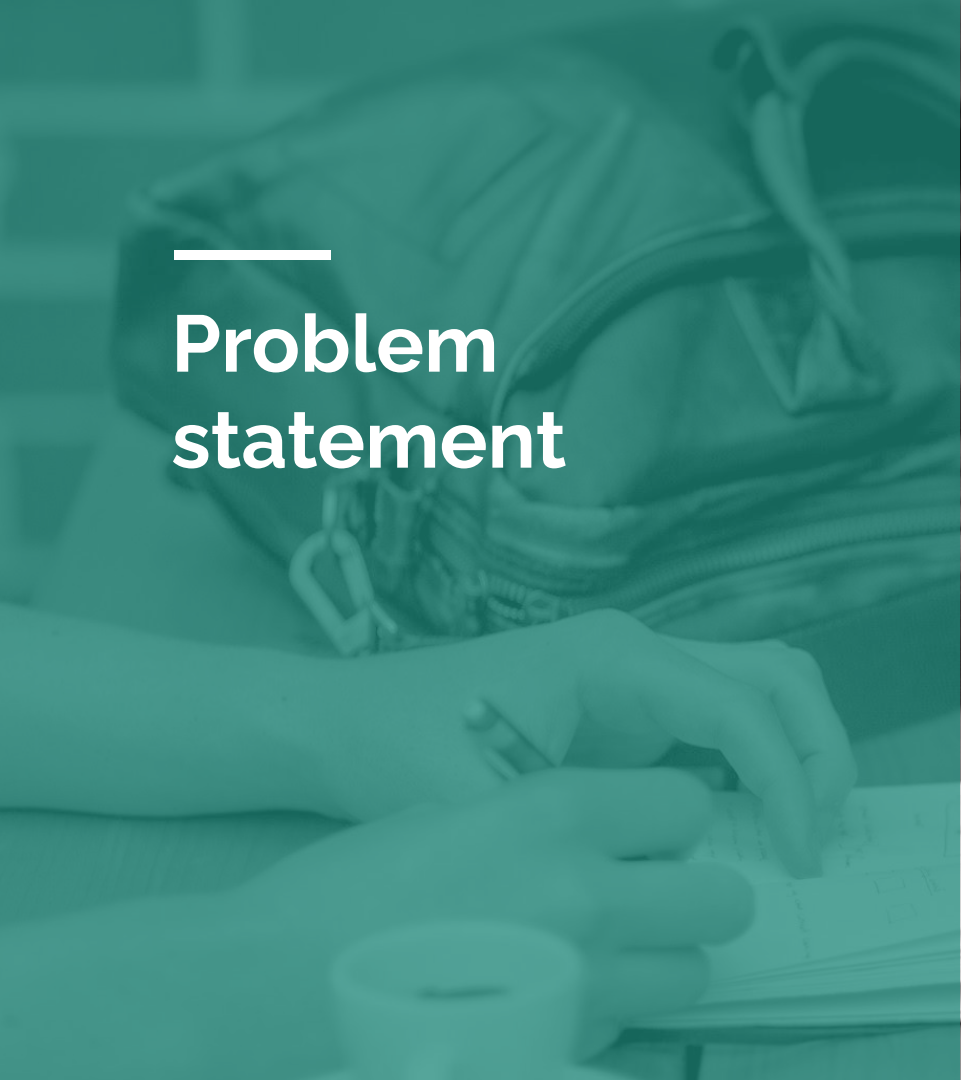
The Problem



Problem statement

To develop an AI driven system that can tackle environmental problem

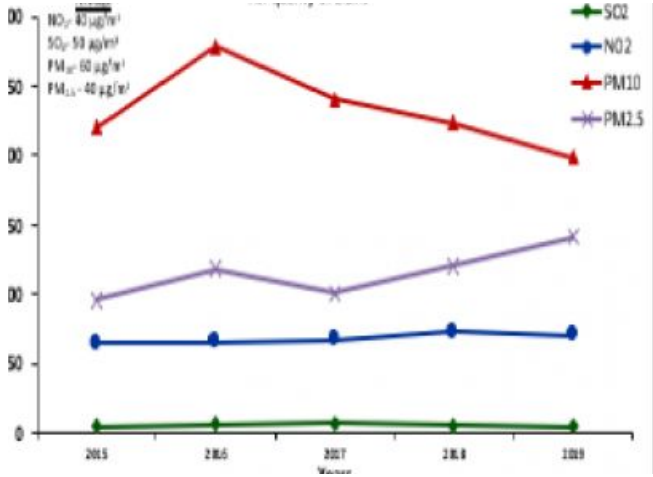
You're encouraged to craft a new application or enhance existing platforms, aiming to achieve at least one of the following objectives :

- **Environmental Data Insights:** Develop an AI ecosystem that captures, processes, and analyzes diverse environmental data – encompassing air quality, water pollution, deforestation rates, and climate patterns.

- **Sustainable Practices:** Make AI tools that encourage people, groups, and businesses to do things that are good for the environment. These tools could give personalized ideas, helpful lessons, and fun challenges to make it more interesting and easy to be eco-friendly. Let's team up to help our planet by making smart, Earth-friendly choices!

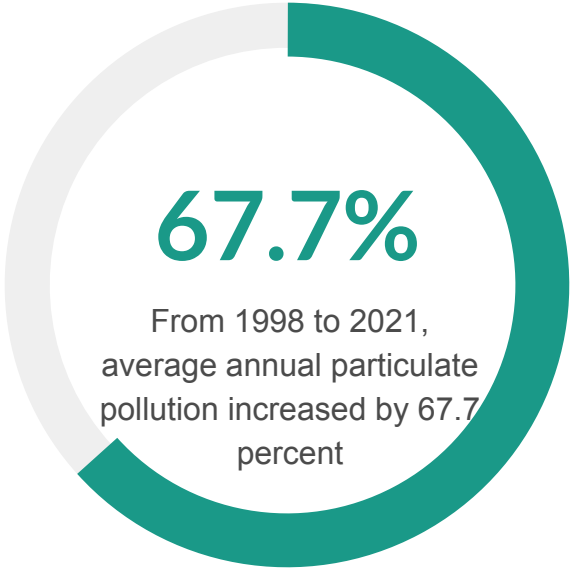
India Air Quality Index Graph

2017-2020



Increment in air Pollution and Causes

The causes of air pollution have left everyone worried about their health. Air pollution being the largest environmental killer, kills over 17 billion people worldwide. While calculating, that’s up to 2.2 years lost on an average



Technologies used :

1. Django rest-framework
2. Tensorflow 2
3. Keras
4. Scikit-Learn
5. Numpy
6. Pandas
7. Matplotlib
8. HTML5 , CSS3 and JavaScript

Solution description : AEROMAX

This code encapsulates an effective solution for PM2.5 air quality forecasting. It defines an `AeroMax` class that simplifies the entire forecasting process, from data preprocessing to deep learning model training and prediction visualization. By leveraging this code, users can efficiently develop and deploy models to predict PM2.5 levels, aiding in air quality management and providing valuable insights for environmental monitoring and decision-making. Additionally, the code offers the flexibility to save visualizations, enhancing its utility for research and reporting purposes.

Model Explanation

- ➔ The code defines an `AeroMax` class for PM2.5 air quality forecasting. It handles data preprocessing, LSTM model creation and training, model loading, and prediction visualization. The class allows for the efficient development and deployment of PM2.5 forecasting models, including the option to save visualizations.
- ➔ The Code work as :

  Initialization and Imports:
  - The `AeroMax` class is created for PM2.5 air quality forecasting.
  - It imports libraries for data manipulation, visualization, and deep learning.

- **Data Processing and Training Data:**
  - The class preprocesses the dataset, parsing timestamps and creating date-related data.
  - Prepare training data by scaling and creating sequences for LSTM training.
- **Model Building and Training:**
  - An LSTM-based deep learning model is defined within the class.
  - The model is trained using training data and saved to a file.
- **Model Loading and Testing Data:**
  - The class can load a pre-trained model if available, saving training time.
  - Testing data is prepared to make predictions using the trained model.
- **Visualization and Graph Saving:**
  - The class visualizes training data, actual test data, and model predictions.
  - Optionally, the visualization can be saved as a graph for further analysis.

How it can help?

- **Air Quality Management:** It can assist environmental agencies and authorities in predicting PM2.5 levels, enabling them to take proactive measures to mitigate air pollution and protect public health.
- **Healthcare Planning:** Healthcare professionals can use PM2.5 forecasts to anticipate increases in respiratory issues and adapt medical resources accordingly, especially for vulnerable populations.
- **Urban Planning:** City planners can incorporate PM2.5 forecasts into urban development strategies, promoting cleaner transportation, green infrastructure, and healthier living environments.
- **Research and Analysis:** Researchers can utilize the code to explore historical PM2.5 data trends, test various forecasting models, and gain insights into the factors influencing air quality.
- **Public Awareness:** Providing real-time or forecasted PM2.5 information to the public through visualizations can raise awareness about air quality, encouraging individuals to make informed decisions like adjusting outdoor activities on days with poor air quality.

Next Steps

What next?

- ➔ The model can be trained on the dataset of any country to predict the air quality index of that country.
- ➔ We can add more features to the web app to make it more user friendly.
- ➔ We can implement the model in real life to predict the air quality index of any city of India.
- ➔ We can use a language model to advice the government to take action according to the predicted graph to reduce the air pollution.

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References

Colab Notebook