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**AIR QUALITY ANALYSIS AND PREDICTION IN TAMILNADU**

Problem Statements:-

* TamilNadu faces significant challenges related to

air quality ,with various regions

experiencing high levels of pollution due to

industrial activities , vehicular emissions and

natural factors.

* Accurate analysis and timely prediction of air

quality are essential to mitigate the adverse

effects on public health and effect the

environment.

Innovative Solutions:-

* AirQuality Montoring Solutions
* Machine Learning Models
* Satellite Data Integration
* Mobile Apps for Citizen Engagement
* Air Quality Index (AQI) Alerts
* Community-based Air Quality Monitoring
* Air Quality Index (AQI) Alerts
* Community-based Air Quality Monitoring
* Public Awareness Campaigns

Data set Link:-

“https://tn.data.gov.in/resource/location-wise-daily-ambient-air-quality-tamil-nadu-year-2014”

Columns Details:-

Stn Code

State

City/Down/village

Location of Monitoring Station

Agency

Type of Location

SO2

NO2

RSPM/PM10

SPM

*Details about column details:-*

* *Std Code:- STD stands for Subscriber Trunk Dial ling.To find STD code of any city from drop down select box.*
* *State:-In this data set we use the state Tamil Nadu.In That state We find the air quality analysis and prediction.*
* *City/Town/Village:-In the data set we use the city, town,villages like Chennai , Coimbatore , Madurai,Salem,Thoothukudi.*
* *Location of Montoring Station:- The location of montoring station in the data set is Kathiawar,Govt.High Secondary School,Thiruvottiyur,Madras Medical,etc...*
* *Agency:-The agency we use in the datasets is TamilNadu,Thiruvottiyur Municipal Office, Chennai etc…*
* *Types of Location:-Based on the analysis of the air quality prediction in particular location.*
* *SO2:-*In the air quality prediction based on the Sodium Dioxide level in the air.
* NO2:-In the air quality prediction based on the Nitrogen Dioxide level in the air.

Libraries Used :-

In this we use a libraries like Numpy , Pandas, Matplotlib, Sea born and import the packages like warnings and filters.

Way to install the libraries:-

* Make sure Python and pip is pre installed on your system.
* To check python version: “python --version”
* To check pip:”pip -V”
* Numpy:-It is a python library,used to solve numerical problems.It stands for Numerical Python.It can be installed as follows “pip install numpy”.
* Matplotlib:-Is a python library that helps to plot graphs.It used in data visualizations and graphical plotting.It can be installed as “pip install matplotlib”
* Pandas:-Pandas is a python package that is used for data analysis and manipulation.Is a open source libraries that is built over numpy. It can be installed as “pip install pandas”

*Train and test :-*

Now we train and test our data set as follow:

* Data collection:-Gather historical air quality data for various locations in TamilNadu. This data should include information on pollutants such as PM2.5, PM10, NO2, SO2, CO, O3, and meteorological data like temperature, humidity, wind speed, and direction.
* Data pre processing:-Clean the data by handling missing values, outliers, and duplicates.Perform data normalization or standardization to ensure that all features have similar scales.Create time-based features, such as time of day, day of the week, and season, which can be relevant for air quality prediction.
* Features Selection:-Use feature selection techniques to identify the most relevant features for prediction.Correlation analysis and feature importance from machine learning models can help in feature selection.

Rest of Explanation:-

* Develop a system that sends real-time AQI alerts to residents' smartphones. These alerts can recommend actions such as avoiding outdoor activities, using air purifiers, or using public transport on days with poor air quality.
* Engage local communities in monitoring air quality. Provide them with low-cost air quality monitoring kits and training to collect data in their neighborhoods. This grassroots approach can supplement official monitoring efforts.

Accuary:-

* Improving the accuracy by splitting the data on heavy variations
* From sklearn import the metrics ad mean square error.
* Mean squared error (MSE): MSE is a measure of the average squared difference between the predicted and actual values.

Conclusion:-

Remember that building an accurate air quality prediction model requires a deep understanding of both the data and the modeling techniques involved.Collaboration with domain experts and environmental agencies in TamilNadu can also be beneficial in building a robust and reliable system for air quality analysis and prediction.