SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
SCHOOL OF COMPUTING
DEPARTMENT OF COMPUTING TECHNOLOGIES
18CSP109L - MINOR PROJECT

Correlation Analysis of Agri-Food Emissions: Unveiling Trends and Relationships

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Abstract

This project presents a consolidated dataset on agricultural CO2 emissions, comprising 21% of global annual emissions. The project reveals relationships between emissions, climate change, and geographic areas, emphasizing the pivotal role of the agri-food sector. It analyzes factors like savanna and forest fires, crop residue burning, and rice cultivation, featuring a regression example for temperature variation prediction. Encompassing various facets of agricultural activities, from on-farm energy use to population demographics, the dataset aids in forecasting future emissions using machine learning.

Forestland, acting as a carbon sink, exhibits negative emissions due to sustainable practices. This dataset is a crucial resource for policymakers, researchers, and environmental scientists, providing insights for targeted strategies to mitigate the environmental impact of the agricultural sector. Given the substantial contribution of the agricultural sector to climate change, the project underscores the significance of informed decision-making and sustainable practices. We seek support for accurate datasets and notebook demonstrations, emphasizing the collaborative effort needed to address challenges posed by agricultural emissions and climate change.

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Introduction

In the quest for global sustainability, understanding the nuanced relationships within the agri-food sector's greenhouse gas emissions is imperative. Our project, "Correlation Analysis of Agri-Food Emissions," delves into a meticulously curated dataset, combining FAO and IPCC data, to uncover intricate connections among various contributing factors. Spanning savanna fires, on-farm energy use, and demographic data, this dataset encapsulates approximately 62% of global annual emissions.

Through sophisticated statistical methods, we aim to identify, quantify, and validate correlations within the dataset. Our focus is on unveiling key relationships, prioritizing influential factors, and presenting insights through intuitive visualizations. By understanding temporal trends and multi-factor influences, our project contributes to the discourse on sustainable agriculture and climate-conscious practices

This analysis serves as a compass for policymakers, environmental agencies, and industry stakeholders, providing actionable insights for navigating the complex realm of agri-food emissions. Through informed decision-making, we strive to foster a symbiotic relationship between agricultural practices and environmental preservation, aligning with broader sustainability objectives.

Objective

- Identify Key Correlation: Explore and identify statistically significant correlations between different features in the agri-food emissions dataset.
- Quantify Relationships: Quantify the strength and direction of relationships between various factors, such as crop residues, land use changes, and emissions.
- Temporal Analysis: Investigate how correlations between different features change over time, considering annual or seasonal variations.
- Prioritize High-Impact Factors: Determine which factors have the most significant impact on overall agri-food emissions and prioritize them for further analysis.
- Visualize Correlation Patterns: Develop visualizations, such as correlation matrices and heatmaps, to present the complex relationships within the dataset.
- Cross-Category Correlation: Explore correlations not only within emissions sources but also across categories like demographic data, land use, and temperature variations.
- Validate Findings: Use statistical tests to validate the identified correlations and ensure the robustness of the findings.
- Identify Multi-Factor Influences: Investigate interactions between multiple factors to uncover complex relationships that may not be apparent in univariate analyses.

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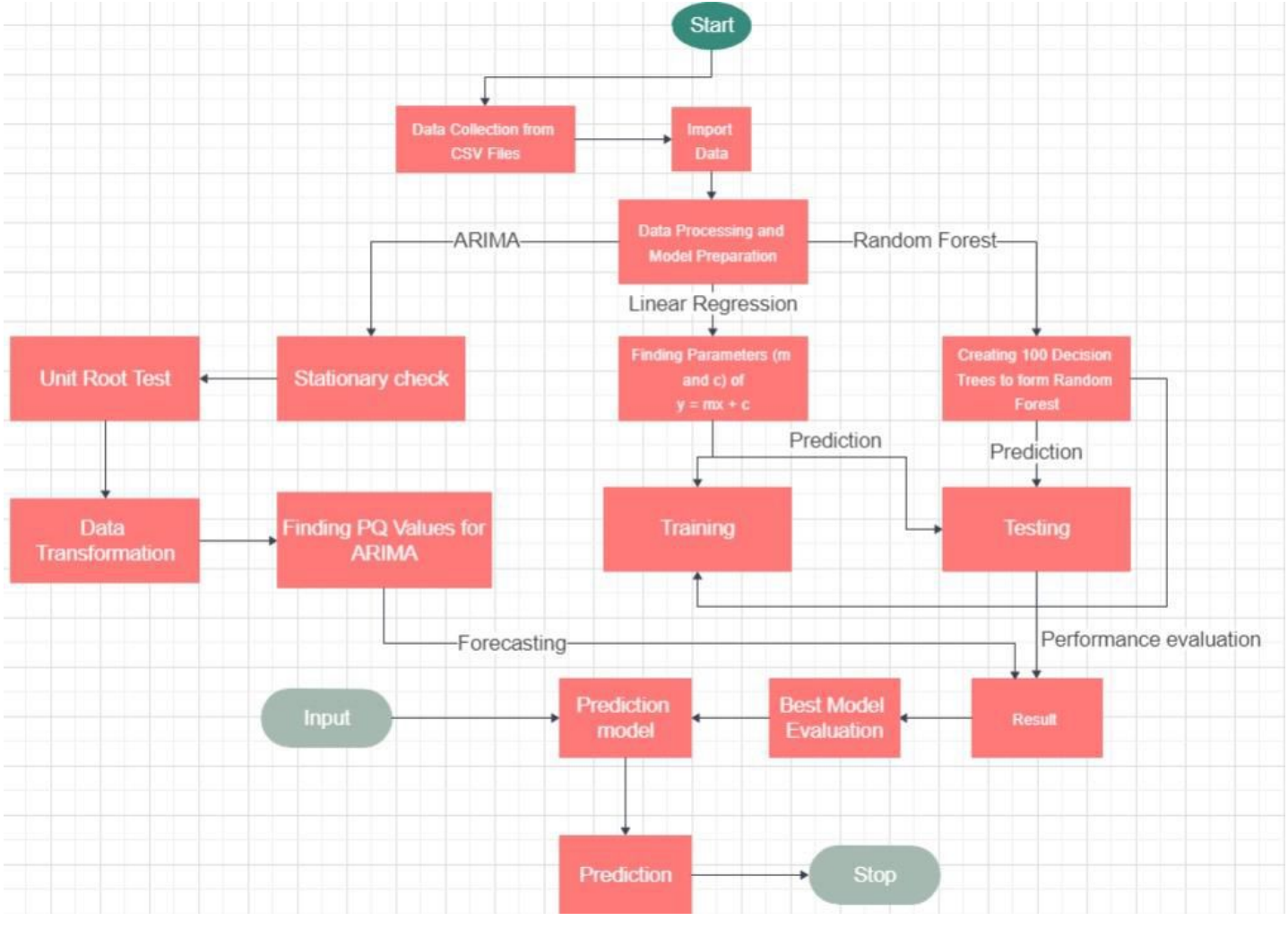
Start
Data Collection from CSV Files
Import Data
Data Processing and Model Preparation
ARIMA
Random Forest
Linear Regression
Unit Root Test
Stationary check
Finding Parameters (m and c) of y = mx + c
Creating 100 Decision Trees to form Random Forest
Prediction
Prediction
Data Transformation
Finding PQ Values for ARIMA
Training
Testing
Forecasting
Performance evaluation
Input
Prediction model
Best Model Evaluation
Result
Prediction
Stop