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Computing Carbon Credits
Different Carbon Emissions Prediction Models

This is the study from the report **"A Machine Learning Algorithm to Explore the Drivers of Carbon Emissions in Chinese Cities"**. This paper focuses on the carbon emissions of 141 Chinese cities and predicts carbon emissions using different machine-learning techniques from 2011 - 2020.

Based on the paper, there are models used for carbon emission:
1. Extra-Trees: An ensemble learning method that builds multiple randomized decision trees and averages their predictions to improve accuracy and prevent overfitting.
2. Random Forest: It constructs multiple decision trees on random subsets of the data and features, then averages their predictions to improve accuracy.
3. Combined Predictive Models using Adaptive-Lasso for feature selection: We use the Adaptive-Lasso method to select the most relevant features from a dataset and then build predictive models based on those features.

Approach for Calculating Carbon Credits:

1. Gather information about past carbon emissions, the variables that affect them (such as energy use and economic activity), and, if pertinent, information about trees, such as their type and size.
2. Determine the most significant factors influencing carbon emissions to choose critical characteristics. Model overfitting can be avoided and irrelevant elements can be removed with the adaptive lasso model.
3. To anticipate emissions, use machine learning models like XGBoost, Random Forest, Regression Tree, Bagging, Boosting, or Extra-Trees. The Extra-Trees approach works very well for researching the variables that affect carbon emissions.

4. To ensure accuracy, train and evaluate your models using the gathered data and relevant metrics such as R-squared, Mean Absolute Percentage Error (MAPE), and Mean Squared Error (MSE).
5. Predict future carbon emissions based on the training models and identify relevant factors.
6. Create a baseline scenario that reflects carbon emissions in the absence of any projects or interventions including carbon offsets. This phase is essential for figuring out the land's carbon worth.
7. Determine the difference between the baseline situation and the anticipated emissions with the carbon offset project in place to compute carbon credits. This entails calculating how much carbon the project has caught or reduced.
8. To dynamically modify the carbon credit computations, use real-time data such as CO2 emission levels, current carbon pricing, and new laws.
9. Use techniques for afforestation projects that precisely calculate the amount of carbon that can be offset by planting trees by examining the number of trees and the amount of carbon that is sequestered.
10. By combining feature selection algorithms, AI optimization, and data preprocessing, we can use boosting technology to improve and refine the prediction outcomes of several models and produce more accurate and dependable forecasts.

Conclusion:

The Extra-Trees algorithm was found to be the most effective in studying the influencing factors of carbon emissions.