Abstract

Artificial Neural Networks (ANN) are good at recognizing patterns and proven themselves as proficient classifiers for addressing problems that are non-linear in nature which
belong to the real world phenomena. The greatest environmental challenge on the earth is to mitigate Global Warming. Carbon dioxide is the most anthropogenic Green House Gas in the atmosphere which is growing rapidly since three decades and decreasing the global energy. This research paper applies classification techniques for global carbon emissions using ANN by grouping the countries based on the quantum of carbon emissions. The global per capita carbon emissions of 183 countries are classified using Generalized Feedforward Networks (GFF) based on the emission rate into three categories namely - low, medium and high. The low carbon emitting countries sharing complex boundaries are further categorized using Support Vector Machines (SVM) with Radial Basis Function (RBF) kernel. It is found that the GFF training performance was exemplary with the classification rate of 0.9950 with testing error rate of 0.0191. SVM classifiers mapped the non-linear input feature space into high dimensional space by constructing an optimal hyper-plane with the classification rate of 0.9796. Various performance measures of experiments and accuracy of classification in grouping countries based on the emission rate are discussed.

Reference

- Oswaldo Ludwig and Urbano Nunes, “Novel Maximum-Margin Training Algorithms for Supervised Neural Networks,” IEEE transactions on Neural Networks, vol. 21, no. 6, June 2010
Classification of Global Carbon Emissions using Artificial Neural Networks


Index Terms

Computer Science

Artificial Intelligence

Key words

Artificial Neural Networks (ANN)  Generalized Feedforward

(GFF)  Green House

Gases (GHG)  Multilayer Perceptron (MLP)

Support Vector Machines (SVM)