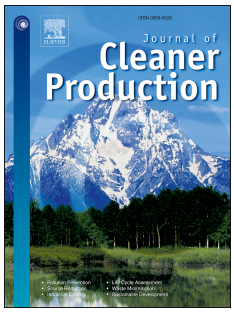
Accepted Manuscript



A novel method for carbon dioxide emission forecasting based on improved Gaussian processes regression

Debin Fang, Xiaoling Zhang, Qian Yu, Trenton Chen Jin, Luan Tian

PII: S0959-6526(17)31042-9

DOI: 10.1016/j.jclepro.2017.05.102

Reference: JCLP 9641

To appear in: *Journal of Cleaner Production*

Received Date: 6 July 2016

Revised Date: 14 December 2016

Accepted Date: 19 May 2017

Please cite this article as: Fang D, Zhang X, Yu Q, Jin TC, Tian L, A novel method for carbon dioxide emission forecasting based on improved Gaussian processes regression, *Journal of Cleaner Production* (2017), doi: 10.1016/j.jclepro.2017.05.102.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

A Novel Method for Carbon Dioxide Emission Forecasting Based on Improved Gaussian Processes Regression

Debin Fang [a], Xiaoling Zhang[b] , Qian Yu [c,*],Trenton Chen Jin[d] and Luan Tian[d]

[a] *Economics and Management School, Wuhan University, Wuhan 430072, China;*

E-Mail: dbfang@whu.edu.cn

[b] *Department of Public Policy, City University of Hong Kong, Hong Kong, China;*

E-Mail: xiaoling.zhang@cityu.edu.hk

[c] *School of Economics, Wuhan University of Technology, Wuhan 430070, China;*

E-Mail: yuqian@whut.edu.cn

[d] *Economics Department, The George Washington University, Washington DC 20052, Unite States;*

E-Mails: trentonjin@gwu.edu; luantian0621@gwu.edu

***** Author to whom correspondence should be addressed; E-Mail: *yuqian@whut.edu.cn*;
Tel.: +86-15549496294.

Abstract: The fact that global warming will bring impact on immigration, agriculture and also generate human conflicts is becoming a focus in climate change topic and the forecasting of carbon dioxide emission has been attracting much attention. In this paper, we proposed an improved Gaussian processes regression method for carbon dioxide emission forecasting based on a modified PSO algorithm which can efficiently optimize the hyper parameters of covariance function in the Gaussian processes regression. Also we tested our improved PSO-GPR method with the total carbon dioxide emissions data of U.S., China and Japan in 1980-2012, and compared the prediction precision of our method with original GPR and BP Neural Networks by the data of U.S., China and Japan. The performance of our improved Gaussian processes regression method enhanced the prediction accuracy of original GPR method and is superior to other traditional forecasting method like BP Neural Networks. Furthermore, we applied PSO-GPR method in generating a prediction total carbon dioxide emissions for 2013 to 2020 and found out that China's total carbon dioxide emission will still increasing but finally at a decreasing rate and U.S. and Japan will have a good control on their amount of carbon emission in the near future. Finally, policy implications about carbon dioxide emission reduction were proposed.

Keywords: CO2 emission; Gaussian process regression; particles swarm optimization; forecasting

Download English Version:

https://daneshyari.com/en/article/8099680

Download Persian Version:

https://daneshyari.com/article/8099680

Daneshyari.com