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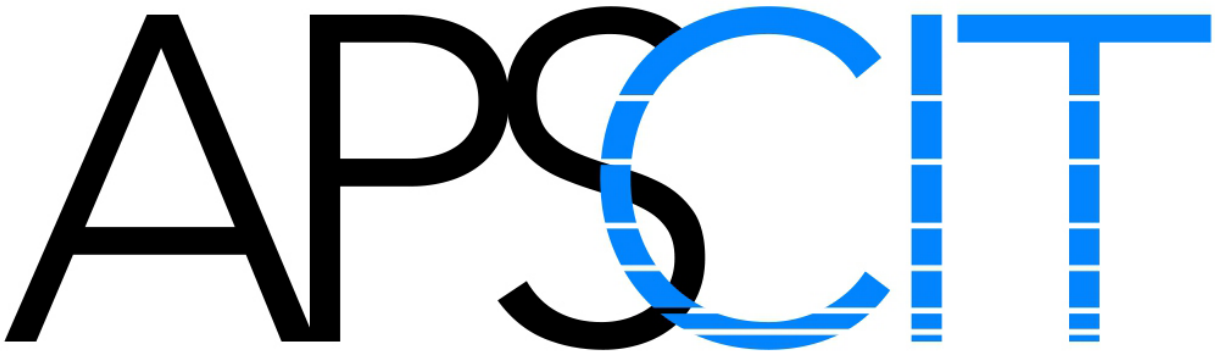

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3. Introduction to the Lossless Source Coding and the Context Tree Weighting Method (T. KAWABATA)
4. Hybrid uplink traffic scheduling algorithm in Fixed Mobile Convergence (FMC) networks: A Comparative Study of Performance (I.S. HWANG)
5. Data analytics and simulation tools for urban mobility of the future (J. DAUWELS)
6. Efficient Tools to Implement Web-Based Systems (L.H. CHANG)
7. Robust texture image representation by scale selective local binary patterns (Z.H. GUO)
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Sat/8/19

No. 2 Meeting Room

Abstract ID: 13

Analysis of Integrated Renewable Energy Monitoring System Data using KNN for Pre-Processing

Jin Hyub LEE, Je Seoung HONG, R. Young Chul KIM, Hyun Seung SON, Hongik University, Korea

Abstract

In near future, there will be a surge in a photovoltaic power generation business around the world. This may b e the reason why the photovoltaic power generation is relatively low in installation cost, not limited in installat ion area, and easy to maintain among the alternative energies caused by global air pollution and depletion of f ossil fuels. In the related research, our previous integrated monitoring system of renewable energy was built t o easily monitor and manage the solar power generation status. Most of monitoring system are a post-process ing method, which gives a warning from recognizing the fault based on data received from sensing data of the photovoltaic sensors and then manually fix them. In this paper, We choose K-Nearest Neighbor algorithm, whi ch is to preprocess the accumulated data to generate a training set, which classifies them such as normal data part, abnormal data part, and fault data part through learning them. Finally we test new data with Test Set. As a result, we will be possible to predict that if it will increase the frequent occurrence of abnormal data to a cer tain level, it may happen breakdown.

Keywords: Photovoltaic Monitoring System, K-Nearest Neighbor, Error Data Classification, Prediction Error

1. Introduction

In recent years, interest in renewable energy, which can replace fossil fuel depletion and global warming, has increased. Installation cost, location, maintenance and so on, the proportion of solar energy industry is high. As of 2014, the proportion of Photovoltaic industry relative to the total of new and renewable energy is 28%, employment 52%, sales 63% and exports 79% in Korea[1]. However, electricity production in the existing solar energy industry was confirmed only through Giro each month. If there is a problem with the solar panel at the beginning of this month, it will suffer damage if it can not be generated. To solve these problems, we have developed an integrated management monitoring system for renewable energy that can be confirmed from time to time[2]. In this paper, we use data accumulated in system server for one year. The K-Nearest

Neighbor(KNN) algorithm of machine learning was applied to analyze the power plant data in order to predict the failure and to take precautions before any damage occurs.
The composition of this paper is as follows. In Chapter 2, we refer to the integrated renewable energy manage ment monitoring system and the KNN algorithm. In Chapter 3, we refer to training data, and in Chapter 4, we perform data analysis using KNN algorithm. Finally, Chapter 5 discusses the conclusion.

2. Related Work

2.1. New&Renewable Energy Monitoring System

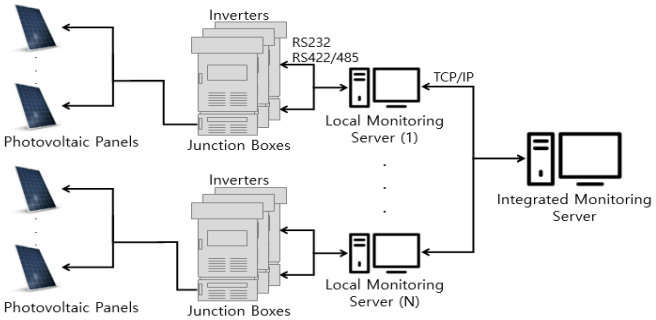

Figure 1 New&Renewable Energy Integrated Monitoring System Structure

Figure 1 is a diagram of the integrated management monitoring system for renewable energy. Converts the light energy gathered in several solar panels into electric energy and connects it to the junction box. The junction box and the inverter are connected, and the inverter sotres the generated energy, the horizontal irradiation dose, the oblique irradiation dose, and the module temperature. This data is stored on the local monitoring server, and serveral local servers transmit data to the integrated monitoring server. The integrated monitoring server stores all data and monitors current power generation, accumulative power generation, and solar radiation on web pages and applications based on this data[2]. In this paper, we analyzed the data stored in the integrated monitoring server.

2.2. K-Nearest Neighbor Algorithm

The K-Nearest neighbor algorithm is based on the already labeled input data, the newly inputdata is given the l abel of k closest data in Euclidean distance. In order of algorithms, we first learn to receive the labeled data an d k. If the number of k is an even number, it may be difficult to classify. Enter the test set. And selects the data of the closest k by the Euclidean distance calculation. The label with the highest number of labels of the select ed data is designated as the label of the test data[3].

3. Training Data

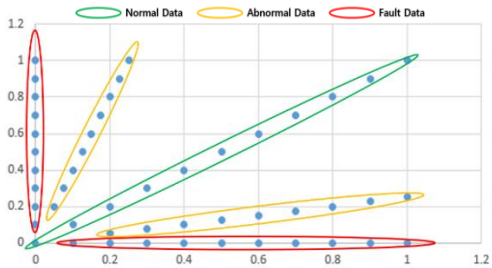

Figure 2 Training Data Graph for Learning

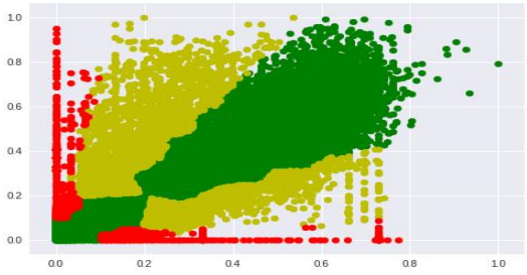

Figure 3 The results of KNN algorithm using tensorflow

In the data learning, we generated ourselves data to classify the normal, abnormal, and fault data for the accurate classification criteria of the training set. Figure 2 is a graph of the training data generated directly. y = x line is normal data, the data in y-intercept and x-intercept are fault data, and the rest data is abnormal data.

4. Application of K-Nearest Neighbor Algorithm

Figure 3 is a result graph of the KNN algorithm application using the tensorflow. The points near the line $\mathbf{y} = \mathbf{x}$ are normal data, the points near the x-intercept and y-intercept are classified as fault data. Finally, the remaini ng points were classified as abnormal data. Overall, the abnormal data range is too wide. In Figure 3, the amou nt of normal data in the coordinates (0.2, 0.2) is too small. This is probably because the normal and abnormal d ata are too close to the learning data.

5. Conclusion

In this paper, we analyzed the error data for the failure prediction using the accumulated data for 1 year in the integrated renewable energy management monitoring system server implemented in the related research. First, we directly generated and labeled the power generation and the slope radiation data. This is for more accurate classification criteria. Second, I learned the generated data. Third, the data was automatically classified by inputting more than 58,000 accumulated test data. As a result, normal, abnormal, and error data seemed to be properly classified, but the classification was inadequate around (0, 0) and (0.2, 0.2) on the coordinates. This is because there are parts that should be classified as normal, not abnormal. We think that the abnormal data was first learned, which is one of the reasons why these results were generated.
In the future, We will classify them more accurately in the future, and use the classified data so that they can b e predicted before a failure occurs and actually be applied in advance.

Acknowledgements:

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Notes