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Forest Fire Detection With Satellite Images For Fire Control

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Abstract

The software is to be developed for automatic detection of forest fires. Fire detection is based on data points collected by NASA's MODIS (Moderate Resolution Imaging Spectro radiometer). The MODIS contains data points which are classified into various bands. This Software is aiming to detect the fire in forest that is on land areas. The band 3 of MODIS is dedicated to lands. Therefore, the data points are processed after extracting the band 3. This algorithm involves masking of water and cloud to get more accurate output. The masking is done to eliminate unwanted disturbance in the satellite image.

Fire detection on satellite images is an important method. 3 classes were industrial sites that can be excluded based on their knows location. This shows that satellite based detection of forest fires has potential for fire control purposes provided that the supply of the mid-infrared satellite data in day time is frequent.

Keywords: *Forestry, Automation, Temperature, Real-time, Wild-fire, Component: Satellite image.*

INTRODUCTION

Software is aiming to detect the fire in forest that is on land areas. The software is to be developed for automatic detection of forest fires. Fire detection is based on data points collected by NASA's MODIS(Moderate Resolution Imaging Spectro radiometer). The MODIS contains data points which are classified into various bands. Modules are Data points, Band selection, image Construction, Cloud and water masking, Fire Detection.[1].Motivation of the paper is to extract relevant band for fire detection, construct image from particular band, land water masking and cloud masking, identify potential fire pixel.

HISTORY & BACKGROUND

NASA's Moderate Resolution Imaging Spectro radiometer (MODIS) active fire products which are the first in a family of remotely sensed fire data sets produced from a new generation of moderate resolution (~1 km), "fire-capable" sensors on-board terrestrial satellites. Since there is use of MODIS algorithm from 2000,the fire detection is easily implemented within the earth. [4].

Fire monitoring means the use of medium resolution satellites (AVHRR, MODIS, TET) for long time series processing and the implementation in user driven applications and services.[2] This paper introduces fire monitoring works of two different projects, namely TIMELINE (TIMe Series Processing of Medium Resolution Earth Observation Data assessing Long Term Dynamics In our Natural Environment) and PHAROS (Project on a Multi-Hazard Open Platform for Satellite Based Downstream Services). It describes the improvement in algorithm and to implement it in user driven applications.

Active fire detection using Landsat-8/OLI data **(**Wilfrid Schroeder , Patricia Oliva). There is increase in data availability in Land-data so new opportunities for fire science and management applications, improve exist resolution satellite fire data sets.[5] Targeting those enhanced capabilities we describe an active fire detection algorithm for use with Landsat-8 Operational Land Imager (OLI) day time and night time data. The approach builds on the fire-sensitive short-wave infrared channel 7 complemented by visible and near-infrared channel 16 data (day time only), while also expanding on the use of multi-temporal analysis to improve pixel classification results.[6]

The Collection 6 MODIS active fire detection algorithm and fire products[2015]**(**Louis Giglio, Wilfrid Schroeder, Christopher O. Justice). We have described improvements in the MODIS active fire detection algorithm, and the associated MOD14 and MYD14 fire products, as part of the MODIS Collection 6 land-product reprocessing activity. The collection 6 algorithm is improvement over the collection 5 algorithm, notice that false alarm is arise from small forest and large fires is arise by thick smoke.[1]

Forest Fire Detection System Reliability Test Using Wireless Sensor Network and OpenMTC Communication Platform(Anton Herutomo, Maman Abdurohman, Novian Anggis Suwastika).[7].Machine to Machine (M2M) communication system has started gaining its real world momentum by the introduction of Internet and mobile technology into this system. Several works use this integrated system into many vertical solutions and bind to one solution platform.One innovation is to use HTTP request.

PROPOSED SYSTEM

K-NEAREST NEIGHBOR CLASSIFICATION

K-nearest neighbors is a simple algorithm that stores all available cases and classifies new cases based on a similarity measure. KNN has been used in statistical estimation and pattern recognition already in the beginning of 1970's as a non-parametric technique.

For Active fire detection use MOD14 algorithm.[8]. The band 3 of MODIS is dedicated to lands. Therefore, the data points are processed after extracting the band 3.This algorithm involves masking of water and cloud to get more accurate output.

Methodology of Proposed system is as follows :

1. Fire detection is based on data points collected by NASA's MODIS.
2. For Active fire detection use MOD14 algorithm.
3. Extracting the band 3.
4. Masking of Water and Cloud.
5. Construct image from particular band.
6. Output can be Latitude and Longitude.

Input and Output

Input : Fire detection is based on data points collected by NASA's MODIS

Band Selection :The band 3 of MODIS is dedicated to lands

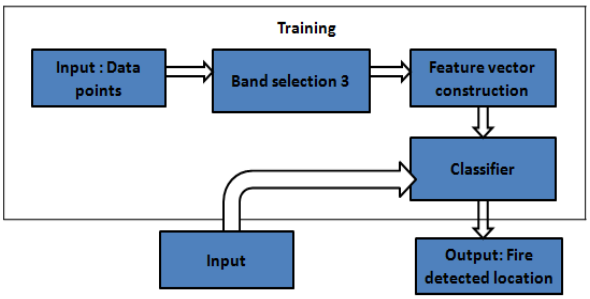

Fig. 1. A. *Block diagram*

Primary Use	Band	Bandwidth[1]	Spectral Radiance[2]	Required SNR[3]
Land/Cloud	1	620- 670	21.8	128
Boundaries	2	841- 876	24.7	201
Land/Cloud	3	459- 479	35.3	243
Properties	4	545- 565	29.0	228
	5	1230- 1250	5.4	74
	6	1628- 1652	7.3	275
	7	2105- 2155	1.0	110
Ocean Color/	8	405- 420	44.9	880
Phytoplankton/	9	438- 448	41.9	838
Biogeochemistry	10	483- 493	32.1	802
	11	526- 536	27.9	754
	12	546- 556	21.0	750
	13	662- 672	9.5	910
	14	673- 683	8.7	1087
	15	743- 753	10.2	586
	16	862- 877	6.2	516
Atmospheric	17	890- 920	10.0	167
Water Vapor	18	931- 941	3.6	57
	19	915- 965	15.0	250

Fig. 1. B. *Data point*

RESULT AND ANALYSIS

Fig. 2. *Fire detected area*

CONCLUSION

Satellite based detection of forest fires has potential for fire control purposes provided that the supply of the mid-infrared satellite data in day time is frequent. Proposed system gives accuracy and also the sensors are not used so the cost is reduced. Fire detection system is detecting fire on land, this can be expanded further for oceans. Satellite fire data sets in support of land science applications in future development.

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