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Algorithm for Detection of Cropping Pattern Analysis of Hisar-I & II Blocks of HISAR District Using Satellite Data & Dip Algorithm Model

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ABSTRACT

Cropping Pattern recognition has its roots in artificial intelligence and is a branch of machine learning that focuses on the recognition of patterns and regularities in data. Data can be in the form of image, text, video or any other format. Under normal scenario, pattern recognition is implemented by first formalizing a problem, explain and at last visualize the pattern. In contrast to pattern matching, pattern recognition algorithms generally provide a fair result for all possible inputs by considering statistical variations. Probabilistic classifiers have supported Agricultural statistical inference for decades. Potential applications of this technique in agriculture are numerous like pattern recognition from satellite imagery, identifying the type of disease from leaf image, weed detection. Agriculture resource is the most important renewable aspect and dynamic natural resource. The present research study reviews Algorithm for Detuction of Analysis in cropping pattern and crop rotation of Hisar-I and Hisar-II blocks, in the context of the developing algorithms and Digital Image Processing Models are used. The Present study deals with the Algorithm (Radiometric, Geometric correction of satellite data and DIP models for cropping pattern like Supervised, Unsupervised and Rule based Classification). Global Positioning System (GPS) used to identify the ground location of cropping pattern and Mx IRS LISS III digital data used to identify the Cropping pattern of Kharif*, rabi and summer seasons* of 2007-08. A rule based approach allows transparent monitoring of performed adaptation actions and gives an important advantage of easily modifiable adaptation process. NDVI of Satellite Images of each date is generated during classification. To improve accuracy, mask technique is used during classification. Season wise cropping pattern maps will be generated. The study successfully is identifying the cropping pattern & Crop Rotation of two blocks of Hisar district.

Keywords: Image processing, Algorithms, Cropping Pattern, Data Compression, NDVI, VI

I. INTRODUCTION

Digital image processing is manipulation of digital images with the help of a computer. A digital image processing system is composed of two parts: Hardware and Software.

Hardware refers to the physical components that make up the system. They include the monitor, central processing unit, secondary storage devices like floppy disk drive, hard disk, scanners etc.

Software refers to the set of programs written in a computer programming language for a particular application. The data are written to some form of storage medium such as tape, disk or CD. Digital image processing is been utilizing in different ways to identify the crop, plant, leaves, flower, fruits etc. as well as to identify the cropping pattern analysis.

Digital image processing is a very popular and rapidly growing area of application under computer science engineering. Its growth leads by technological innovations in the fields of digital imaging, computer processing and mass storage devices. A digital image is a representation of a two dimensional image as a finite set of digital values, called picture elements or pixels. Pixel values typically represent gray levels, colours, heights, opacities etc. Digital image processing encompasses a wide and varied field of applications. Space based satellites generate data in mbits/s with High-resolution cameras. So Data compression techniques are required to reduce the data for storage. Digital images generally contain a significant amount of redundancy, thus image compression techniques take advantage of these redundancies to reduce the number of bits required to represent the image. There are two main kinds of data redundancy on digital images: spatial redundancy and coding redundancy.

The Digital image processing algorithms can be categories into three main functions:

1. Image pre-processing
    I. Radiometric error correction
    II. Geometric error correction
2. Image enhancement
3. Image classification
    I. Supervised Classification
    II. Unsupervised Classification

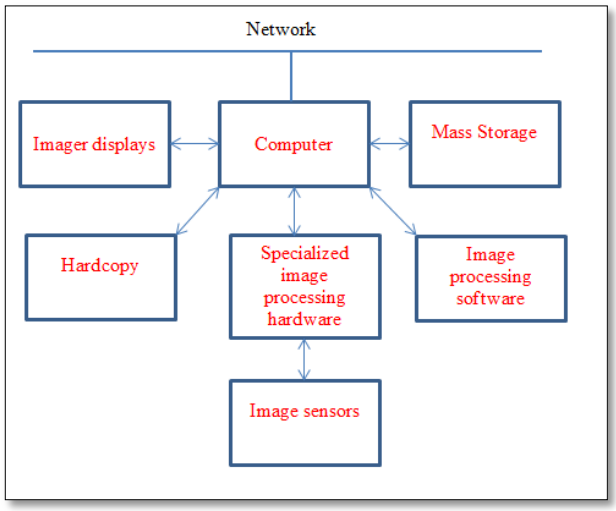
The image classification Methods:

1. Artificial neural network
2. Clustering Method
3. SVM (Servo Vector Machine)

Cropping systems of a region are decided by and large, by a number of soil and climatic parameters which determine overall agro-ecological setting for nourishment and appropriateness of a crop or set of crops for cultivation. Cropping systems experiments tend to emphasize a set of practices corresponding to management system and usually address questions at the field or farm scale.

Geographic Information System modeling capability through analytical functions like overlay, cluster analysis, clumping functions, Reclassification, indexing and spatial searching land use planning can be based. Yield monitoring can be achieved with Geographical Information System technology.

Components of an Image Processing System



The Global Positioning System is yet another geo-informatics tool required for agricultural development and to establish the accurate location of yield data collection.

Agriculture resources are among the most important renewable, dynamic natural resources. Comprehensive, reliable and timely information on agricultural resources is very much necessary for a country like India whose mainstay of the economy is agriculture. *(Balaselvakumar S.)* Agriculture is the backbone of Indian economy, providing the livelihood to about 67.0% of the population and contributing approximately 35.0 per cent to the gross national product *(Roy P. S. 2004)*[2]. The remote sensing is playing a main role in agriculture field.

Instance-based algorithms come under the category of general statistical techniques. Basically they are lazy-learning algorithms, as it delays the generalization or induction process until the classification is achieved (Mitchell, 1997). It requires less computational time during the training process than eagerlearning algorithms. The nearest neighbor algorithm is one of the straightforward instances-based algorithms. Aha (1997) and De Mantaras and Armengol (1998) elaborated briefly about the

instance based classifiers. Cover and Hart (1967) explained K-Nearest Neighbor (KNN) classifier, where the instances in a dataset will generally exist in close propinquity to other instances that have similar properties. The major inadequacy in this classifier is, its large computation time for the classification process. Moreover, the accuracy of KNN can be improved by choosing a suitable distance metric for a given data set.

The crop production in Haryana can be broadly divided into Rabi and Kharif. The major kharif crops of Haryana are rice, jowar, bajra, maize, cotton, jute, sugarcane, sesame and groundnut. The main Rabi crops are wheat, tobacco, gram, linseed, rapeseed and mustard. About 80% of population of the state is agriculture dependent, directly or indirectly. The state of Haryana has a geographical area of 44.20 lakh hectare. About 86% of the geographical area is cultivable, of which 96% has already been brought under plough. Therefore, there is hardly any scope for bringing additional area under cultivation, except for reclamation of degraded lands affected by water logging, salinity and alkalinity. About 84% of the cultivated area in the state is irrigated. The cropping intensity in the state is nearly 170%.

II. LITERATURE REVIEW

Agriculture is the most important aspect to human beings. Climate is challenging to identify the cropping patterns in India.

Groten (1993), Liu & Kogan (2002), Rasmussen (1997) (1), Concluded that there is correlation between NDVI and the green biomass and yield, therefore, NDVI can be used to estimate yield before harvesting.

Raupenstrauch and Selige (1998) (2), Conducted a study on crop rotation analysis using satellite remote sensing for nutrient balance models and risk assessment. They derived crop rotation from multi-temporal crop maps produced by supervised classification of remote sensing data.

Iyalla, T. (2004), (3), Carried out study on Optimizing Agricultural Yields in Nigeria using Remote Sensing, Global Positioning System (GPS) and Geographic Information System (GIS) Technology. Remote sensing techniques are also useful in the determination of the spatial distribution of plant status (health or efficiency) and corollary expected yield by measuring the greenness of the field.

David A. Maluf (2007) (4), Storing vast amounts of multidimensional telemetry data presents a challenge. Telemetry data being relayed from sensors to the ground station comes in the form of text, images, audio, and various other formats. Compressing this data would optimize bandwidth usage during transmission and reduce storage resources needed at the ground level. However, the multitude of heterogeneous data types present in telemetry data and the need for data precision makes compression quite difficult. The application of a single compression technique for all data types usually yields ineffective results.

Uchida S. (2010) (5), Study aimed at the development of method of monitoring paddy planting applicable to areas located in the tropical humid Climatic region. The method was integrated with two steps of procedure. At the first step, land use map was produced which discriminate paddy field using multi-temporal Landsat data. The results showed meaningful improvement in accuracy of discrimination compared to conventional method of land use classification using spectral information of Landsat data.

P. V. Raju & K. V. S. Badrinath (2010) (6), The need for multi-temporal data analysis for delineation of wheat crop has been demonstrated first. It is found that Maximum Likelihood Classification (MLC) with the composite data of multi-temporal images is limited by the problem of large null set containing crop pixels. Therefore, for effective classification of multi-temporal images, two approaches are evaluated: (1) MLC with different strategies—sequential MLC (s_MLC), MLC with Principal Components (pca_MLC) and iterative MLC (i_MLC);

and (2) Artificial Neural Networks (ANN) with back-propagation method.

M. P. Sharma, Manoj Yadav et.al (2011) (7), Analysed Cropping Pattern and Crop rotation with the help of satellite data at block level of Kurukshetra district of Haryana. Multi-date IRS LISS-III data of different seasons for the year 2007-08 have been used for the study. Cropping pattern maps of Rabi, Kharif and Summer season have been generated to know the spatial distribution and associations between crops or crops and fallow land in the same fields (although not in a particular order of sequence). The findings of the study may be used by Department of Agriculture, Haryana for planning of agricultural strategies in the district and for planning agricultural research and extension activities for crop diversification.

Francisco E. Oliva1, Oscar S. Dalmau, and Teresa E. Alarcón (2014) (8), Recognizing different types of crops trough satellite imagery is an important application of Digital Image Processing in Agriculture. A supervised algorithm for identifying different types of crops is proposed. The segmentation stage begins with the assignment of the likelihood of each pixel to belong to each class, which is based on the histogram information. Finally the segmentation is obtained using Gauss-Markov Measure Field. For this research Landsat-5 TM satellite images are used.

Rekha Chahar (2015) (9), Agricultural Image Processing is one of the core application of Image processing is one of the most growing research area that is having its participation in different application areas including the biometric system, biomedical system, etc. One of such application area is the agricultural industry. In this application area, image processing is been utilizing in different ways to identify the crop, plant, leaves, flower, fruits etc. as well as to identify the disease. study of the diseases in agriculture field. Digital image processing is a technique used for enhancement of the image. To improve the agriculture product automatic detection. Many method of used for segmentation in image processing for agriculture field.

Dario Amaya, Alejandra Rojas and Diana Gutierrez (2017) (10), To develop an algorithm to classify the fruit damage caused by the Aonidiella aurantii pest in a Citrus x tangelo crop. With this detection and prediction is intended to provide a tool for estimation of pesticide application doses on the affected plants. The algorithm was capable to identify and classify Citrus x Tangelo fruits, using as parameter the recognized affected surface. After the image segmentation, a new mask was applied to recognize the free A. The main contribution of this system is the implementation of artificial vision methods for detecting affected areas on the surface of the fruit and determines its quality in order to accomplish the task of fruit selection.

Vorgeleft Von (2017) (11), Data products of optical remote sensing systems are increasingly used in many areas of our everyday life. The spatial as well as the spectral resolution of satellite Image data increases steadily with new missions resulting in a higher precision of known procedures and new application scenarios. While the memory capacity requirements can still be fulfilled, the transmission capacity becomes increasingly problematic. Real-time transmission of high-resolution image data is currently not possible.

Lauma Jokste, Janis Grabis(2017) (12), Rule based adaptive systems are growing in popularity and rules have been considered as an effective and elastic way to adapt systems. A rule based approach in classification approach allows transparent monitoring of performed adaptation actions and gives an important advantage of easily modifiable adaptation process.

III. NEED & SCOPE OF RESEARCH WORK OF THE STUDY

India is an agricultural country; wherein about 70% of the population depends on agriculture. Farmers have wide range of diversity to select suitable crops. However, the cultivation of these crops for optimum yield and quality produce is highly technical. It can be improved by the aid of technological support.

Scope of the study:

- Describing the present cropping system with the help of Rules based technique & DIP models.
- Monitoring the long-term changes in the cropping system,
- Evaluation of the long-term effects of present cropping system, and
- Prescribing the alternate cropping system.

IV. PROPOSED WORK OF THE STUDY

- Season wise cropping pattern analysis using DIP algorithms & rule based classification.
- To access the participations of crops among the cultivated area.
- To generate detailed crop pattern and crop rotation maps at block level.
- To spatially re-distribute tabular crop area statistics from a number of spatial data sets.

V. CHALLENGES OF THE STUDY

To increase food security for an increasing population, information is required on current cropping system, and the dynamics of agriculture should be monitored. Cropping pattern and crop rotation maps, including detailed temporal and spatial information, are needed for agriculture management, crop monitoring and food security issues. At regional to global scales, data are either missing or, if available, the information is in most cases outdated and therefore not useful. Moreover, the quality of the available information is variable and often poor. This lack of information on agriculture is the major obstacles hampering efficient policy making and research to achieve food security. Therefore, all countries of the world mainly less developed or developing countries need agriculture management. Cropping pattern, crop rotation, crop yield acreage, productivity and production estimates are important for planning and taking various policy decisions.

VI. REFERENCES

[1]. Lilisand T. M., Ralph W, Chipman J. W. "Remote sensing and Image interpretation" John Wiley and Sons, 2003, 789 pp.

[2]. Sarker, R. A., Talukdar, S. and Haque, A.F.M.A. "Determination of optimum crop mix for crop cultivation in Bangladesh" Applied Mathematical Modelling, 21, 1997, pp 621 – 623.

[3]. Shanwad U. K., Patil V. C. and Gowda H. H. "Precision Farming: Dreams and realities for Indian agriculture" Proceeding of Asian GPS Conference. 2002.

[4]. Von, Vorgelegt. "A reconfigurable Archilecture for Real-Time Image Compression on-board Satellites" Dipl.-Inf. Kristian Manthey geb.in Wolfen, 2017.

[5]. D. Salomon, Data Compression: The Complete Reference, Springer, New York, NY, USA, 4th edition, 2007.

[6]. Faria, Lilian N., Fonseca, Leila M. G. and Costa, Max H.M. "Performance Evaluation of Data Compression Systems Applied to Satellite Imagery" Journal of Electrical and Computer Engineering, volume 2012, Article Id 471857, pages 15