REVIEW ON IMAGE PROCESSING IN WATER RESOURCE MANAGEMENT

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ABSTRACT- With the fast development of the economy, expanding population, huge agricultural division, and developing businesses, the general interest for water in our nation keeps on expanding. Water resources emergency become increasingly genuine. As local water resources development and usage of the most critical issues to tackle water deficiency measures. To address this issue, researchers proposed extraction strategy to separate water from water bodies. Water extraction is the way toward taking water from any source, either incidentally or forever, for flood control or to acquire water for, for instance, irrigation. The separated water could likewise be utilized as drinking water after appropriate treatment. In this paper we checked on different extraction strategies utilizing image processing technique.

Keywords: [Water resources; Water extraction; image processing.]

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1. INTRODUCTION

India has embraced extensive ventures for framework development of enormous dams, stockpiling structures, and channel systems to meet the nation's water and agricultural needs, especially on the side of innovation based intercessions to improve creation of food grains, heartbeats, oilseeds, and vegetables. This is obvious from the enormous increment in budgetary allotment from the eleventh Five-Year Plan contrasted with the twelfth Five-Year Plan in irrigation including Watershed Development (from Rs 243,497 crore to Rs 504,371 crore) and Drinking Water and Sanitation part (from Rs 120,774 crore to Rs 254,952 crore). This progression has helped in accomplishing food and water security to a huge degree, however in numerous regions of less copious surface water, the expanding utilization of water in farming and a developing population has prompted higher and possibly impractical extraction of ground water for irrigation and local needs. Water-sparing and water resources the board proposed by government was a frameworks building, water-sparing and improving water gracefully level was just a portion of logging control. Along these lines, the model required further refinement that through creating Water-sparing agribusiness to forestall and control logging.

Water sparing and water the executives approach has made wonderful progress in the numerous regions, while logging didn't adequately controlled, even endured a genuine environmental monetary issue in numerous desert garden locales. The underneath figure depicts water resources the executives and

powerful use. With the quick development of PC applications to image processing and accessibility of ease image processing frameworks, computerized image processing techniques enhanced by visual interpetation helps will be valuable for successful use of information. Utilization of different computerized image processing alongside utilizing an ease image processing framework for point by point investigation of water extraction techniques is talked about.
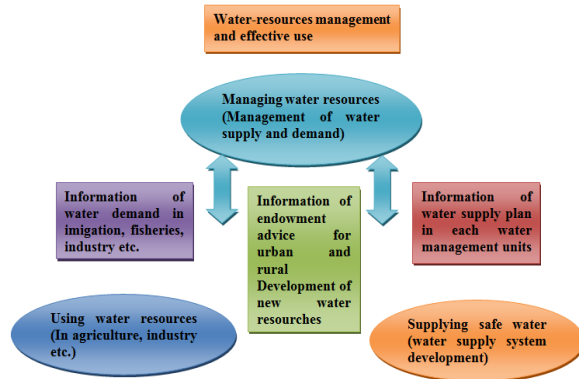

Figure-1 Issues and Concerns regarding Water Resource Management in India

The expanding shortage and weakening in nature of water resources and their administration have featured a few concerns, which should be tended to through the National Water Policy and the State Water Policies there under, just as by the Central and State enactments made in similarity with the arrangements. The significant worries to be tended to incorporate the accompanying:

•   Poor the board of water resources has prompted a basic circumstance in numerous pieces of the nation. Poor or discriminatory access to safe drinking water and sanitation keeps on being an issue in numerous regions, making conditions for social difficulty.

•   The effectively wide worldly and spatial varieties in accessibility and nature of water may increment significantly because of effect of environmental change, exasperating water emergency and increasingly serious occurrences of water-related fiascos, for example, floods, dry spells, and high disintegration.

•   Ground water keeps on being seen as an individual property instead of a network resource. Its extraction and abuse proceeds unjustly and with no thought for its supportability and without satisfactory comprehension of the varieties in underground water quality.

•   The existing irrigation frameworks are deficiently kept up and inadequately oversaw, prompting wastage and under-usage of accessible resources. This has brought about an enlarging hole between the irrigation potential made and used.

•   In numerous pieces of the nation, huge stretches of streams are both vigorously contaminated by untreated modern effluents just as civil sewage and without streams to help sea-going environment, social needs, and style. This is influencing the accessibility of safe water other than causing natural dangers and wellbeing perils.

•   There are various interstate debates on stream water sharing between States, which should be speedily gone to by reevaluating the current institutional set up, for example, the Water Disputes Tribunal at the Center.

•   Holistic and between disciplinary way to deal with water as a resource and to water resource portion related issues is absent.A variety of methodologies for public participation have been developed and potentially useful for water resource management, ranging from unilateral information from government to the general public, to various forms of direct or indirect involvement of stakeholders in the deliberations. Image processing techniques are mostly used in water resource management for exploration, mapping, and monitoring of water resources are a prerequisite for the availability, accessibility, fair utilization, and rational management of water resources in arid and semiarid regions.

Advantages of digital image: ƒ

•   The processing of images is quicker and more practical. One needs less an

ideal opportunity for processing, just as less film and other capturing gear. ƒ

- It is progressively environmental to process images. No processing or fixing synthetic compounds are expected to take and procedure computerized images. Notwithstanding, printing inks are basic when printing computerized images. ƒ
- When shooting a computerized image, one can immidiately check whether the image is acceptable or not. ƒ
- Copying a computerized image is simple, and the nature of the image remains great except if it is compacted. For example, sparing an image as jpg position packs the image. By resaving the image as jpg group, the compacted image will be recompressed, and the nature of the image will deteriorate with each sparing.
- Fixing and correcting of images has gotten simpler. In new Photoshop 7, it is conceivable to smoothe face wrinkles with another Healing Brush Tool in a few seconds.
- The costly proliferation (contrasted and rastering the image with a repro camera) is quicker and less expensive.
- By changing the image arrangement and goals, the image can be utilized in various media.

2. LITERATURE SURVEY

1. **Yudie Wang, Zhiwei Li , Chao Zeng , Gui-Song Xia and Huanfeng Shen** (2020) et.al proposed the OTOP "offline training and online prediction" strategy for urban water extraction. The OTOP technique can not just improve the accuracy of urban water extraction in different environmental backgrounds, yet additionally give an adaptable method to quicken the efficiency of water extraction, to encourage the related investigation into long-term and large-scale urban water monitoring. Hmm gives an incredible data stockpiling and data processing platform, which has free access to Landsat data over the whole time arrangement, and it additionally can rapidly group process large quantities of pictures, paying little mind to reality. Therefore, contrasted and the other methods of urban water extraction, for which it is important to download data for ensuing nearby processing, the OTOP strategy can spare a great deal of time while downloading data and space while storing data. The data processingcan additionally be acted in parallel on GEE, which speaks to a qualitative leap in processing efficiency.

Merits

1. The proposed OTOP strategy, the training of the network is done offline, and the incredible computing execution of GEE is adequate for the part that should be prepared online, with the goal that the entire procedure is free.

2. The OTOP strategy isn't constrained by the TensorFlow framework for the programming language and the building style of the network model, with the goal that it is progressively adaptable and allowed to assemble the favored profound learning model.

3. The proposed strategy can process the accessible satellite pictures with superior, without data download and capacity, and the general execution of urban water extraction in the test territories is likewise higher than that of the modified normalized difference water index (MNDWI) and random woods classifier.

Demerits

1. It is hard to determine the ideal limits for various pictures to successfully distinguish among water and non-water, on the grounds that the ghastly attributes of water fluctuate both spatially and temporally.

2. **LINGKUI MENG, ZHIYUAN ZHANG, WEN ZHANG, JINAN YE, CHENHAN WU, DEQING CHEN, AND CHAO SONG** (2019) et.al proposed another robotized lake and reservoir extraction process (LREP),

which applied the modified two-mode (MTM) technique to separate water from halfway pictures by computing edges in the normalized difference water index (NDWI) and the near-infrared (NIR) band; at that point, they evaluated the division edges from a lot of NDWI limits got for the rest of the pictures. Thusly, a progression of highlight factors was utilized to expel streams, shadows, and lakes. At long last, another shape parameter called multifaceted nature was acquainted with portray the edge characteristics of water bodies, distinguishing lakes and reservoirs from paddy fields and remaining lakes. They checked the calculation utilizing 154 Gaofen-2 pictures covering three urban areas: Liaoyuan, Xianning, and Zigong.

Merits

1. This strategy can possibly monitor an assortment of lakes and reservoirs, including lost lakes, new reservoirs, and surface water quality.

Demerits

1. The unpredictability is acquainted with depict the edge characteristics of reservoirs and lakes and to distinguish them from one another.

3. Dilbar Abduraimova, Dinislom Atakulov, Zaytuna Ibragimova, Tursunoy Apakhodjaeva (2020) et.al dedicated to the issues of monitoring and control in the field of water management, which is the premise of the rational use of water resources (streams), the proficient use of current GIS (geographic information framework) for the viable authority over the condition of water system frameworks. In explores used Landsat satellite data and new data techniques and technologies. Determinate hydraulic and hydrological parameters of flow. The outcomes were contrasted and the data in the field. Their examinations assessed the development of a riverbed utilizing observational data from Landsat pictures and perceptions over some stretch of time. The

effect of erosion and accumulation forms on water management can be found in an accurate evaluation of the measure of water and the causes of water los. This permits us to develop a model of progress in water demand. Accordingly, remote sensing of the distortion forms in the stream will permit us to evaluate the water limit of water system organizes and decide the measure of disfigurement caused by erosion and accumulation forms in the waterway.

Merits

1. Using remote sensing technologies with GIS for examining distortion forms in the streams gives quick, accurate and economically useful distinguishing proof of the procedures during extensive stretch.
2. And it give economize the time and resources to make a reliable and high-quality database.

Demerits

1. Utilizing remote sensing technologies with GIS not fit for long haul Landsat pictures.

4. H. G. Sui, C. Xu (2012) et.al proposed a novel water extraction algorithm consolidate multi-scale level set method with OTSU algorithm. Right off the bat, they brought multi-scale framework into level set method. Multi-scale framework is a method thinking about both worldwide information and nearby information of the image. The general basic information of the image can be kept up at coarse scales and point by point information can be kept at fine scales. In this way, coarser scale extraction results can be utilized as an earlier guide for the better scale, so that not exclusively are the factual properties of the sign goals image considered, yet in addition measurable varieties of multiple goals are misused. In addition, computational multifaceted nature is decreased since a great part of the work can be practiced at coarse goals, where there are essentially less pixels to process. Also, in light of the multi-scale level set framework, the division consequence of

OTSU algorithm is utilized to speak to the underlying division bend. At long last, so as to wipe out the impact of structures shadow and street, post-preparing is considered in this paper. The trials with genuine SAR images exhibit the effectiveness of the new method.

Merits

1. A tale water extraction algorithm consolidate multi-scale level set method with OTSU algorithm remove water from SAR images automatically, accurately and quickly.

Demerits

1. The biggest limitation with Otsu is its assumption of paired classes: It parcels the grayscale histogram to two classes.

5. Fan Yang, Jianhua Guo, Hai Tan and Jingxue Wang (2017) et.al proposed another strategy for urban water extraction from high-resolution remote sensing images. So as to improve the accuracy of water extraction, they improve the NDWI algorithm and propose two new water files, in particular the NNDWI1 which is touchy to turbid water, andNNDWI2 which is delicate to water bodies whose unearthly information is interfered by that of vegetation. They superimpose NNDWI1 and NNDWI2 picture division results, and then use Object-Oriented Technology to distinguish and expel shadows in the little territories, so as to get the conclusive outcomes of urban water extraction. Their trials test the accuracy of algorithms in five urban territories. As per the outcomes, the AUWEM algorithm has more noteworthy water extraction accuracy contrasted and NDWI and the MaxLike, with an average Kappa coefficient of 93% and an average complete blunder pace of about 11.9%. Conversely, the average Kappa coefficient and blunder pace of the MaxLike are about 88.6% and 18.2%, individually; the average Kappa coefficient and mistake pace of NDWI is about 86.2% and 22.1%, separately. Also, AUWEM shows more prominent accuracy when distinguishing water edge and

little streams. It can successfully recognize shadows of high buildings from water bodies to improve the general accuracy. All the more importantly, AUWEM has more steady location accuracy than NDWI has when the edge changes. It can likewise be relevant for other water features extraction, and can be applied to screen and study the changes in water bodies in different spots.

Merits

1. It can adequately recognize shadows of high buildings from water bodies to improve the general accuracy.

Demerits

1. The proposed algorithm has restricted ability for recovering water content information.

6. Kshitij Mishra and P. Rama Chandra Prasad (2015) et.al proposed a programmed way to deal with separate the water body from a Landsat satellite imagery utilizing a perceptron model. Perceptron includes classification dependent on a linear predictor function that merges not many characteristic properties of the article generally known as feature vectors. The feature vectors, joined with the loads, summarize to give a contribution to the yield function which is a binary hard limit function. The feature vector in this examination is a lot of characteristic properties appeared by a pixel of the water body. Low reflectance of water in SWIR band, examination of reflectance in various groups, and an altered standardized contrast water file are utilized as descriptors. The standardized distinction water list is changed to upgrade its range over shallow locales. For this investigation an edge estimation of 2 has been demonstrated as most ideal among the three limit esteems.

Merits

1. The proposed method accurately and immediately separated water from other land cover features.

Demerits

1. The yield estimations of a perceptron can take on just one of two qualities (0 or 1) because of the hard-limit transfer function.

7. Lianjie Qin, Wei Xu, Yugang Tian, Bo Chen and Siyue Wang (2018) et.al introduced A method to remove stream directs in urban environments from a high-goals digital elevation model (DEM). The method utilizes terrain transition lines to delineate channel systems. To start with, terrain transition lines are separated from the DEM. At that point, shallow street trench are expelled dependent on elevation from the terrain transition lines, and at that point, commotion is evacuated using the region growing method. In this manner, a large portion of the street trench are expelled by pixel block expansion, and at that point, the non-channel pixels are evacuated by fitting a quadratic surface. The computational efficiency and accurate localization of waterway channel extraction using the proposed method is shown using light detection and ranging (LiDAR) information for a urban environment in Johnson County, Iowa.

Merits

1. The proposed method is powerful for extracting channels and removing street dump in this urban environment.
2. A potential use of this method is to give the waterway channels required to riverine flood modeling and geomorphological investigations.

Demerits

1. An absence of information in level territories. Trouble in exactly indicating breaks in slope.

8. K.Nithya, R.Shanmugasundaram, N.Santhiyakumari (2017) et.al proposed K-Means Clustering for Study of Salem City Resource Management. The proposed procedure is utilized to investigate the land use and spread districts in Salem during the time of 1973-2014.The pre-handling strategies is utilized in this strategy at first the picture is upgraded by applying the Mean Shift Filter. The target of this study is useful to section the urban areas into land use and land spread locales and correlation is done in year insightful way. The proposed procedure is utilized to study the development and status of urban spread in Salem city. At first pre-preparing is finished with mean shift filtering to diminish clamor and for area smoothing. After that K-means clustering procedure is applied to fragment the pictures into various areas like vegetation area, building area and water body area at that point study the land use changes in Salem district during the time of 1973-2014. It is better for area smoothing contrasted with different procedures. Next, the division is finished utilizing K-Means Clustering and the outcome is acquired.

Merits

1. The proposed method is utilized to break down the land use and spread areas.
2. K-Means is quick, powerful and more obvious. It gives best outcome when data set are separated from one another.

Demerits

k-means clustering limits the Euclidean distance for all the data focuses in the bunch

9. Gordana Kaplan & Ugur Avdan (2017) et.al proposed a pixelbased index and object-based method has been utilized on a Sentinel-2 satellite image. Since pixel-based methods can't separate water from different regions with a low albedo, in this work, we chose to add the NDWI to the object-based method. Combining the two methods for a 10-m-goals image gave results that can't be recovered by utilizing just the pixel-based index or pixel-based classification method. In spite of the fact that pixelbased methods have been utilized for more than two decades and a few enhancements have been made to them, they are less accurate when used for uneven,

blanketed, shady and urban regions. This sort of study can be valuable in any field associated with water observing. It is additionally truly reasonable for use on rocky or some other territory for deciding changes on explicit water bodies. The improvement of water extraction was normal since the objectbased method utilizes not just the multi-spectral characteristics of the images yet in addition extra characteristics characterized by the client. The drawback of NDWI in correlation with the pixel-and objectbased classifications is the utilization of just two bands.

Merits

Pixel-based classification can give generally excellent outcomes for water extraction, however the quantity of classes is significant and it can require some investment.
The greatest favorable position of object-based classification is that it tends to be directed quick and the outcomes are satisfactorily accurate.

Demerits

1. The spectral responses of day office, water, and blue ice, rock and shadow are a major test for the pixel-based classifiers.

10. B. Chandrababu Naik , Prof. B. Anuradha (2018) et.al looked at two different satellite pictures, for example, Landsat-8 and Sentinel-2A for feature extraction of water bodies utilizing different water list methods utilizing NDWI, MNDWI, AWEI, and PCA. The performance of water feature extraction based ISODATA unsupervised classification give great outcomes to both the Landsat-8 and Sentinel-2A satellite data. The most extreme surface water region of Lake was about 394.026 Sq. miles in PCA method and 387.434 Sq. miles in MNDWI method for Landsat-8 picture. The greatest in general classification accuracy of 94.74% and by and large kappa statistics is 0.8869 accomplished in two different satellite pictures.

Merits

1. The PCA and MNDWI water file methods give better outcomes in accuracy assessment analysis utilizing ISODATA unsupervised classification.

Demerits

1. The vast majority of water body extraction improvement files give 1.01% better outcomes in Landsat-8 when contrasted with Sentinel-2A satellite data.

11. AKSHAY KHARADE, MANISHA GENDLE, TEJAL LODHA, DR.M.T. JADHAV (2017) et.al measure the water level utilizing picture processing with the assistance of camera and furthermore show the bearing of water flow utilizing different picture processing methods, for example, pre-processing, segmentation, boundary extraction. In this proposed framework, the water level and location of water flow is measured. A rectangular compartment having two channels and two outlets on inverse side is utilized to alter the course of water flow utilizing the deltas and outlets. A stand is set at the focal point of the holder to hold the bolt and camera. Airfoil is utilized alongside the bolt for the correct flow alignment. Picture is caught by the camera is in the RGB shading space. Camera is instated by the client utilizing the MATLAB code by client. From the RGB shading space just red shading plane is utilized for change to dim scale picture. The essential motivation behind shading space change is to recognize just red shading and keep away from some other shading impedance. This dim scale picture is additionally changed over into the paired picture utilizing thresholding calculation. To identify the item, BLOB (Binary Large Object) examination is utilized. It figures the factual qualities for marked area.

Merits

1. Advantages of this undertaking are it has better efficiency contrasted with previous techniques and as equipment prerequisite is

less it is less exorbitant. Changes can be effectively made by our prerequisite.

Demerits

1.   The restriction is MATLAB is increasingly slow quality relies upon different atmospheric condition.

CONCLUSION

The survey exhibited that in all the cases analyzed image processing techniques in water resource the board. This paper gives the point by point investigation of image processing in water resource the management field for water extraction. All things considered, the qualities and shortcomings, which have risen up out of the cases, permit distinguishing proof of the primary headings of the necessary enhancements.

REFERENCES

[1]. Yudie Wang, Zhiwei Li , Chao Zeng , Gui-Song Xia and Huanfeng Shen (2020), "An Urban Water Extraction Method Combining Deep Learning and Google Earth Engine",
DOI: 10.1109/JSTARS.2020.2971783,   **Print ISSN:** 1939-1404, IEEE.
[2]. LINGKUI MENG, ZHIYUAN ZHANG, WEN ZHANG, JINAN YE, CHENHAN WU, DEQING CHEN, AND CHAO SONG (2019), "An Automatic Extraction Method for Lakes and Reservoirs Using Satellite Images",
DOI: 10.1109/ACCESS.2019.2916148,
Electronic ISSN: 2169-3536, IEEE.
[3]. Dilbar Abduraimova, Dinislom Atakulov, Zaytuna Ibragimova, Tursunoy Apakhodjaeva (2020), "Evaluation of erosion and accumulative process with using Geoinformation systems in water resource management", IEEE.
[4]. H. G. Sui , C. Xu (2012), "AUTOMATIC EXTRACTION OF WATER IN HIGH-RESOLUTION SAR IMAGES BASED ON MULTI-SCALE LEVEL SET METHOD AND OTSU ALGORITHM", International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XXXIX-B7, 2012 XXII ISPRS Congress, 25 August – 01 September 2012, Melbourne, Australia.
[5]. Fan Yang, Jianhua Guo, Hai Tan and Jingxue Wang (2017), "Automated Extraction of Urban Water Bodies from ZY-3 Multi-Spectral Imagery", Water 2017, 9, 144; doi:10.3390/w9020144
www.mdpi.com/journal/water
[6]. Kshitij Mishra and P. Rama Chandra Prasad (2015), "Automatic Extraction of Water Bodies from Landsat Imagery Using Perceptron Model", Hindawi Publishing Corporation Journal of Computational Environmental Sciences Volume 2015, Article ID 903465, 9 pages http://dx.doi.org/10.1155/2015/903465.
[7]. K.Nithya, R. Shanmugasundaram, N. Santhiyakumari (2017), "Study of Salem City Resource Management Using K-Means Clustering",
DOI: 10.1109/ICEDSS.2017.8073663,
Electronic ISBN: 978-1-5090-5555-5, IEEE.
[8]. Gordana Kaplan & Ugur Avdan (2017), "Object-based water body extraction model using Sentinel-2 satellite imagery", ISSN: (Print) 2279-7254 (Online) Journal homepage: http://www.tandfonline.com/loi/tejr20, http://dx.doi.org/10.1080/22797254.2017.1297540, European Journal of Remote Sensing.
[9]. B. Chandrababu Naik , Prof. B. Anuradha (2018), "Water Body Extraction Using Images From Two Different Satellites Over Chilika Lake", International Journal of Electronics Engineering (ISSN: 0973-7383) Volume 10 • Issue 1 pp. 140-145 Jan 2018-June 2018.
[10]. AKSHAY KHARADE, MANISHA GENDLE, TEJAL LODHA, DR.M.T. JADHAV (2017), "WATER LEVEL MEASUREMENT AND DETECTION OF FLOW DIRECTION USING IMAGE PROCESSING", INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY [IJIERT] ISSN: 2394-3696 Conference Proceedings of TECHNO-2K17 (Technical Symposium).

[11]. Lianjie Qin, Wei Xu, Yugang Tian, Bo Chen and Siyue Wang (2018), "A River Channel Extraction Method for Urban Environments Based on Terrain Transition Lines", https://doi.org/10.1029/2018WR023095, 2018 American Geophysical Union.