iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** III **Month of publication:** March 2019

DOI: http://doi.org/10.22214/ijraset.2019.3283

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue III, Mar 2019- Available at www.ijraset.com

Novel Review on Various Resolutions of Satellite Images

Mrs. Pushpa. R. N
Assistant Professor, Department of CSE, JNNCE, SHIVAMOGGA, INDIA

Abstarct: ***Satellite images are used in many fields of research. Resolution is the major issue in these kinds of images. Resolution is one of the important characteristics of an image. Images are transformed in order to obtain high resolution. The eternally increasing range of applications requires quantitative approaches. However, the spectral properties of the fluorescent proteins associated presently accessible set an higher limit to the quantity of molecules which will be detected simultaneously with common research ways. spatial resolution is a live of the realm or size of the smallest dimension on the Earth's surface over that associate independent activity are often created by the detector. it's expressed by the dimensions of the constituent on the bottom in meters. . whenever a picture is nonheritable on film or by a detector, its sensitivity to the magnitude of the magnetic force energy determines the radiometric resolution. Temporal resolution refers to the length of your time it takes for a satellite to finish one entire orbit cycle. It additionally refers to however typically a detector obtains imagination of a selected space. This paper reveals a novel survey approach on various satellite image resolutions along with their essential applications.***
Keywords: RGB, CORONA, LANDSAT

I. INTRODUCTION

Satellite imagery is pictures of Earth or different planets accrued by using imaging satellites operated through governments and groups around the world. Satellite TV for pc imaging corporations promote photos with the aid of licensing them to governments and corporations inclusive of Apple Maps and Google Maps.

Fig 1: Satellite Image

There are 3 basic types of satellite images:

1) *Panchromatic*: The most basic types of satellite imagery were taken by a black-and-white camera mounted to a spacecraft. An enormous example is the CORONA satellite, launched by the United States National Reconnaissance Office in the 1960s. The CORONA mission used several satellites, and it focused regions of the world wherein suspected navy movement turned into taking vicinity.
2) *Multispectral*: RGB files have 3 layers of facts, one which corresponds to the reds in the photograph, any other for the veggies, and a third for the blues. In other phrases, RGB pictures only record visible light. for the reason that 1980s, satellites had been recording colorations beyond the RGB spectrum, which means they're "multispectral." GeoEye-1 is an example of 4-band (RGBN) multi-spectral imagery. The 4th letter, N, refers to a selected wavelength of near-infrared light. in case you buy a GeoEye-1 photo, your record will come with all 4 bands – pink, inexperienced, blue, and close to-infrared. Landsat has up to eight bands.
3) *Hyper Spectral*: These pictures don't just document some bands of light – they file now and again masses of very slim bands. The intention is to cowl the continuous spectrum of mild, as opposed to file it in discrete bands. these forms of photographs tend to be used in more unique packages that I gained cross into right here.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue III, Mar 2019- Available at www.ijraset.com

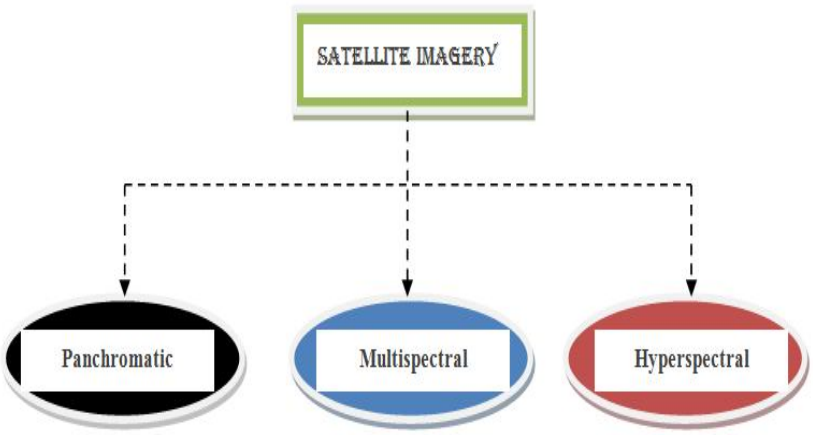


Fig 2: Different Satellite Images

In quick, RGB shade and panchromatic are outstanding for people who are simply inquisitive about figuring out features on the floor now, tracing adjustments inside the landscape through the years, or maybe detecting seasonal version that may replicate the presence of subsurface functions. Multi- and hyper spectral imagery is fine for extra advanced applications that depend upon diffused changes in vegetation boom.

Satellite TV for pc image processing has an excellent application in destiny and may be used for analysis of diverse pictures taken from satellites and air crafts of ground. far flung sensing gives a cost-powerful approach for mapping and monitoring broad regions, and has the gain that the spread of illnesses consisting of dieback is not better by way of remote tracking. Archived facts can be used to reveal how regions have modified thru time. The method is based upon simple ideas, easy to recognize and clean to put into effect and use.

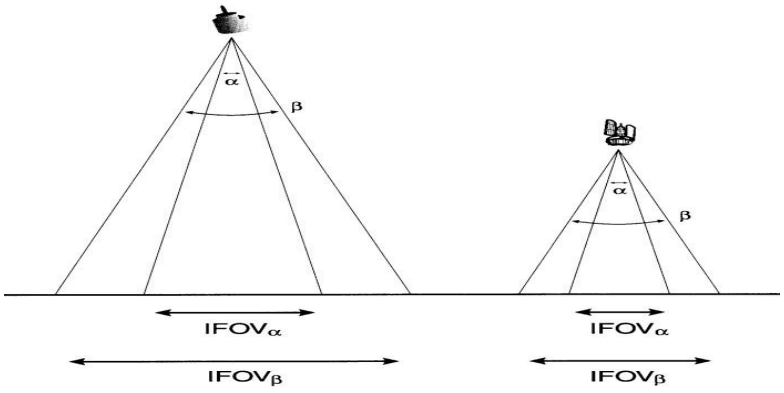


Fig.3. IFOV variation with angle of view and altitude of the sensor

The size of the region viewed on the ground can be obtained by multiplying the IFOV (in radians) by the remoteness from the ground to the sensor. This region on the ground is called the ground resolution or ground resolution cell. It is also referred as the spatial resolution of the remote sensing system.

II. SPATIAL RESOLUTION

Spatial resolution is defined because the measure of how closely traces may be resolved in an photo is referred to as spatial decision, and it depends on houses of the gadget growing the photograph, no longer just the pixel decision in pixels in line with inch (ppi).For realistic functions the clarity of the picture is decided by its spatial resolution, no longer the wide variety of pixels in an photo. Spatial decision describes how plenty element in a photographic photograph is seen to the human eye. The potential to "resolve," or separate, small info is one manner of describing what we call spatial decision.

Spatial resolution of pictures received via satellite tv for pc sensor systems is usually expressed in meters. for example, we frequently talk of Landsat as having “30-Meter" resolution, which means that two items, thirty meters lengthy or wide, sitting facet by side, can be separated (resolved) on a Landsat photograph.

Fig.4 Examples of a coarse resolution and a fine resolution image

To compute the size of pixel is given by the Instantaneous Field of View (IFOV). The IFOV is the raw-boned cone of visibility of the sensor, or the area on the Earth's face that is seen at one particular instant of time. IFOV is reliant on the altitude of the sensor above the ground level and the viewing angle of the sensor.

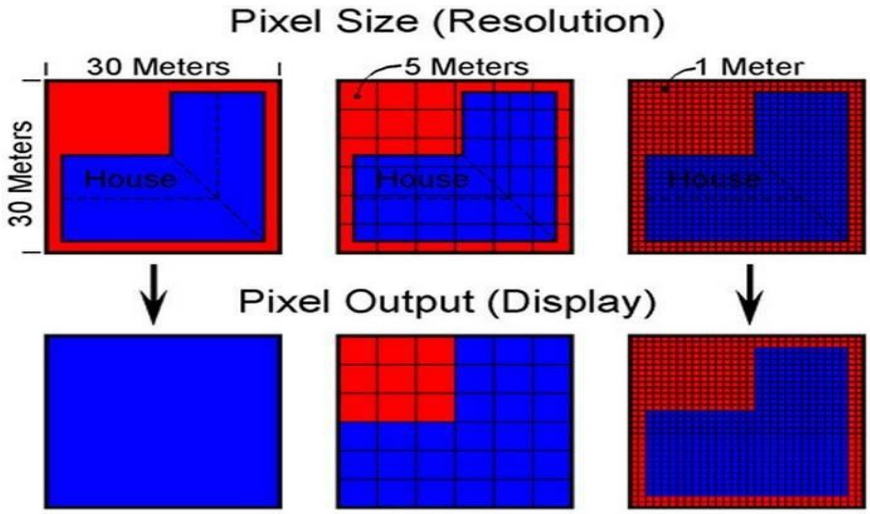


Fig. 5. Schematic representation of feature identification at different spatial resolutions

Fig. 5 gives an instance of the way the identity of a function (a residence in this situation) varies with spatial resolution. In the example, for the 30m decision photo, the signature from the "house" dominates for the cell and as a result the entire cellular is classified as "residence". however, within the fine decision pix, the form and the spatial quantity of the characteristic is better captured. in the 5m resolution photo, alongside the boundary of the function, a number of the cells which might be partly protected beneath the feature are categorised as "house" based totally at the dominance of the indicators from the characteristic. within the very high-quality resolution photograph, the characteristic form and the spatial volume is greater exactly diagnosed.

III. TEMPORAL RESOLUTION

Temporal decision is described with the aid of the amount of time (e.g. days) that passes between imagery series periods for a given surface location. Temporal decision describes the range of times an item is sampled or how frequently facts are obtained for the same region the absolute temporal decision of a remote sensing gadget to picture the same vicinity at the same viewing angle a 2d time is same to the repeat cycle of a satellite tv for pc. The repeat cycle of a close to polar orbiting satellite tv for pc is typically several days, for Land sat it's miles 16 days. but due to the off-nadir viewing capabilities of the sensors and the facet lap of the satellite tv for pc swaths inside the adjacent orbits the actual revisit length is in well known much less than the repeat cycle. The actual temporal decision of a sensor consequently depends on an expansion of factors, along with the satellite/sensor capabilities, the swath overlap, and range.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue III, Mar 2019- Available at www.ijraset.com

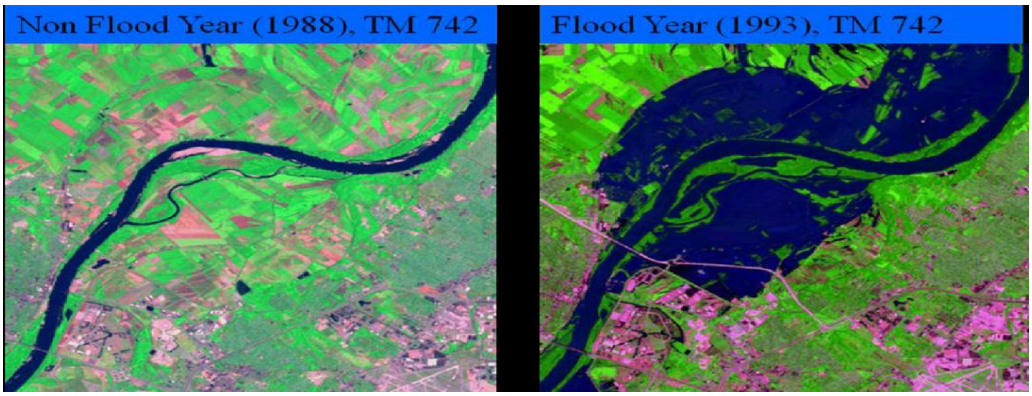


Fig.6Land sat TM images of the Mississippi River during non-flood period and during the great flood of 1993.

IV. RADIOMETRIC RESOLUTION

Radiometric decision is defined because the capability of an imaging machine to record many levels of brightness (evaluation as an example) and to the powerful bit-intensity of the sensor. Radiometric resolution refers to how an awful lot statistics is in a pixel and is expressed in gadgets of bits. An unmarried bit of statistics represents a binary choice of sure or no, with a mathematical cost of 1 or 0. Normal Black & White pix from a source including a digital camera are 8 bits, meaning the information is represented with a fee of zero-255 or 256 in overall. In contrast, a colour image is represented the usage of three channels, red-green-Blue, and each channel is 8 bits, equalling 24 bits of data. people visualize colourings as a aggregate of the 3 number one colours, crimson, inexperienced, and blue. Every shade and corresponding color is represented using a mixture of those three primary colourings and the intensity of each colour. A value of 0 in the blue channel approach that pixel is black. If the fee of a pixel in blue channel is 255, it way that the pixel is shiny blue. So if a blue channel pixel has a radiometric resolution of eight bits, there will 256 shades of blue. A radiometric resolution of eleven manner the pixel has 2048 feasible intensities of blue, 12 bit resolution represents 4096 sun shades of blue, and 14 bits represent sixteen,384 sun shades of blue.

Fig.8 8-Bits Collected Radiometric Resolution

V. SPECTRAL RESOLUTION

Spectral represents the spectral band width of the clear out and the sensitiveness of the detector. The spectral resolution may be defined because the capacity of a sensor to outline high-quality wavelength periods or the capacity of a sensor to resolve the strength acquired in a spectral bandwidth to symbolize unique parts of earth floor. The finer the spectral decision, the narrower the wavelengths variety for a particular channel or band.

Many faraway sensing systems are multi-spectral, that report strength over separate wavelength stages at numerous spectral resolutions. for example IRS LISS-III makes use of 4 bands: zero.52-0.fifty nine (green), zero. Sixty two-zero.68 (purple), zero.77-0.86 (near IR) and 1.fifty five-1.70 (mid-IR). The Aqua/Terra MODIS devices use 36 spectral bands, which include three in the seen spectrum. Recent development is the hyper-spectral sensors, which detect hundreds of very narrow spectral bands as shown below:

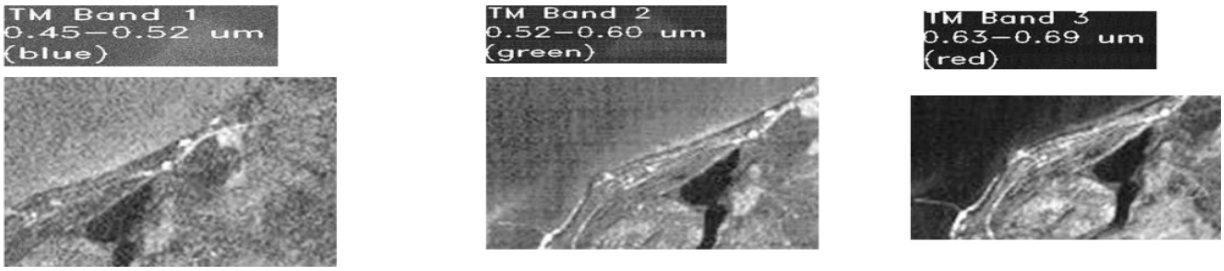


Fig.7 Landsat TM images of an area recorded in different spectral bands

The Landsat application is the longest-running organization for acquisition of satellite imagery of Earth. The most latest, Landsat eight, become launched on February eleven, 2013. The contraptions at the Landsat satellites have obtained thousands and thousands of pics. The photographs, archived within the united states of America and at Landsat receiving stations around the arena, are a unique aid for international change studies and applications .under is a unique comparison of numerous satellite tv for pc photographs resolutions with Landsat satellite tv for pc sensors.

Comparison of Landsat Sensors

	Thematic Mapper (TM) Landsat 4 and 5	Enhanced Thematic Mapper Plus (ETM+) Landsat 7	Multispectral Scanner (MSS) Landsat 1-5
Spectral Resolution (µm)	1. 0.45-0.52 (B) 2. 0.52-0.60 (G) 3. 0.63-0.69 (R) 4. 0.76-0.90 (NIR) 5. 1.55-1.75 (MIR) 6. 2.08-2.35 (MIR) 7. 10.4-12.5 (TIR)	1. 0.45-0.52 2. 0.53-0.61 3. 0.63-0.69 4. 0.78-0.90 5. 1.55-1.75 6. 2.09-2.35 7. 10.4-12.5 8. 0.52-0.90 (Pan)	0.5-0.6 (green) 0.6-0.7 (red) 0.7-0.8 (NIR) 0.8-1.1 (NIR)
Spatial Resolution (meter)	30 x 30 120 x 120 (TIR)	15 x 15 (Pan) 30 x 30 60 x 60 (TIR)	79 x 79
Temporal Resolution (revisit in days)	16	16	18
Spatial coverage (km)	185 x 185	183 x 170	185 x 185
Altitude (km)	705	705	915 (Landsat 1,2,3)

Table.1 Comparisons of Landsat Sensors

VI. APPLICATIONS

The majority of remote sensing work has been focused on natural environments over the past decades. Applying remote sensing technology to urban areas is quite new. With the advent of high resolution imagery and more capable techniques, urban remote sensing is rapidly gaining interest in the remote sensing community as it includes wide area of applications as listed below:

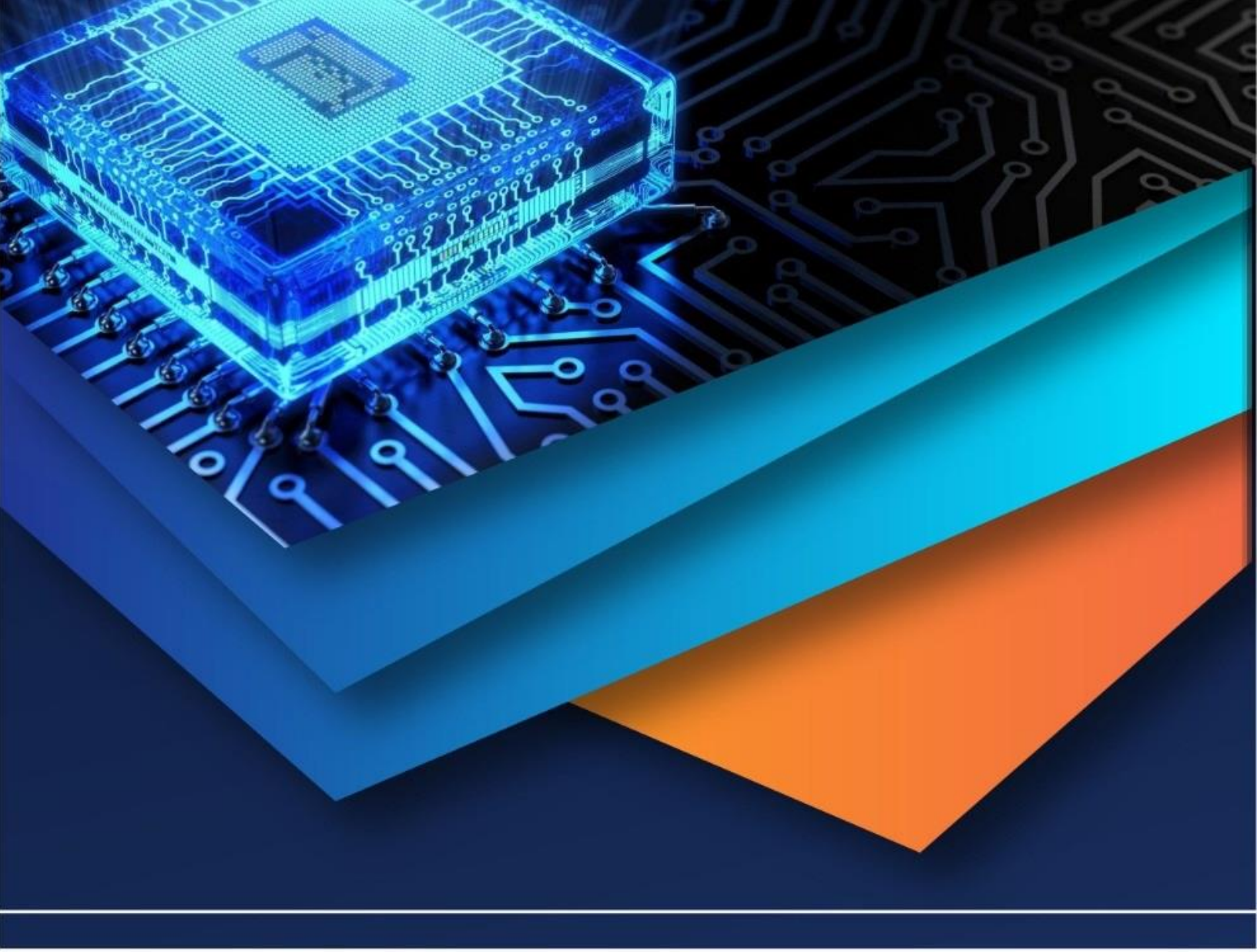
- Weather information
- For forest Inventory
- Border Security
- Crop growth
- Disease Identification
- Weed/pest infestation
- Flora and fauna feature extraction
- Land form Monitoring
- Wetland delineation
- Yield application
- Coastal mapping
- Resource mapping
- For forest Inventory
- Border Security
- Crop growth
- Disease Identification
- Weed/pest infestation
- Flora and fauna feature extraction
- Land form Monitoring
- Urban planning
- Forest application
- Weapon monitoring
- Volumetric change calculation
- Visual Inspection
- Hydrological Monitoring
- Relative soil moisture
- Species Differentiation
- Wave height and wind speed
- Vegetation and soil wetness
- Updating road maps
- Crop heath analysis
- Telecommunication mapping
- Disaster mapping and monitoring

VII. CONCLUSION

Faraway sensing presents a value-effective method for mapping and tracking extensive areas, and has the advantage that the unfold of diseases including dieback isn't greater by using faraway monitoring. Satellite TV for pc image processing has an amazing application in destiny and can be used for evaluation of diverse photographs taken from satellites and air craft's of ground. Archived statistics can be used to reveal how areas have changed thru time. The technique is based upon simple principles, smooth to recognize and smooth to put in force and use.

REFERENCES

[1] Ishpreet Kaur, NirvairNeeru,"A Study Of Remote Sensing Using Image Fusion: A Review", International Journal Of Advanced Research In Computer Science,Issn-No 0976-5697, July – August 2017.
[2] Lu Zhuo, Dawei Han "Multi-Source Hydrological Soil Moisture State Estimation Using Data Fusion Optimisation",Hydrol. Earth Syst. Sci., 21, 3267–3285, 2017.
[3] Santosh NepaL, Wolfgang-Albert Flügel, Peter Krause, Manfred Fink,Christian Fischer,"Assessment Of Spatial Transferability Of Process-Based Hydrological Model Parameters In Two Neighbouring Catchments In The Himalayan Region",WileyArticle,Hydrological Processes 31:2812-2826, 2017.
[4] Yassine Bouslihim, IliasKacimi, HassaneBrirhet, Mourad Khatati, AichaRochdi,Namira E AmraniPazza, AbdelhalimMiftah, Zainab Yaslo,"Hydrologic Modeling Using Swat And Gis,Application To Subwatershed Bab-Merzouka(Sebou, Morocco)",Journal Of Geographic Information System, 8, 20-27 2016
[5] ImeneDiabiSkhakhfa, LahbaciOuerdachi ,"Hydrological Modelling Of Wadi Ressoul Watershed, Algeria, By Hec-HmsModel",Journal Of Water And Land Development,PlIssn 1429-7426,2016.
[6] LiekeMelsen, AdriaanTeuling, Paul Torfs, Massimiliano Zappa, Naoki Mizukami, Martyn Clark3, And RemkoUijlenhoet,"Representation of Spatial and Temporal Variability In Large-Domain Hydrological Models: Case Study For A Mesoscale Pre-Alpine Basin" Hydrology And Earth System Sciences,2207-2226,2016.
[7] Gayathri K Devi, Ganasri B P, Dwarakish G S,"A Review on Hydrological Models",International Conference On Water Resources, Coastal And Ocean Engineering (Icwrcoe 2015).
[8] M. S. Lavreniuk,S. V. Skakun,A. Ju. Shelestov,B. Ya. Yalimov,Udc 004.62, 004.67S. L. Yanchevskii,4 D. Ju. Yaschuk,1†† And A. Ì. Kosteckiy1," Large-Scale Classification Of Land Cover Using Retrospective Satellite Data",Cybernetics And Systems Analysis, Vol. 52, No. 1, January, 2016.
[9] David Rohde, Jonathan Corcoran,"Graphical Tools For Conditional Probabilistic Exploration Of Multivariate Spatial Datasets",Computers,Environment And Urban System,Elsevier 2012.
[10] A'kif Al-Fugara,Rida Al-Adamat , Omar Al-Kouri , Saleh Taher,"Dsm Derived Stereo Pair Photogrammetry:Multitemporal Morphometric Analysis Of A Quarry In Karst Terrain.",The Egyptian Journal Of Remote Sensing And Space Sciences, Elsevier 2016.
[11] ArzuErener, SebnemDüzgün, Ahmet CevdetYalciner ,"Evaluating Land Use/Cover Change With Temporal Satellite Data And Information Systems",Elsevier 2011.
[12] Ahire Rina B,Prof. V. S. Patil,"Overview Of Satellite Image Resolution Enhancement Techniques",Ieee 2013.
[13] S. John Nisha Anita, C. John Moses," Survey On Pixel Level Image Fusion Techniques",Ieee International Conference On Emerging Trends In Computing, Communication And Nanotechnology (Iceccn)Ieee13 June 2013.
[14] Harmandeep Kaur, Jyoti Rani,"Image Fusion On Digital Images Using Laplacian Pyramid With Dwt", Image Information Processing (Iciip), Ieee 2015
[15] Saranya G, S. Nirmala Devi,"Performance Evaluation For Image Fusion Technique In Medical Images Using Spatial And Transform Method",Wireless Communications, Signal Processing And Networking (Wispnet),Ieee 2016.
[16] D. N. Moriasi, B. N. Wilson, K. R. Douglas-Mankin, J. G. Arnold, P. H. Gowda,"Hydrologic And Water Quality Models:Use, Calibration, And Validation",American Society Of Agricultural And Biological Engineers Issn 2151-0032,2012.
[17] C. Gläßer∗, D. Thürkow, Ch. Dette, S. Scheue,"The Development Of An Integrated Technical–Methodical Approach To Visualise Hydrological Processes In An Exemplary Post-Mining Area In Central Germany",Isprs Journal Of Photogrammetry And Remote Sensing,Elsevier 65 (2010) 275–281
[18] R.Thriveni,Dr.Ramashri,"Satellite Image Enhancement Using Discrete Wavelet Transform And Threshold Decomposition Driven Morphological Filter",International Conference On Computer Communication And Informatics (Iccci-2013)
[19] Bo Huang ,Hankui Zhang , Huihui Song , Juan Wang &Chunqiao Song,"Unified Fusion Of Remote-Sensing Imagery:Generating Simultaneously High-ResolutionSynthetic Spatial–Temporal–Spectral EarthObservations",Remote Sensing Letters,Issn: 2150-704x,2013.
[20] Xiaoqin Wang, Xiangan Chen, Lu Li,"Spatial And Temporal Image Fusion For Time Series Modis Data AndMulti-Sensors Medium Resoultion Data",Igarss,Ieee 2014



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY