

TRANSFORMATION OF IMAGE FOR GIS APPLICATIONS

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Abstract: Image Transformation means taking an image as input and giving an image as output with similar or entirely different features by applying required transformations. There are different types of transformations like affine transformation Fourier transformations etc. Image transformations is playing vital role in many fields of study these days, one of them is in Geographical Information System(GIS).A Geographic Information System or Geographical Information System (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data .In GIS images are taken through different sources, which need to be transformed for getting required information, The following software helps in transforming an image using different function to get the required data from the image .Software can handle conversion of one format to another ,scaling of the image, resizing of the image, cropping of the image, slicing of the image, changing the projection of the image from one projection to another and translation of image by using control points. All these transformation are very important in GIS field for getting the required data from the image .Software can apply these type of transformations not only on single image but also on batch of images at once, but at one time only one type of transformation can be applied to the batch files.

Key Words: Geographical Information System (GIS), gdal, Image magick Image Transformation

I. INTRODUCTION

The image transformation defines arithmetic operations on images which converts image one representation to another with similar or different features. The system would perform processing on an image which in turn generates processed image by applying transformation functions such as affine transformation, Fourier transformation, Hough transform and Radon transform...etc. The image transformations is playing vital role in many fields of study these days, one of them is in Geographical Information System(GIS).A Geographic Information System (GIS) is designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data. In GIS images are taken through different sources, which need to be transformed for getting required information. There are many software tools are present in market today which convert required data from the given image. These software functions handle for conversion process such as image scaling, image resizing, image cropping, changing projections of image and also image translation by using control points. All these transformation are very important in GIS field for getting the required data from the image. These types of image transformation not only restricted to single image but also can apply for a batch of images. This software is developed using .NET framework and gdal and image magick libraries used are as functions. This paper presents transformation of required images are processed through software functions for GIS applications.

1.1 Purpose

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This project image transformation document is intended to specify the functional, non-functional requirements which mainly targeting technical personnel such as the project supervisors, engineers and lecturers. This document would also be considered as the basis for the design and test specification document for our GIS System.

1.2 Scope

This paper covers the all requirements of image transformation for end user and final output of the GIS system as per the set of inputs given by the end user. The scope of this paper will be limited to describing features of the software and constraints to be met, and therefore will not go into detail on any specific programming languages, development tools or design specifications. The software which is transforming images based on the set of inputs and generates output based on options given by end user.

II. IMAGE CONVERSIONS AND IMPLEMENTATION TECHNIQUES:

2.1 Converting Image from One format to another:

It converts the image into any format; add the extension of the file format in the ending of the destination file name.

The path executable file for converting image is given below:



|.exe file| |source file path| |destination file path|

(Conversion of jpg to png):-

Magick (.exe file) d:\ex\tra.jpg(source file path) d:\ex\tra1.png(dest file path)

i.e.:- magick D:\ex\tra.jpg d:\ex\tra1.png



 tra	Type: JPEG image Dimensions: 800 x 553	Date taken: 5/21/2006 4:31 PM Size: 148 KB
 tra1	Type: PNG image Dimensions: 800 x 553	Size: 765 KB

2.2 Resizing / scaling the image:

It Decreases the size of the File/Image.

The path of executable file for Resizing / scaling the image is given below:

|.exe file| |source file path| -resize |dimensions or % ||destination file path|

i.e :- magick(.exe file) d:/ex/tra.jpg(source file path) -resize 60x40(height & width) d:/ex/tra2.png(dest file pat magick d:/ex/tra.jpg -resize 60x40 d:/ex/tra2.png



tra.jpg



tra2.png(60x40)

magick (.exe file) d:/ex/tra.jpg (source file path) -resize 50%(percentage) d:/ex/tra3.png(dest file path)

i.e:- magick d:/ex/tra.jpg -resize 50% d:/ex/tra3.png



tra.jpg



tra3.png(50%)

2.3 Image Rotation:

In this image Rotation we have 2 techniques

- i) Without Background.
- ii) With Background.

Without background:

It rotates the image without background.

The path of executable file for image Rotation is given below:

|.exe file| |source file path| -distort SRT |Angle| |destination file path|

magick(.exe file) d:\ex\tra.jpg (source file path) -distort SRT 120(angle) d:\ex\tra4.jpg (dest file path)

i.e :- magick d:\ex\tra.jpg -distort SRT 180 d:\ex\tra4.jpg



original image



after rotation

With background:

It rotates the image with background.

The path of executable file:

|.exe file| |source file path| -virtual-pixel black +distort SRT |Angle| |destination file path|

Magick (.exe file) d:\ex\tra.jpg (source file path) -virtual-pixel black +distort SRT 20(angle)

d:\ex\tra6.jpg (dest file path)

i.e :- magick d:\ex\tra.jpg -virtual-pixel black +distort SRT 20 d:\ex\tra6.jpg



Original image



After rotation (with background)

2.4 Cropping Of Image:

It Crops the Image.

The path of Executable File:

|.exe file| |source file path| -crop |dimensions||destination file path|

Magick(.exe file) d:\ex\tra.jpg(source file path) -crop 40x30(final size of the image)+10+10(x and y

offset d:\ex\tra7.jpg (dest file path)

i.e:- magick d:\ex\tra.jpg -crop 350x225+100+100 d:\ex\tra7.jpg



tra.jpg



tra7.jpg (cropped)

To find image coordinates:

<https://inkplant.com/tools/image-Coordinates?>

Point Based Translations:

Three points based transformations:

The path of Executable File:

|.exe file| |source file path| -distort Affine |"src pt,dest pt"||destination file path|

Magick(.exe file) d:\ex\rose55.jpg(source file path) -distort Affine "3.5,60.5 3.5,60.5 32.5,60.5

32.5,60.5 3.5,30.5 33.5,20.5"("src pt1,dest pt1 src pt2,dest pt2 . . . scr pt n,dest pt n")

d:\ex\rose3p.jpg(dest file path)

Affine:-

i.e: magick d:\ex\rose55.jpg -distort Affine "70,60 85,90 120,100 130,105 150,145 160,145"

d:\ex\rose3p.jpg



LABEL.PNG



LABEL_AXIS_DISTORT.PNG

Perspective:-

i.e: magick d:\ex/build.jpg -alpha Set -virtual-pixel transparent -distort Perspective "7,40 4,30 4,124

4,123 85,122 100,123 85,2 100,30" d:\ex/trans2.jpg



BUILD.JPG



TRANS1.JPG



rose55.jpg



rose3per.jpg



BUILDING_PERS.PNG



BUILDING_PERS_REV.PNG

Four points based transformations:

The Path of Executable code:

|.exe file| |source file path| -distort Affine |"src pt,dest pt"||destination file path|

Magick(.exe file) d:\ex\build.jpg(source file path) -alpha Set -virtual -pixel transparent -distort perspective "7,40 4,30 4,124 4,123 85,122 100,123 85,2 100,30"("src pt1,dest pt1 src pt2,dest pt2 . . . src pt n,dest pt n") d:\ex\rose3p.jpg(dest file path)

i.e:- magick d:\ex\build.jpg(src path) -alpha Set -virtual-pixel transparent -distort Perspective "7,40 4,30 4,124 4,123 85,122 100,123 85,2 100,30" d:\ex\buil4p.png(dest path)



Build.jpg



buil4p.jpg

magick d:\ex\tra.jpg -alpha Set -virtual-pixel transparent -distort Affine "70,60 85,90 120,100 130,105 150,145 160,145 180,170 195,178" d:\ex\rose4pp.png



2.5 Slicing Of Image:

It slice/crops the image.

The Pathe of Executable Code:

|.exe file| |source file path| -crop |dimensions||destination file path|

Magick(.exe file) d:/ex/build.jpg(source file path) -crop 3x3(final size of the image)as equal as possible(@) +repage +adjoin d:/ex/build.jpg(dest file path)

i.e:- magick d:/ex/build.jpg -crop 3x3@ +repage +adjoin d:/ex/buid.pg



Build.jpg



Build-(0-8).jpg

Re-projections using GDAL:

The Pathe of Executable Code:

|.exe file| |t buffer| |projection type||source file path| destination file path|

gdalwarp (.exe file) -t_srs(buffer) "+proj=utm +zone=44 +datum=WGS84"(projection
D:\ImageTransformation-Intern\Sample_Tiff_Files\it.tiff D:\Imagetransformation-
Intern\Sample_Tiff_Files\sam.tiff

gdalwarp -s_srs "+proj=longlat +ellps=WGS84 +datum=WGS84" -t_srs "+proj=utm +zone=33
+ellps=GRS80" D:\ex\sa.tif D:\ex\sam.tif

[policy.xml](#)

Configure ImageMagick policies.

By default any coder, delegate, filter, or file path is permitted. Use a policy to deny access to, for example, the MPEG video delegate, or permit reading images from a file system but deny writing to that same file system. Or use the resource policy to set resource limits. Policies are useful for multi-user servers that want to limit the overall impact ImageMagick has on the system. For example, to limit the maximum image size in memory to 100MB:

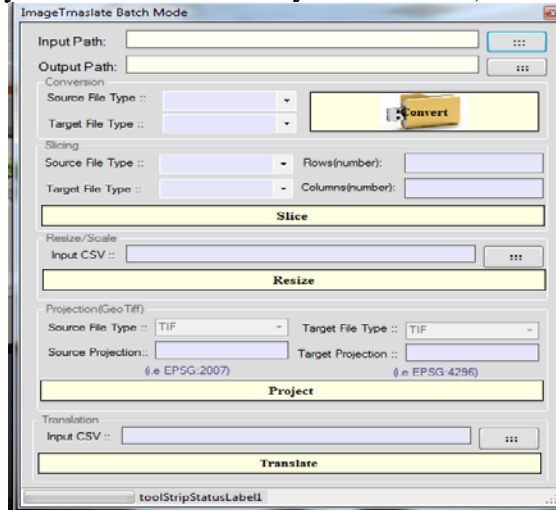
```
<policy domain="resource" name="area" value="100MB"/>
```

Any image larger than this area limit is cached to disk rather than memory.

To limit the elapsed time of any ImageMagick command to 5 minutes, use this policy:

```
<policy domain="resource" name="time" value="300"/>
```

Define arguments for the memory, map, area, and disk resources with SI prefixes (e.g 100MB). In addition, resource policies are maximums for each instance of ImageMagick (e.g. policy memory limit 1GB, -limit 2GB exceeds policy maximum so memory limit is 1GB).



II. GENERAL USAGE

Image Translate Application can be used for conversion of Images in a folder from one format to another, images can be sliced to a number of images, can be resized into different dimensions, and Images can be projected to different projection systems and can translate images based on the control points.

User Interface:-

The general user interface of the application is as follows:-

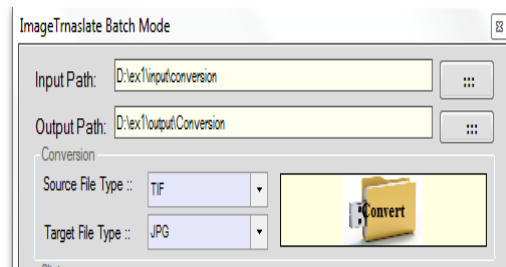
3.1. Conversion Of Images From one Format to Another

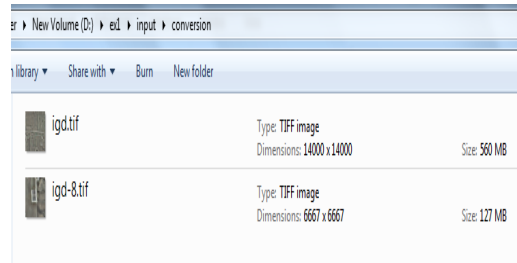
For conversion of image from one format to another Follow these steps:-

- 1-->Select Input Images folder path
- 2-->Select Output Images folder path
- 3-->Select the file type of the images in the input folder
- 4--> Select the required source file type of the images in the output folder
- 5-->Click convert button.

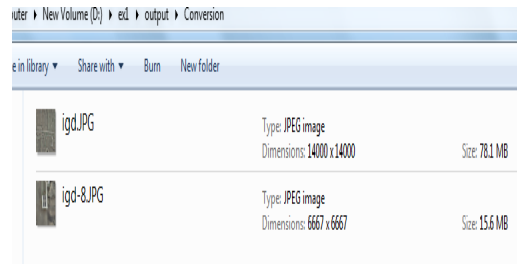
Example for the following procedure:-

Input:-





Output:-



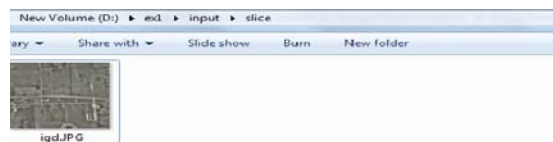
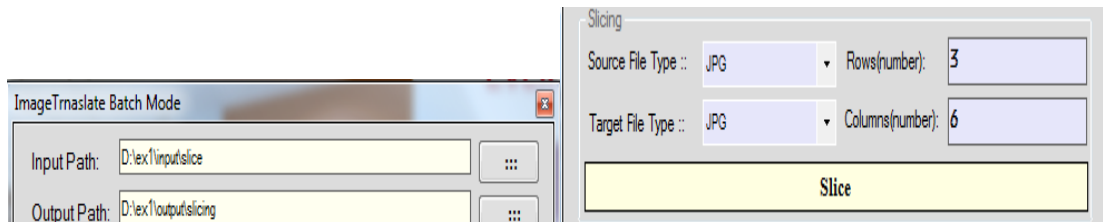
3.2. Slicing of the Images

For slicing of the image Follow these steps:-

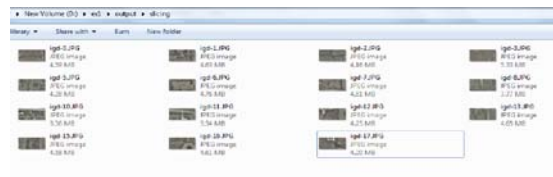
- 1-->Select Input Images folder path
- 2-->Select Output Images folder path
- 3-->Select the file type of the images in the input folder
- 4--> Select the required source file type of the images in the output folder
- 5-->Enter the number of rows and columns you want the image to be sliced
- 7-->Click slice button.

Example for the following procedure:-

Input :



Output:-



3.3. Resizing Of Images

For resizing of the images Follow these steps:-

- 1-->Select the input CSV file path
 - The CSV file should contain the following variables:-
 - a-->The input file path.

b-->height of the output image

c-->width of the output image

d-->The output path files type

Note: each of the variables should be separated by “,”

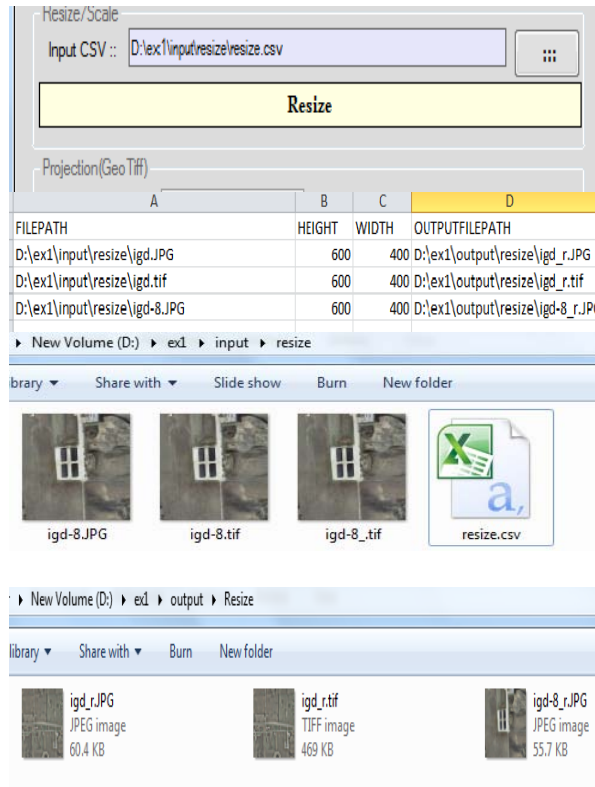
Example:-

D:\ex1\input\resize\igd.JPG ,600 ,400 ,D:\ex1\output\resize\igd_r.JPG

2-->Click resize button.

Example for the following procedure:-

Input:



Output:-

3.4. Projecting the image into different Projection System

For projection of the image Follow these steps:-

1-->Select Input Images folder path

2-->Select Output Images folder path

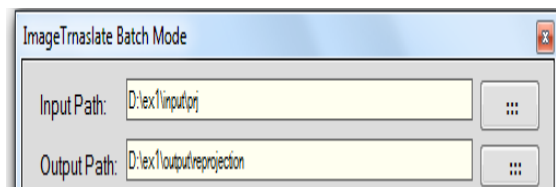
3-->Enter the source and target projection values

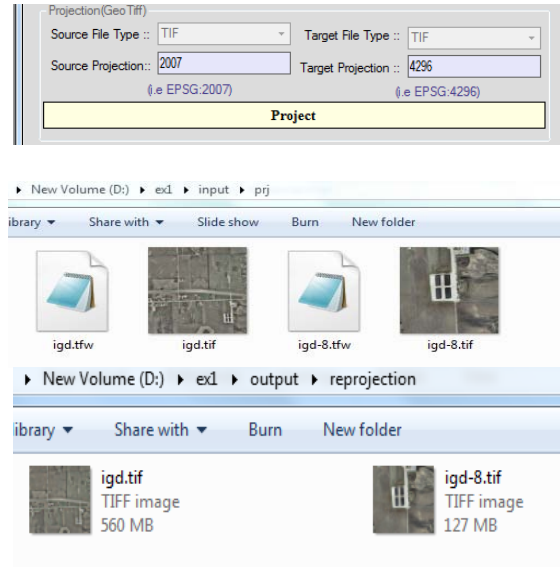
4-->Click project button.

Note: Only Geo files i.e. .Tiff can be reprojected and .tfw file should be present in the same path with the same file name of corresponding .tiff file

Example for the following procedure:-

Input:-





Output:

3.5. Point Based Translation Of Images

For translation of the images Follow these steps:-

1-->Select the input CSV file path

The CSV file should contain the following variables:-

A-->The input file path.

B-->enter the control points

C-->The output path files type

Note: 1.each of the variables should be separated by “,”

Points should be given as sets which are of source point and point separated by “:” and each set separated by “|”.

Example:-

D:\ex1\input\translation\rose55.jpg,
70:60|85:90|120:100|130:105|150:145|160:145.

D:\ex1\input\trans\rose55_Tr.jpg

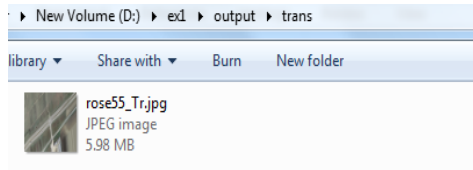
2-->Click translate button.

Example for the following procedure:-

Input:



Output:-



III. CONCLUSION

With this tool we can convert N no. of Conversions from any format to any format with only one click & with this we can do Conversion Of Images From one Format to Another, Slicing of the Images, Resizing of Images, Projecting the image into different Projection Systems & Point Based Translation Of Images.

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