EG5503 GIS & Remote Sensing

Aerial Photograph Interpretation & Classification

Introduction

In a previous lecture you were introduced to the Electromagnetic spectrum and its importance for remote sensing. Airborne and satellite sensors record the energy reflected off the surfaces of the Earth (and additionally any emitted energy sources) in a range of atmospheric windows. Even within these regions there are many instances of poor reflectance; for instance, the poor reflectance of water features in much of the visible portion of the spectrum that results in their rather dark appearance on the imagery.

One of the most important atmospheric windows is the visible region of the spectrum, and this is evident by observing the numerous optical sensor instruments that detect across this range of wavelengths. Using multispectral capabilities we are able to employ colour composites for our observations and applications. **Colour Aerial Photography** is a primary example of optical remote sensing.

This practical uses a digital colour aerial photograph taken over **West Manchester** during the summer of **2006**. You will use standard airphoto interpretation techniques to analyse and interpret the features present within the imagery. Using the results of this analysis you will also perform a simple (manually based) classification of the image scene.

Data

All data is stored on the J: network (Gaia) drive in:

J:\EG5503\API

Please copy the TWO IDRISI files (raster file and associated documentation file) to **your own drive space (I: or H: drive depending on your student account)** – in a suitably named folder - (you will need **10MB** of space). The two files you need to copy are:

westman.rdc
westman.rst

Table 1

Cities Revealed Colour Aerial Photograph (spatial resolution: 1 metre)		
File designation	**'Colour' description**	**Sensitive to the detection of:**
Westman	Red-Green-Blue [True-colour (24bit)]	Land cover properties, cultural feature identification, soil/vegetation properties

Practical Class Tasks

1. The first task for this practical is to **perform an airphoto interpretation (API) using the Westman digital colour aerial photograph**. You should identify as many different features/objects present within the image as possible. You should use the API key to detect and identify the different features and using this key **construct a table highlighting the nature of the following properties:**

   Shape, Tone, Texture, Shadows, Site, Association and Resolution.
   (see notes at the end of this document)

2. You are to create a simplified **Land Use Classification** from the aerial photograph of West Manchester employing your knowledge of the Manchester area and the results of your API as well as taking advantage of the very high spatial resolution of the imagery (1 metre spatial

resolution). You should **adopt the following classification**, and must include a formal (and brief) description of the scheme used in the classification procedure. The classification scheme is shown below:

FEATURE NAME	DIGITIZE FEATURE ID	DESCRIPTION
Agriculture	1	Farming land
Commercial	2	Business properties
Residential	3	Homes
Recreational	4	Golf, parks etc
Water	5	Ponds, rivers, lakes etc
Roads	6	Main roads
Railway	7	Railway line

Operations within IDRISI

Airphoto Interpretation (API)

The procedures used in airphoto interpretation are manually based. However, it is a relatively simple procedure to perform within a digital environment using a software programme such as IDRISI. To display the images simply select from the menu bar:

Display

Display Launcher

Select Raster Image

Navigate to the appropriate sub-directory (your nominated RESOURCE FOLDER), and select the **westman** file for display. Accept the display default options – it will happily display the 24-bit data in your IDRISI operating window.

The true advantage of performing the API in a Digital Image Processing (DIP) environment is that you have the opportunity to zoom into selected portions of the image – enabling more accurate interpretation of the different landscape elements.

Manual Land Use Classification using Colour Aerial Photography

Examine the aerial photograph closely and try to identify the different types of ground surface features – using the classification scheme provided. With this basis select different categories of **Land Use**. Please note that land use is quite different from land cover. Land use implies some form of human activity or economic function associated with a specific area of land, whereas land cover simply relates to the type of feature present on the earth's surface (Lillesand & Kiefer 2000).

You may wish to refer to a remote sensing textbook to help you understand suitable classification schemes.

Lillesand & Kiefer (1994) *Remote Sensing and Image Interpretation*
Campbell (1987) *Introduction to Remote Sensing*

Both of these textbooks are available from All Saints Library.

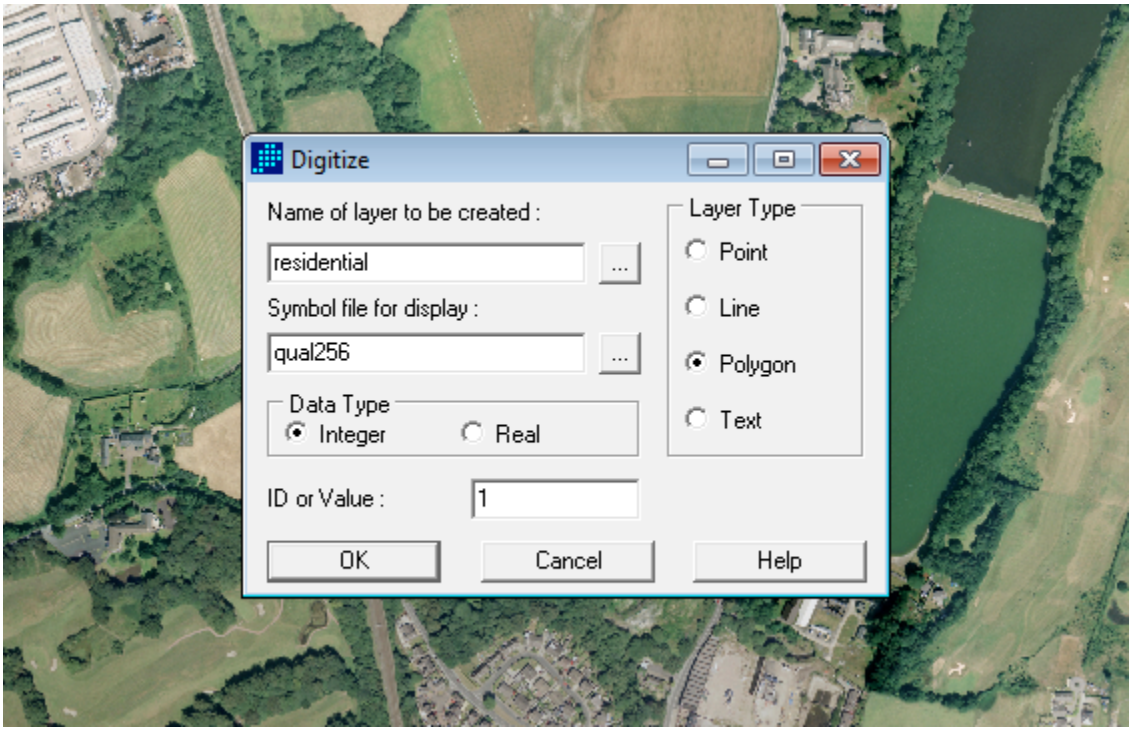
You must begin to manual identify the different classes present within your aerial photographic image. Use the zoom button to help you do this.

Once you have identified the different potential classes you map out the area of interest (the aerial photography) based upon the different categories. To do this use the **on-screen digitize** function available within IDRISI. This function allows you to create new vector-based map entities (using points, lines and areas).

For the purposes of the manually created thematic map you will be expected to employ the line and area (polygon) data layer types.

To begin digitizing simply…

Click on the *CrossHair* symbol from the toolbar  . This opens the on-screen digitize function. Select the **Name, Feature ID** and **Type** of the new data layer to be created (see the figure below). Click **OK** to start digitizing the feature of interest.



It is important to note that when you create a new data layer composed of more than one feature located at different geographical locations within the aerial photograph you should simply complete the first polygon or line feature by simply clicking on the right-hand mouse button. To continue digitizing another feature within the same class/category simply select the CrossHair button once again and start again – making sure to **maintain the same ID value** for the new feature within the same class.

Once you have completed the digitization process the next step is to **create a map** composition file for printing and submission along with **your API feature characteristic table**. As you add each of your digitized land use vector layers over the 'westman' raster layer, be sure to select the palette file for each vector layer as '**Qualitative**' (qual256) and do NOT select 'autoscale'. Once you have added other map elements (including your name) you should save and **PRINT** the map.

To do this, select **Save Composition** from the Composer window to save the work – and then **Print** to print the map (landscape).

Call the Map Composition file (or Bitmap file) **Landuse** (you have now created a land use classification for the colour aerial photograph of West Manchester). On closing the display **make sure that you save the vector layers** you have just created – otherwise the map composition file will be empty when you next come to display and print its contents.

Key to Airphoto Interpretation

Shape
The general form and/or spatial arrangement of objects
e.g. orchard vs. Forest
e.g. the criss-cross pattern of roadways
Stereo photographs also show height which further defines shape

Resolution (size)

This needs to be considered in reference to scale
Is it a garden shed or a barn?

Tone (Hue)
The relative brightness of an object or its colour
e.g. water features are typically darker in the image

Texture

Frequency of tonal changes
e.g. grass appears 'smoother' than forest
Depends on scale

Shadows
Both useful and a nuisance
Define the profile of the object
Hide objects in the shadow area

Site

Topographical location and important in identification of vegetation types
e.g. certain vegetation types favour environmental conditions

Association (context)

Occurrence of certain features in relation to others
What objects are found together?
e.g. possible association of parkland and extensive tree cover