

GIS Application in Agriculture

Part-1: Essential concepts in GIS
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April 2015

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Welcome to this talk on GIS Applications in Agriculture. This is Part 1. My name is Balaji. I am presenting this with Mr. Sreedhar who is a doctoral scholar at IIT-Bombay.

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Population data presented in tabular format

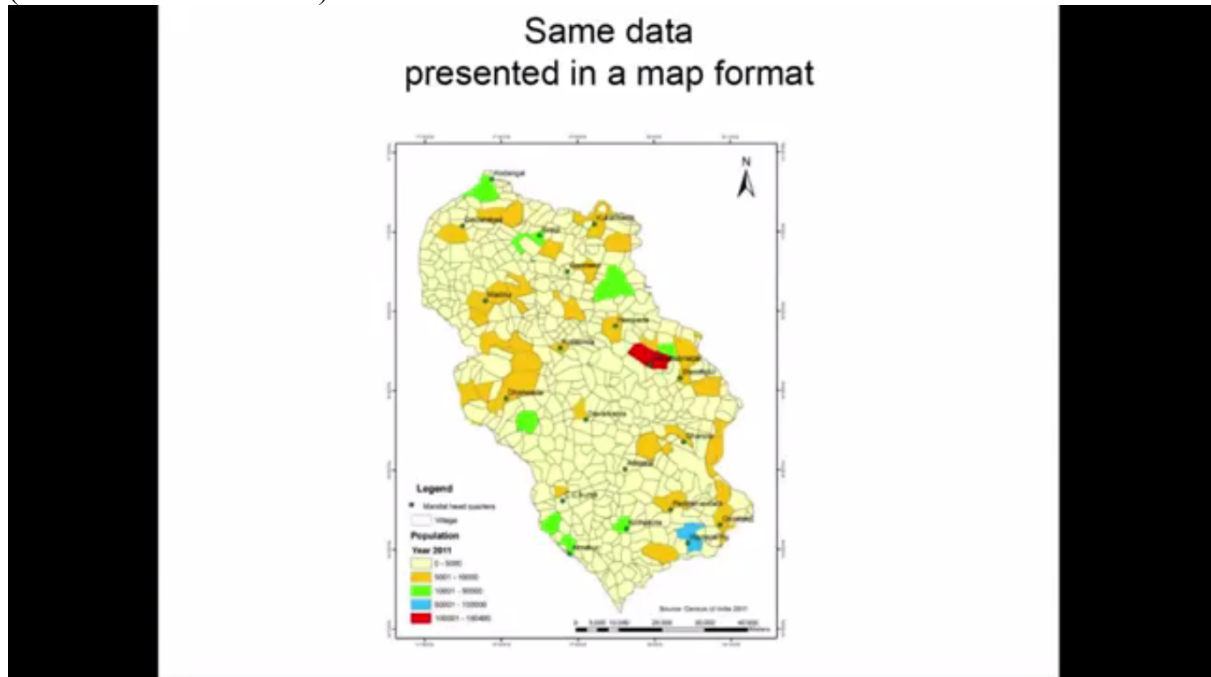
Village	Population
Addakal	1102
Jadcerla	2811
Kotur	1003
Mahabubnagar	15000



Now look at population data presented in a tabular format. On the left, you have villages, the names of villages. On the right, you have the census figures in numbers. This is one way of

presenting it. This is also a very popular way in newspapers etc., this is how they present, but there could be another way.

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For example, you can present it as in a map. You can call it a map in fact. This data when presented in a map format, you can see here there are color codes. They reflect different population ranges. You can instantly make sense of the areas that are well populated, heavily populated and ones that are under populated. For example, you can see here in this map that there is actually a city in the middle of a large number of villages.

Now if you believe the second way, the map way is a better way of presenting population data.

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What is GIS?

Geographic Information System (GIS)-
is a system designed to capture, store...
manipulate, analyze...
manage and present
all types of **geographically referenced** data
More generally, Spatial Data
With non-spatial data where necessary

You have already got an idea of what GIS is. What is GIS? Geographic Information System or GIS, it's a system designed to capture, store, manipulate, analyze, manage and present all types of geo-referenced or geographically referenced data; more generally, special data and you mix it with non special data where necessary. That is GIS. This is at least our definition. You know there are many variations in the way GIS is defined in practice.

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What is geo-referencing?

Associating something with locations in physical space

Similar to (x,y) in a typical graph on a paper

Geographic coordinates: Every position on earth is specified by a set of numbers

Latitude: horizontal lines on a printed map of earth

Longitude: vertical lines

Elevation: height



What is geo-referencing? It's nothing. It's simple. It's associating something with locations in physical space. Very similar to the way in a -- in a graph on paper, you also see it every point on the paper with a value of x and the value of y. That's as simple as that.

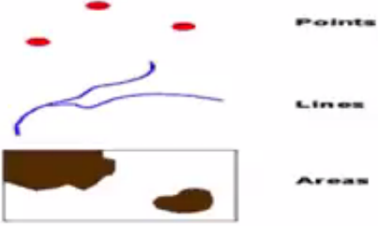
Now in like you have coordinates on paper, you have geographic coordinates. Every position on the Earth is specified by a set of numbers. The popular ones, very well known ones, latitude, which is -- which is a horizontal line on a printed map of it, longitude, which are vertical lines and elevation, which is of course the height. These are generally used in georeferencing a particular place.

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GIS definition

- Spatial data includes – place , time and attribute
- Geographic data representation and type

- Vector - Raster



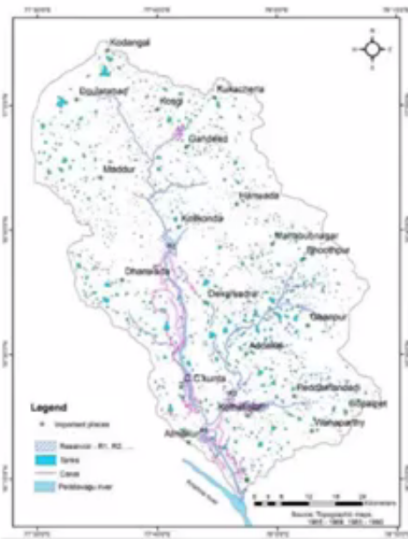
www.esri.com

So GIS definition, continuing our discussions on it, GIS definition is that spatial data is important in GIS and it includes place, time and attribute.

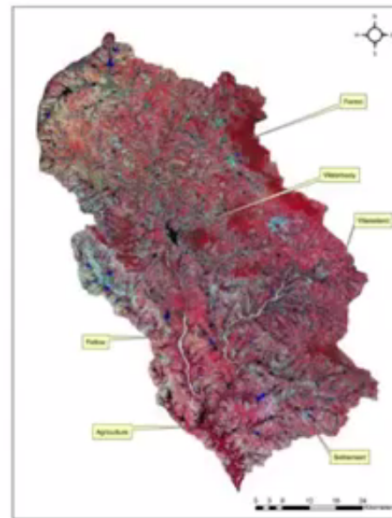
Now Geographic data can be of two -- two formats. One is vector. The other is raster and they can be different types like, for example, points, lines and areas. We will go into them separately.

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Vector data



RASTER DATA



A vector data you can see is presented at the right and the vector data is often generated when you digitize a paper map. That's as simple as that. At the right side you have a raster data, which looks color coded in some way and this is generated primarily from satellites. In fact, most of the satellite derived imagery is presented as raster data.

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What are attributes?

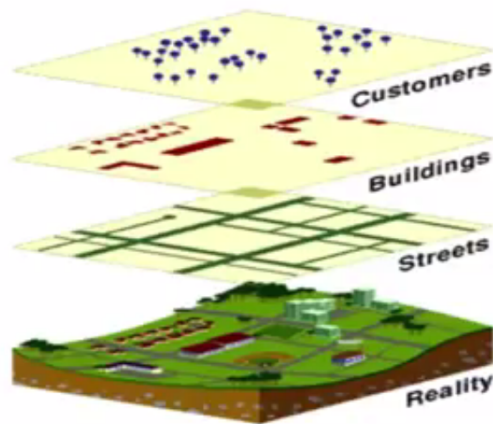
Thematic attributes, more accurately

- Weather
- Land use
 - Soil or crop or forest types
- Hydrography
 - Water sources
- Socio-economic
 - Income status
 - Ownership of assets

What are attributes? Actually, you should call them thematic attributes. For purposes in agriculture, you can say weather is an attribute. Land use a group of other types can be an attribute. Hydrography is an attribute. Socio-economic parameters such as income status, ownership of assets, they can be thematic attributes.

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Data layers in GIS



Now each theme can be a layer like, for example, you can have the physical map of an area over which you lay streets, buildings or even customers etc. As you can see here, these are all various attributes.

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GIS is related to data management

- Relational data
- Spatial Data
 - Format can be vector or raster
 - Type can be point, line or polygon
- Visualisation is an important aspect
- Query and analysis

So in effect, what is GIS? It is related to data management. It's a -- it's a way to relate data. It's a relational data management. The key aspect of GIS is spatial data. The format can be vector or raster. The type can be point line or polygon. Visualization is an important aspect. Query and analysis are important aspects related to GIS presentation and its eventual use in decision making.

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Exercise

- Google Maps is a popular service, <http://maps.google.com>. Visit Google Maps, and select a favorite location.
- View the “political” map, Locate and view “earth”,
- Locate and view imagery
- Can you now say something about the attributes you found?

- Visit *Wikimapia*, and locate your favorite street, and add any detail that may be useful to many others.

Now we stop here this part and look at the exercises that we are giving you. Go to Google Maps. Visit Google Maps and select a favorite location. Look at the political map and locate and view earth, and locate and view the imagery. now can you say something about the attributes you found there? Do that as an exercise. It's an open-ended one.

The other is you should visit the site called Wikimapia. Locate your favorite street. And if you find that some details can be added which are useful to others, do add them. And these are open-ended exercises. These are not going to be graded, but to help you get familiarity with this.

There is going to be a Part 2. If you are interested you should be visiting that as well.

Thank you.