

GIS Assignment 1

by Tapi Matuwi

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Geo analysis visualisation using Geographical Information systems

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Table of Contents

1.0 Introduction.....	3
2.0 Fundamentals of Visual Perception.....	3
3.0 Fundamentals of Cartographic Visualisation	3
4.0 Origins of GIS	3
5.0 Principles of Thematic Mapping and Data Visualisation	5
5.1 Visual Contrast	5
5.2 Legibility	6
5.3 Figure Ground Organisation	6
5.4 Hierarchical Organisation	6
5.5 Balance	6
5.6 Conclusion of design principles.....	7
6.0 References	8

1.0 Introduction

In this report will be the fundamental of different visualisation and how they fit into GIS. This report will also look at the origins of GIS and how it has changed over the years.

2.0 Fundamentals of Visual Perception

Sight is one of our five senses and we use it on a daily basis without paying much attention to it. The idea of visual perception is essential to how we see ourselves. At its simplest visual perception is the way that one processes the light that enters their eyes. It is how the brain understands the shapes, textures, lines and colours that they eyes see. Visual perception works like a computer in terms of sight, this is when because light from the outside environment enters the eye it turn into 100 million neuro signals. After it gets there it will then have to go through the optic nerve to the brain and this then leads to the brain to processing the information caused by that light. The optic nerve has 1 million fibres so before the brain get any information to process the neuro signals are filtered and compartmentalized by the eye to make it easier for the brain to transmit. (1)

3.0 Fundamentals of Cartographic Visualisation

Cartographic Visualisation also known as geographic visualisation is primarily about how geographical or spatial data is visually represented. The psychological aspects of cartographic visualisation are made important by Cartographers because they see the subject as "first and foremost, an act of cognition. It is a human ability to develop mental representation that allows us to identify patterns and create to impose order". (2) Cartographic Visualisation of geo-referenced data, gives a more efficient demonstration and approachability which would a better understanding of the geographic space. Cartographic visualisation is a graphic method that is related to how cartographic models are made, this enables people to use geospatial data for studying and research with the way that it appears and is presented. (3)

4.0 Origins of GIS

The first documentation of G.I.S dates back to 1832 where a French Geographer, Charles Picquet created a map to display the cholera epidemiology in Paris by representing 48

districts in different color gradients. In 1854 a man named John Snow did something similar in London by showing cholera deaths by using points on a map. The next stage that was taken in the development of modern G.I.S was in the early 20th century; there was a printing tech called photolithography. Photolithography was used to separate layers from a map this meant that water, vegetation and developed land could all be presented as on their own. Although this gave the appearance of being a G.I.S it is not seen as full G.I.S because you are not able to analyze the data on the map. (4)

In the 1960s mapping software development began with Howard Fisher. The establishment of the Harvard Laboratory for Computer Graphics and Spatial Analysis started under Fisher. From this point GIS and automated mapping systems started to evolve and associated databases along with them. In 1968, the Environmental Science Research Institute was founded by a private consulting group. Their studies on cartographic software tools and data structure transformed modern mapping and they are still setting examples in the GIS Industry. (5)

From the year 1965 to 75 was the time period of GIS pioneering. It was all slowly coming together as technology advanced. Map graphics were used as outputs using line printers, data storage progressed with mainframe computers and being able to record coordinates as data input. The 1960s were a key time in the history of GIS because a lot of people see this as the foundation of Geographical Information Systems. This was all because of a man named Roger Tomlinson who is also known as the father of GIS. Tomlinson started, planned and directed the Canadian Geographical System. CGIS was unique as it adopted a layer approach system to map handling. (6)

Canada occupies a massive volume of territory and because of this the idea for a Canadian Land inventory came into shape in 1964 but it wasn't fully operational until 1971. In order to determine how capable the ground was different crop types and forested areas the Canadian Land Inventory used soil. They saw that accurate and relevant data was extremely important to the land planning and decision making. As time went by CGIS was being modified constantly in order to keep up with technology. (6)

CGIS weren't the only group that were developing GIS. The US Census Bureau were early adopters of some of the ideologies of GIS. The pioneering work that they carried out led to the digital input of the 1970 census using the data format "Geographic Base File – Dual Independent Map Encoding". This file format supported digital input, error fixing and choropleth mapping; which is a map that uses differences in the coloring, shading and where the symbols are placed inside specific areas to show the average values of a certain amount in those areas. (6)

In the UK the Ordnance Survey started their routine topographic map development. Even today the Ordnance Survey is still making different GIS data products these include every house, fence and stream in every single part of the UK. Around this time in history GIS was still in its ground-breaking stage. It was still in its early phases and starting to be nurtured by a few national agencies around the world. (6)

In the 1970s tools like Skylab allowed the information gathered about earth on a fixed schedule. Data was measured and updated on a regular basis, one of the primary advantages of GIS and GPS. The Landsat program was established around this time, which was a series of missions managed by the National Aeronautics and Space Administration (NASA) and the United States Geological Survey. Landsat gained high resolution data at a global state. Since then we have had a better understanding of Earth's dynamic surface and man's environmental impact. [expand] Space based navigation and positioning systems were also designed in the 1970s. The US Department of Defense used GPS just for military purposes, but it was then available for civilian use in the 1980s. GPS systems are able to signal to track movement anywhere on the planet. Since GPS systems are not affected by weather or topography they are tools we can rely on for navigation. (5)

In the 1990s GIS was being implemented slowly on the sub-municipal level by neighbourhood organizations and community based agencies. The development of Arcview for Windows and ArcIMS which allows distributed mapping and spatial analysis using the internet and takes away a lot of the hardware and licensing expenses of using a full software package, has improved the availability of spatial data to marginalized and underfunded groups. The importance of spatial analysis for decision-making was becoming recognized. Slowly, GIS was being introduced to classrooms and companies. Software was able to handle both vector and raster data. With more satellites being launched into orbit, this data collected from space could be consumed in a GIS. This in accordance with the availability of global position systems gave users more tools than they've ever had before. Like the flick of a switch, GPS selective availability was turned off. Suddenly, accuracy has changed from the size of an airport to the size of a small shed. GPS has led the way to great innovative products like car navigation systems and unmanned aerial vehicles. (5, 6)

Now in the 2010s GIS has changed a lot when compared to the past. Many changes have occurred and one of the biggest is the GIS data that is available for use around the world. Another thing is being able to see maps in 3D, this is something that GIS experts in the past would have thought was impossible. For what is to come in GIS 4D format maps are some that we can look forward to. (7)

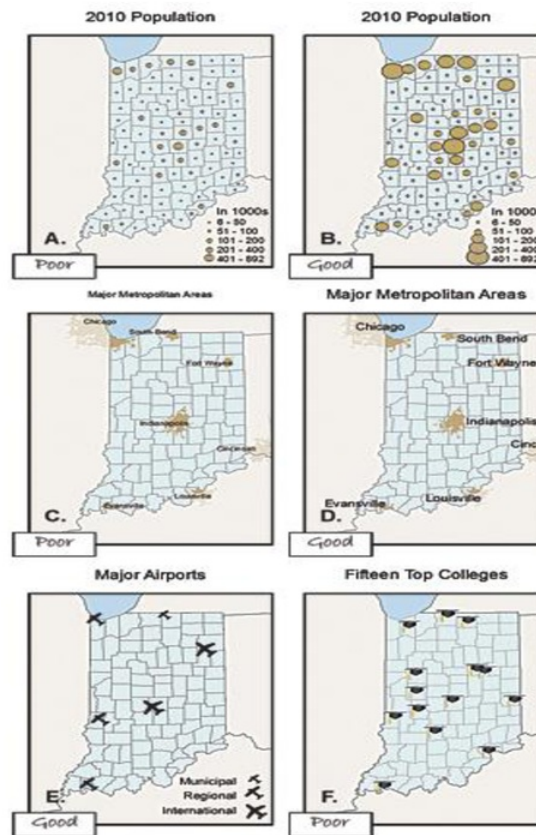
5.0 Principles of Thematic Mapping and Data Visualisation

5.1 Visual Contrast

This shows how a map's features and page elements work with one another as well as their background. To make this more understandable, we can take in the consideration of our incapability to see in the dark. This is because the eyes are not getting that much of reflected light meaning that there is minimum visual contrast in between the objects in your field of view therefore you are not able to differentiate objects from each other or what is surrounding them. If there was a rise of illumination you would then be able to differentiate features from the background. The features will still need to be big enough to be seen and understood in order for your mind to interpret what your eyes are looking at. (8)

5.2 Legibility

This is the ability to see and understand. A lot of people try to create their maps contents and pages easily seen, but it is also essential that people can understand them. Good decision making when selecting symbols plays a big part in legibility. The symbols that are chosen must be the right sizes and symbols that people are familiar with so that they are seen with no problem and understood. When you look at this image the you can see the geometric symbols better at smaller sizes. The bigger symbols need more space for them to be legible.



5.3 Figure Ground Organisation

This is the separation of the figure in the front from and formless background. This is used by cartographers to help map readers focus on a certain part of a map. There are a lot of ways that figure ground organisation can be endorsed like adding more detail to the map or using a white wash, feathering, or a drop shadow. The visual layering of the information of the map helps readers focus on what is important and allows them to identify the patterns. The hierarchical organisation of reference maps is different to thematic maps.

5.4 Hierarchical Organisation

One of the main objectives of map making is to separate meaningful characteristics and portray likenesses, differences and interrelationships. The internal graphic structuring of the map is important to help people read a map. Hierarchy separates the map visually and puts it into different layers of information. The visual layering of the information of the map helps readers focus on what is important and allows them to identify the patterns. The hierarchical organisation of reference maps is different to thematic maps.

5.5 Balance

This involves how the map is organised as well as other elements on the page. The outcomes of a well-balanced map are equilibrium and harmony. Balance can also be used in different ways to promote edginess, tension to even make an impression more organic. Other primary outcomes of balance in a map are visual weight and direction.

5.6 Conclusion of design principles

Together all if these five principles have quite an impact on the map. The way they are used will draw the attention of the person reading the map or possibly deter them. When given careful thought to the design of maps these principles give a better understanding of how people want to look at maps.

6.0 References

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GIS Assignment 1

GRADEMARK REPORT

FINAL GRADE

55/100

GENERAL COMMENTS

Instructor

19/19/6/6/5 (55)

1) Good clear introduction with some suitable references to visual perception. Try to use more references.

You have obviously research the topic of GIS and presented some interesting facts but at this level of study you need to focus on your research.

2) Think about GIS and its suitability statistical analysis.

3/4) You demonstrate a good understanding of the use of MapInfo software and you have been able to produce some suitable thematic maps demonstrating MMR uptake over several years.

However, because you have used up much of your word count in the opening chapters you have not discussed your data findings or concluded. Also no correlation between deprivation and affluence have been discussed. For example if you choose the Townsend index and overlaid your MMR data you would then have a location where you would be able to look at the different data sets and discuss whether affluence and deprivation has any bearing on the parents' choice of the MMR uptake.

5) Some elements of good research in all sections had a good flow we however come to an abrupt stop and no conclusion you therefore lost marks.

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5
