Measurement the Distance between Points on the Map

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ABSTRACT: *In order to determine the distance between points on the map and present the geographic information on a map this study is concerned with the map projection and measurement this distance. Therefore, This project consist of three parts: the first one is drawing the map by using conical projection the second part measurement the distance between two or more points on the map third part is to present the geographic information on the map. From the results it has been concluded that conical method was efficient to achieve the map projection and compute the distance between points and to compute the longitude and latitude.*

KEYWORDS: *Map projection, conical projection, longitude, latitude.*

I. INTRODUCTION

A map projection is the process of transforming and representing positions on the earth's three-dimensional curved surface to a two-dimensional (flat) surface. Map projections allow to represent some or the Earths entire surface, at a wide variety of scales, on a flat, easily transportable surface, such as a sheet of paper. Map projections also apply to digital map data, which can be presented on a computer screen. There are hundreds of different map projections. The process of transferring information from the Earth to a map causes every projection to distort at least one aspect of the real world- shape, area, direction [1].

The appropriate projection for a map depends on the scale of the map, and on the purposes for which it will be used. A projection that maintains angular relationships and accurate shapes over small areas is called conformal projection. These projections are used where angular relationships are important, such as navigational or meteorological charts. Conical projection projects information from the spherical earth to acon that is either tangent to the earth at a single parallel, or that is secant at two standard parallels. Once the projection is complete, the cone is unwrapped to form a flat surface. The lines where the cone is tangent or secant are the places with the least distortion [2, 3].

The most common way to locate points on the surface of the earth is by standard, geographic coordinates called latitude and longitude. These coordinates' values are measured in degrees, and represent angular distances calculated from the center of the earth. latitude line represent the angular distance between the equator and points north or south of it on the surface of the earth, the second line is the longitude line, also called meridians, run perpendicular to lines of latitude and it indicate the angular distance between the prime meridian and points east or west of it on the surface of the earth [4, 5].

GIS software represents features on the earth, such as building, cities, roads, rivers, and states on a computer, usage of GIS to visualize, question, analyze, and understand this data about the world and human activity. Often, this data is viewed on a map, which provides an advantage over using spreadsheets or databases. Because maps and spatial analysis can reveal patterns, point out problems, and show connections that may not be apparent in tables or text [6, 7]

GIS makes map data interactive and thus more useful for example a GIS shows a street as more than a screen graphic, when click on a GIS street map to find out the speed limit, the number of lanes, the last time it was paved, any planned construction , and a multitude of additional related facts. All this information provides an accurate understanding of the street if a city needed to widen this street, it could use GIS to create a 50-foot buffer on the street to find the properties that fall within the buffer. GIS can then easily identify property owners affected by the project so that they may be contacted. GIS combines layers of data to find the best alternatives, saving invaluable time for a government or a company. Every day, businesses need to deliver goods and services to clients all around a city. Each truck deriver needs a route of how to most efficiently visit each client. GIS provides tools to create efficient routes that save time and money and reduce pollution [8, 9]. Because of all the above mentioned this study was aimed to determine the distance between points on the map.

II.   PROPOSAL FRAMEWORK

This work is programmed using Visual basic language. The work decomposed into the following :-
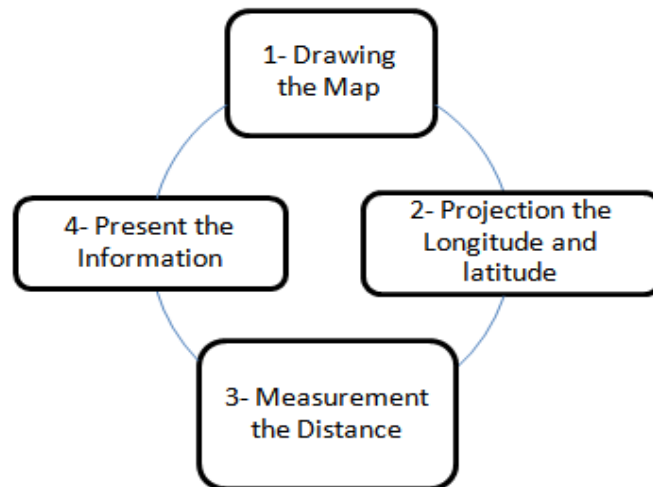
III.   DRAWING THE MAP

The map is drawing by converting information from the earth map by using the planar method. This information can be drawing by saving points as longitude and latitude on the file and then convert this point into pixels by using the equation:

X= round (x1*1000)-33000
Y= 31000 – round (y1*800)
Y1= 31000 – round (y1*800)
 X1= round (x1*1000)-33000
Line (X, Y)- (X1, Y1)

- (1000) A variable number represents the amount of measurement and this dynamic value is also represents the size of the map display.
- (33000, 31000) these numbers are subtracted from the value of the variable resulting from the equation to determine the site that I want on the display to drawn the map.
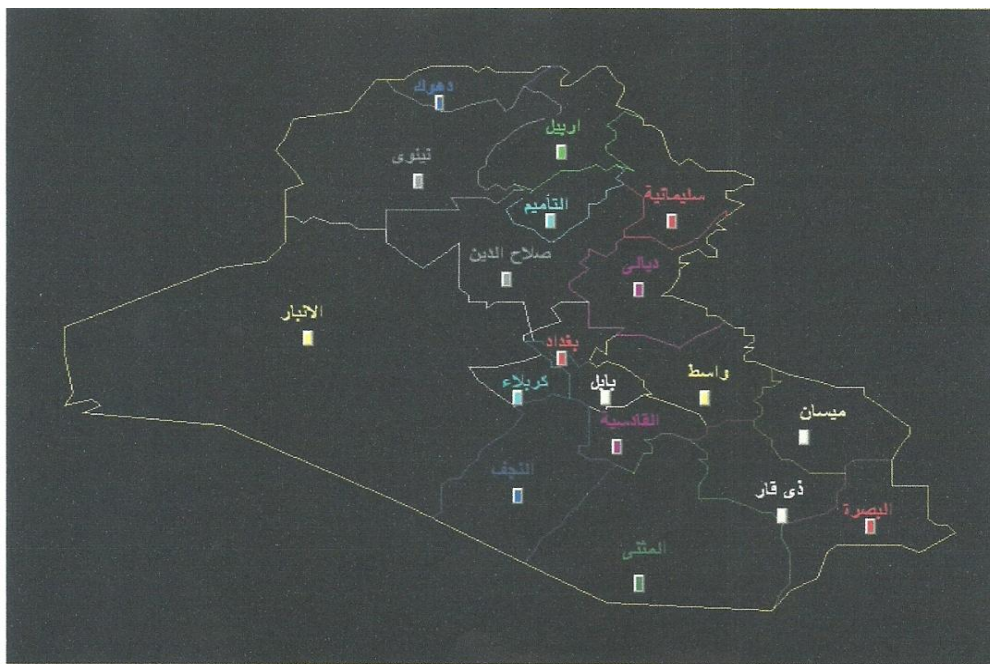

Figure (1) drawing the map

Compute the longitude
The longitude can be compute by using the equation:
Logitude1= (31000-b)/800
Compute the latitude
The latitude can be compute by using the equation:
Latitude1 = (a+33000)/1000
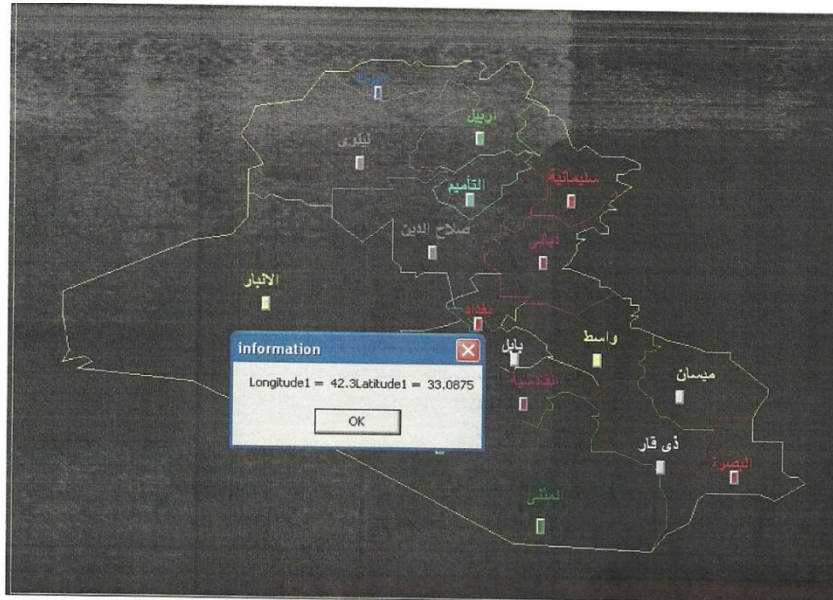
- A, b is the screen coordinate.

Figure (2) Display the longitude and latitude.

IV.   COMPUTE THE DISTANCE:

The distance can be compute by two steps:

1-   Compute the delta long by using the equation:
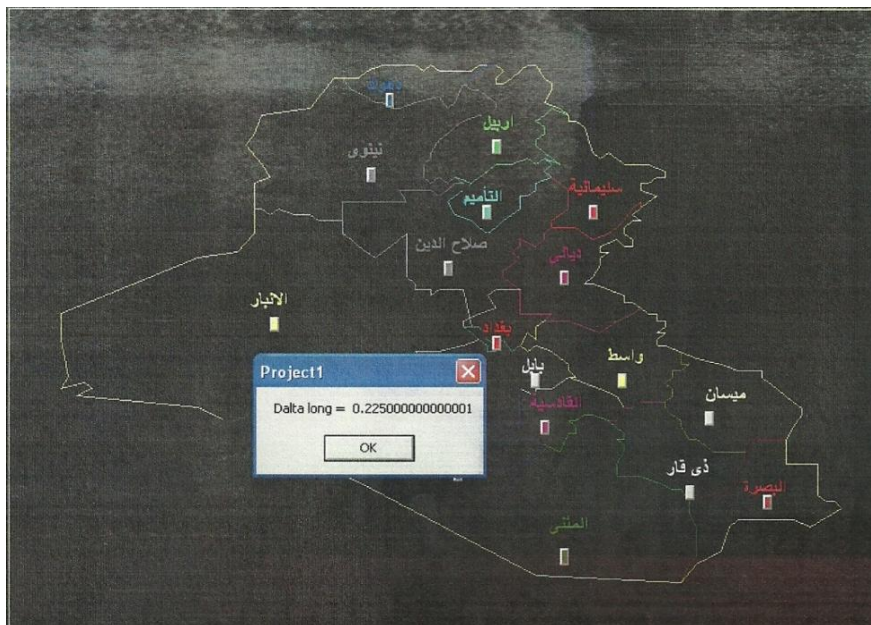Delta longitude= Abs (longitude2 – longitude1)

Figure (3) display the delta longitude

2-   Compute the delta lat by using the equation:
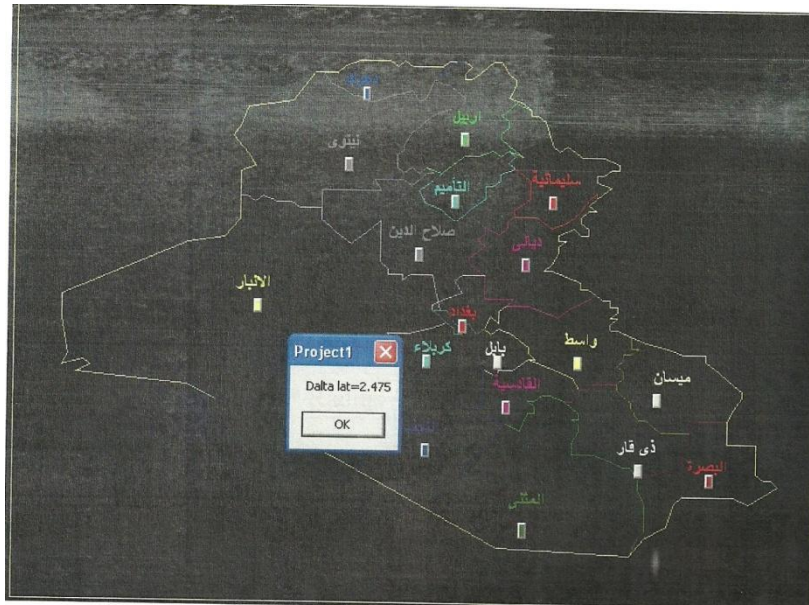   Delta latitude= Abs (latitude2 – latitude1)

Figure (4) display the delta latitude

Compute the distance by using the following equation:

Distance= (Delta longitude)* (kmperlong()* kmperlong ()) + (Delta latitude)* (kmperlat (0*kmperlat()))

Pi=3.14

Radius=6821

When it was want to compute the distance between the longitude there is a problem appear because the longitude is get near on the end of the earth and the distance became different between each two longitudes, so we need to compute the distance by take cosine of the angle and multiple by the longitude and the pi and then divided by 180 (the number of the longitude), but in the case of the latitude there is no problem generate because the latitude is not near.

Kmperlong= (2*pi* Radius* Cos ((y1* pi)/ 180)) /360

Kmperlat=2*pi* Radius/360

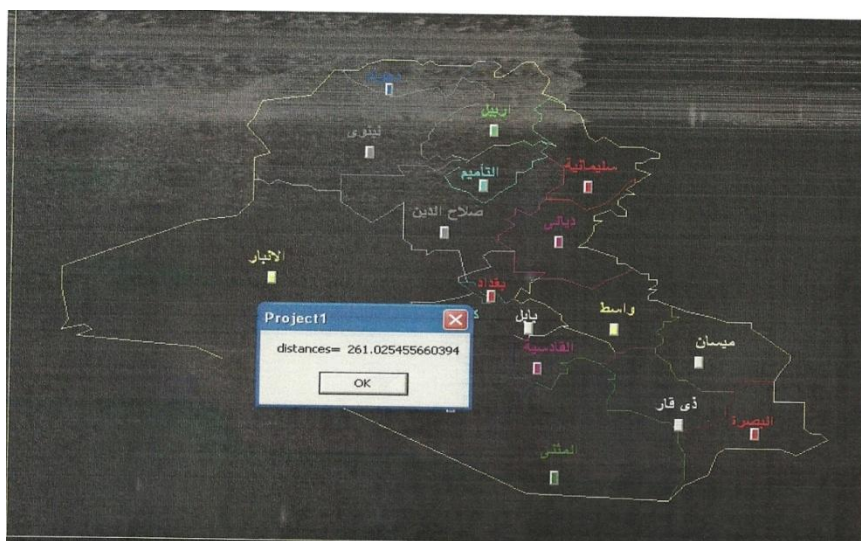It divided by 360 to convert the value to degree

Figure (5) Display the distance

V. COMPUTE THE TOTAL DISTANCE

The total distance can be used to compute the distance between two or more points on the map. And this is doing by using the equation:
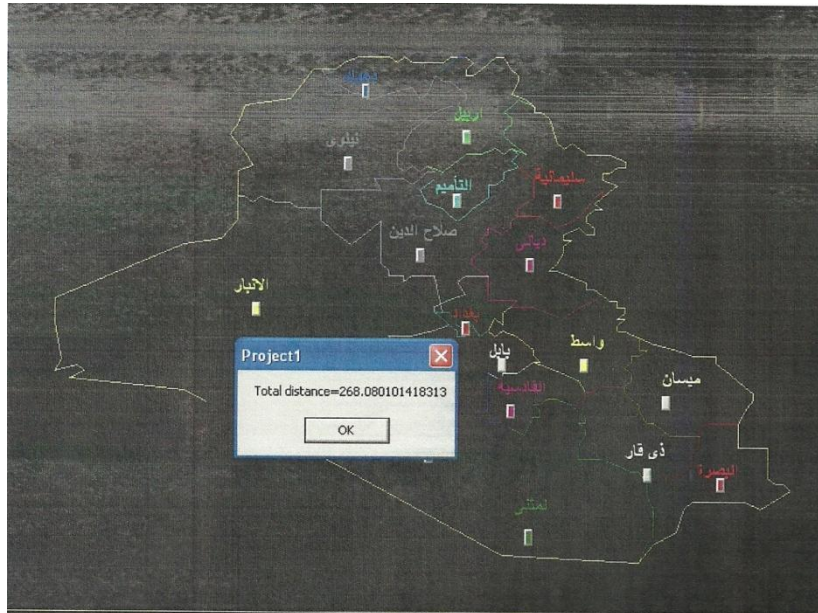
Sum= sum + distances

Figure (6) display the total distance

Present the information

In the last the information is present on the map by saving the information on a text and then display the text on the map.
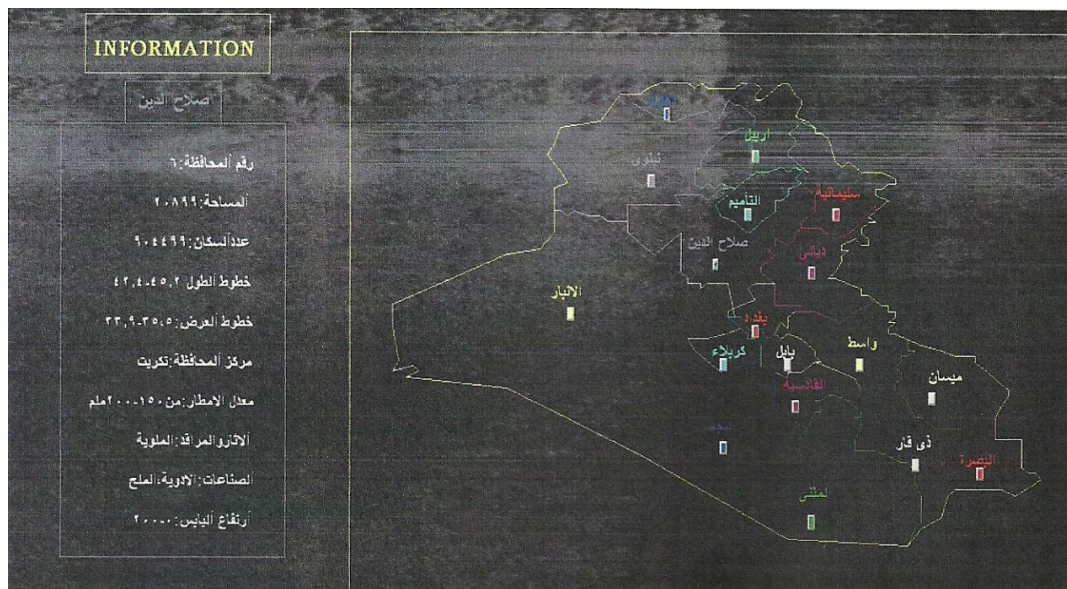

Figure (7) display the information

VI. CONCLUSION

It can be concluded that planner method was efficient to achieve the map projection and compute the distance between points and to compute the longitude and latitude.

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