

## **Development of a National Address Database and diffusion in web.**

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### **Résumé.**

L'Adresse joue un rôle fondamental dans notre société en tant que support d'un grand nombre d'informations, tant dans le secteur public que privé. Elle permet de rattacher une personne, une propriété, un bien, un service, etc. à une position spatiale géographiquement reconnue.

L'adressage est une opération qui permet de localiser sur le terrain une parcelle ou une habitation, c'est-à-dire de « définir son adresse » à partir d'un système de cartes et de panneaux mentionnant la numérotation ou la dénomination des rues et des constructions. Pour automatiser cette opération, quelques outils SIG sont dotés de géocodeurs qui permettent de retrouver où se trouve une adresse littérale sur une carte et d'y associer des coordonnées géographiques. Pour un endroit donné le géocodage est devenue un facteur important dans la vie quotidienne.

Le web mapping ou la cartographie en ligne est l'usage des technologies de l'Internet pour le stockage et la diffusion de cartes via la toile.

La solution web mapping proposée par ArcGIS SERVER nous permet de créer et de mettre à jour des applications cartographiques Web qui présentent les informations géographiques résidant sur notre serveur. L'interface de création d'applications du gestionnaire est destinée aux utilisateurs connaissant peu ou pas du tout le développement Web.

Une application Web propre à nos objectifs et adaptée à nos besoins est développé via le gestionnaire. Ce dernier nous permet de choisir les données à afficher, de procéder à des options et choix sélectifs des éléments cartographiques, tels que les flèches du Nord et les barres d'échelle, de choisir les outils à utiliser avec notre application et de configurer la mise en page des cartes.

**Mots clés :** Adresse, adressage, SIG, géocodage, web mapping.

### **Abstract.**

The address plays a fundamental role in our society as a support of a large amount of information, both in the public and in private sectors. It allows to links a person, property, asset, service, etc. to a spatial position geographically recognized. Addressing is an operation that allows locating on the ground a parcel or a house, that is to say, "define his address" from a maps system and signs indicating the streets numbering or naming also for a buildings. To

automate this process, some GIS tools feature offers geocoders that can restore where a literal address is on a map and to associate geographical coordinates. For a given place geocoding has become an important factor in daily life. Web mapping or online mapping means the use of Internet technologies for the storage and distribution of maps through the net.

The web mapping solution from ArcGIS SERVER allows us to create and update Web mapping applications that present geographic information residing on our server. The creation of Interface Manager application is designed for users who know little or not yet web development.

A Web application proper to our objectives and adapted to our needs is developed via the manager. This allows us to choose the data to display, to make selective options and choice of map elements, such as North arrows and scale bars, and to select tools to use with our application and configure the page setting maps.

**Keywords:** Address, addressing, GIS, geocoding, web mapping

## 1. Introduction

Address is one of the fundamental means by which people conceptualize location in the modern word. In a geographic information system (GIS), addresses are converted to geographic coordinates on the earth's surface, usually expressed as longitude and latitude, through the use of geocoding techniques.

The process of geocoding forms a basic fundamental component of spatial analysis in a wide variety of research disciplines and application domains (e.g., health, business, crime analysis, political science, computer science).

In this article, first, it is necessary to know the geographic information system and analyze the needs of the structure and to review the foundation of the geocoding process; in parallel a reflection concerning repository address and methodology for creating and modeling.

Finally, creating bridges for the dissemination of geographic information using the network and the web portal.

## 2. Geocoding Principe

Geocoding is the process associated with a point in space coordinates in a defined system. For a geographic information system (GIS) working in two dimensions, it is therefore necessary to define the position of a point with a pair of coordinates (X, Y). This marked the point can then be integrated into the GIS will be the object of treatment, using its geographical position. GIS need a reference file whose coordinates are known. The accuracy desired locations determine the type of geocoding employed. Geoconcept allows for several types of geocoding. [1]

## 3. Geocoding Types

To automate this operation the GIS feature geocoders for determining the coordinates of an address using geographic reference data whose coordinates are known. Depending on the

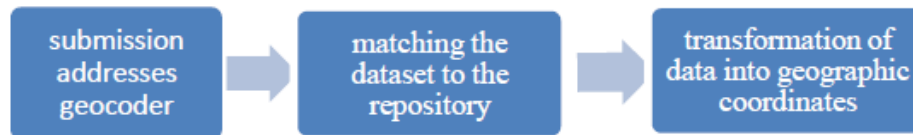
desired accuracy of the geocoding reference data can be shared coordinates, streets, or remarkable points.

- Common geocoding.
- Geocoding at street number by linear interpolation.
- Point-of-interest geocoding.
- Geocoding cadastral.
- Geocoding area. [2]

#### 4. Geocoding Methodology in ArcGis

Geocoding is a transformation of the digital data into spatial data. This transformation is only possible via addresses. In ArcGIS, Geocoding is the process of creating a punctual layer in which the entities are based on data from a table, using a reference layer.

Geocoding process is decomposable in three-step:



In this article, we studied the geocoding to the area and geocoding to street number by linear interpolation.

**Geocoding by linear interpolation** implements a reference file containing a description of the geography of street sections, track section of nature, their names, their zip code of the town and the numbers of their ends (start right at the beginning left and right end, left end). The geocoded point coordinates are then calculated by linear interpolation.

**Geocoding in the area**, this type of geocoding can locate data using a specific address district is using the name number of island and the number of the plot or building. The search for an address with the geocoding to the area is via SQL requests are using the selection attributes. [3] [4]

#### 5. Area of study

The application is performed on data concerning Oran; the province is located on the northwest coast of Algeria and has a coastline of 120km.

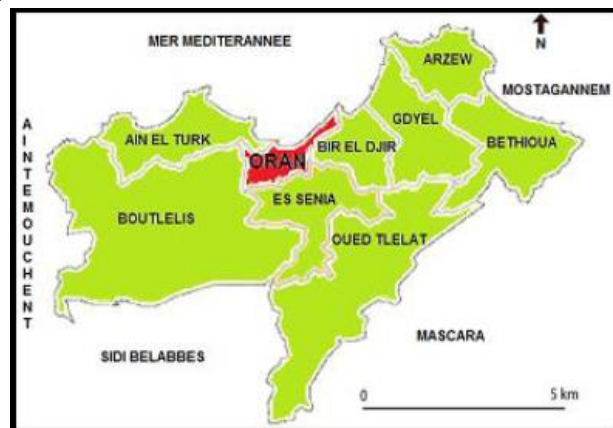


Fig. 1. Location of Oran.

The project was carried out on the data concerning the town of Bir-elDjir specifically the neighborhood Haï-Nakhla. This data set consists of a satellite image from the Internet, via Google Maps.



## 6. Description of work environment

Geocoding can be used as part of many applications. For the implementation of our application, our choice fell on GIS ArcGIS 10 (The ESRI Company develops ArcGIS system). [5]

## 7. Choice of the projection system

Before entering the DB, it is necessary to choose a projection system Able to adequately represent the chosen region. Our case considers the projection WGS\_1984 UTM\_zone\_30. This projection allows us to overlay layers made with other thematic layers in a unified system.

## 8. Creating the database

In our project a file geodatabase is used to store a set of data sets each data set is stored as a file. This allows the creation of objects of our conceptual data model: wilaya (province), county, district, parcel, building, stretch-street, address-plate and wired address.

## 9. Result of geocoding in ArcGIS

### 9.1 Geocoding by linear interpolation

Example: Geocoding address 15 street BENYOUCEF KADDOUR, 31001

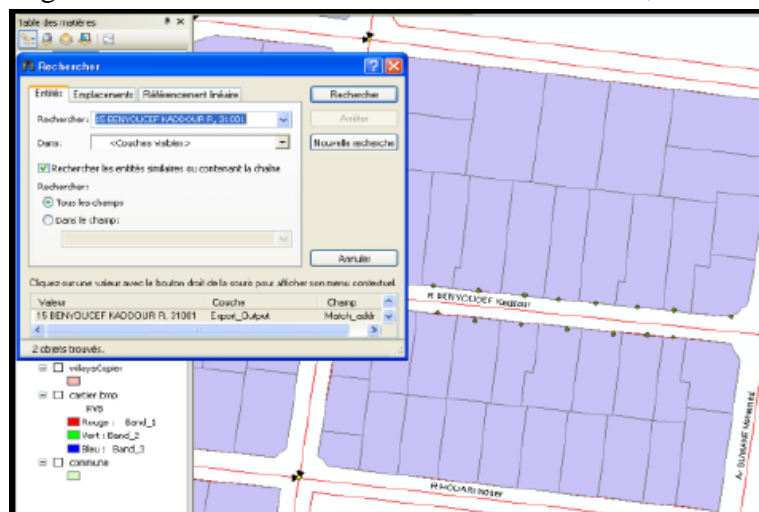


Fig. 3. Search a linear address.

The geocoding engine searches the reference file the track section associated with a range of numbers with 15, whose type is "street", the street name is "BENYOUCEF KADDOUR" and corresponding to the desired common. [6]

### 9.2 Geocoding to the area:

The search for an address with the geocoding to the area is via SQL queries are using the selection attributes.

Eg research plot No. 53 ilot 9 Hai district Nakhla the following SQL query:

```
SELECT *  
FROM Parcelle, Ilot, Quartier  
WHERE "Quartier.NOM_QUARTI=Hai Nakhla"  
AND "Ilot.Num_Ilot=9"  
AND "Parcelle.Num_Parcelle=53";
```

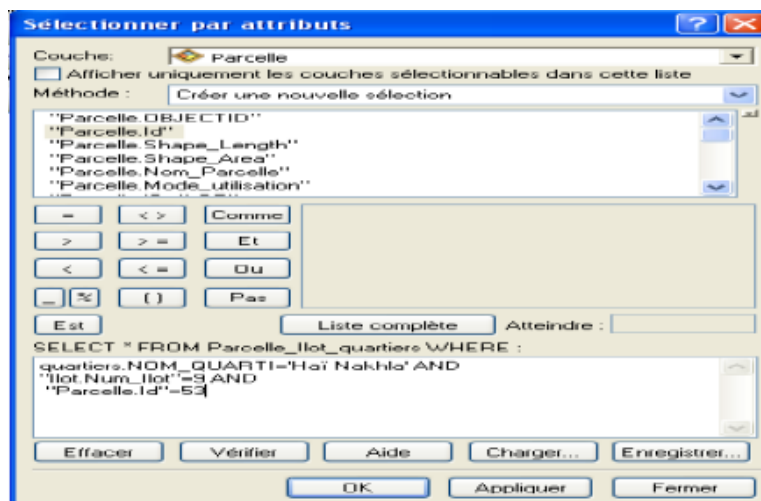


Fig. 4. Select query.

We selected all the attributes of the parcel table, ilot, neighborhood or conditions are verified. The result of the selection appears at the figure below.



Fig. 5. Result of selection.

## 10. Development of a Web application:

Web mapping is the process of designing, implementing, generating and delivering maps on the World Wide Web. Web GIS or Internet GIS is related to web mapping but with an emphasis on analysis, processing of project specific geodata as well as exploratory aspects [9]. Concerning our application was used ArcGIS web solution is ArcGIS SERVER, this latter supports the system platforms of tasks and can create, manage, and distribute GIS services on the Web, for desktop clients, mobile and web.

### 10.1 Service creation and publication of geocoders:

When using ArcGIS Server, you should follow a three-step process for our geographical information is made available to other users via the server:

- ✓ Create GIS resource using ArcGIS Desktop.
- ✓ Publish the resource as a service using ArcGIS Server.
- ✓ Utilisez le service via une application cliente.
- ✓ Publishing the map service [7]

#### a- Publishing the map service

We create the map in ArcGIS, and then publish the map service in ArcGIS Server.

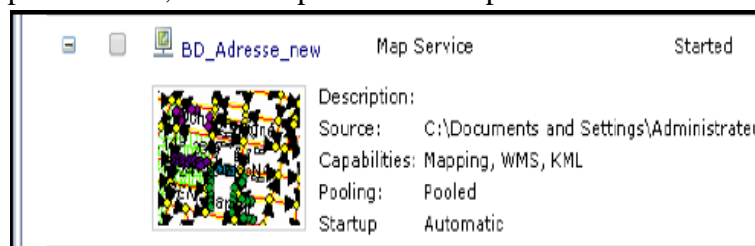


Fig. 6. Publication of a map service.

#### b- Publication of Image Service:

Before creating an image service, we must ensure that the imaging data is in a shared location visible to all SOC machines in our GIS server.



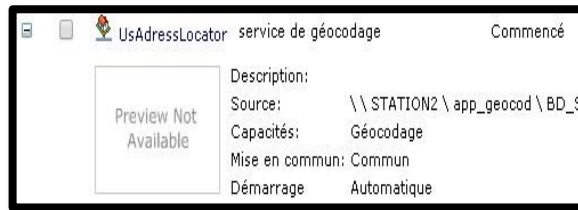
Fig. 7. Publishing an image service.

c- **Publishing a Service WFS (Web Feature Service):** With WFS services, you have the option of publishing a geodata service or a map service. [8]



Fig. 8. Publishing a Service WFS.

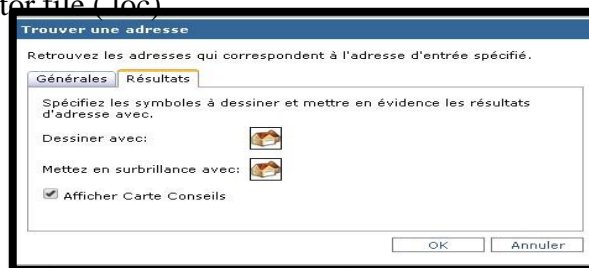
**d- Publishing a Service WMS (Web Map Service):** WMS is a specification published that displays the map images with layers on the Internet. WMS was created in ArcCatalog



**Fig. 9.** Publishing a WMS service.

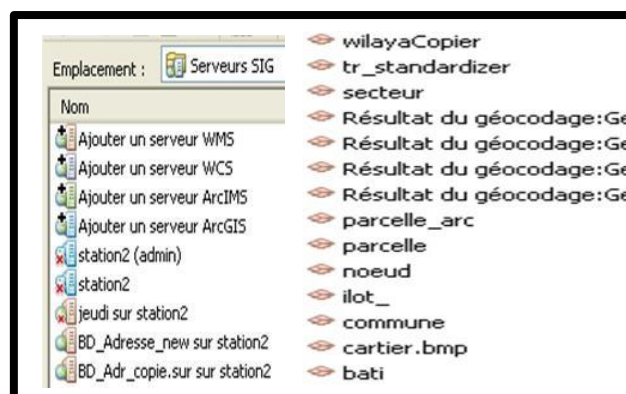
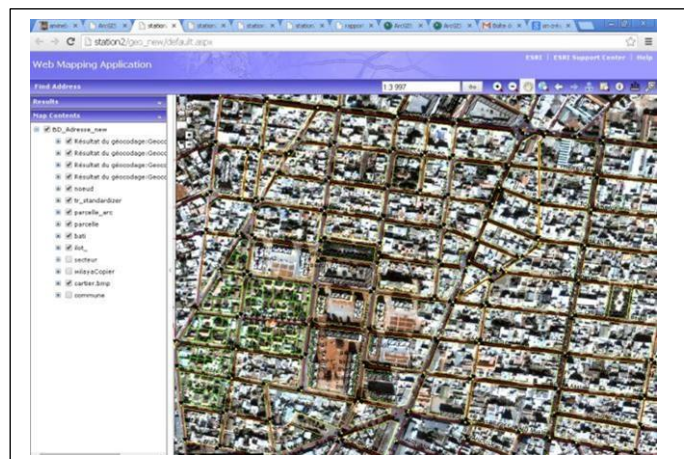
**e- Publication of a geocoding service:**

After you have created and saved the address locator, you can publish it as a geocoding service; we use the locator file (.loc)



**Fig. 10.** Publication of a geocoding

**Fig. 11.** Type of choice of result.



**Fig. 12. .** Web interface application.

### The search for an address:

To find a specific address or location, click **Find Address**.

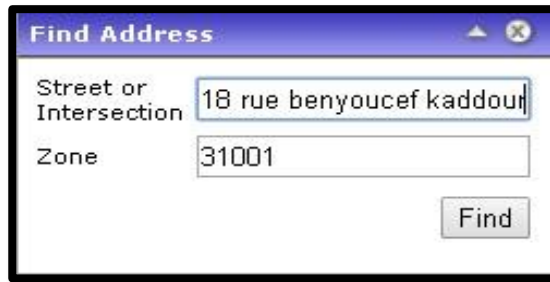


Fig. 13. Searching for an address



Fig. 14. Search result.

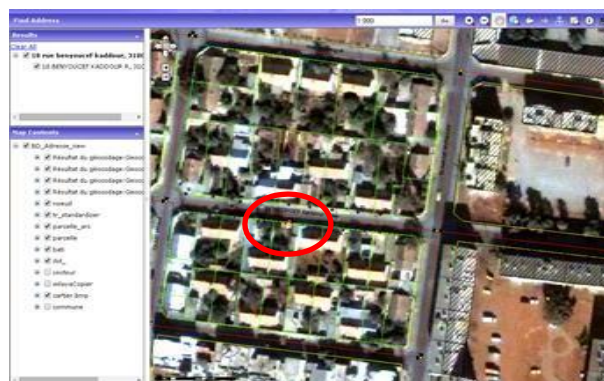


Fig. 15. Result of the address searched.

On clicking the resulting address the application, we advanced with the symbol on the map to the location of the desired address.

## 11. Conclusion

Geocoding is a booming technology. These systems of Geocoding are constantly changing and must continually face new expectations. The choice of the webcasting solution is an important factor as its possibilities and limitations condition the use that can be done.

## Reference

- [1]: Mémoire d'ingénieur en science géodésiques et travaux topographiques- adressage et gestion des villes- centre des techniques spatiales ARZEW- M.Y.CHAOUATI & M.B.TADJEROUNI

[2] : <http://www.udccas69.net>

[3] : [http://gtadresse.ign.fr/IMG/pdf/ABC\\_VOIES.pdf](http://gtadresse.ign.fr/IMG/pdf/ABC_VOIES.pdf)

[4] : <http://gabriel.fraisie.perso.sfr.fr/ArcGIS/ArcMap/Documentation/arcmap10.pdf>

[5] : <http://fr.wikipedia.org/wiki/ArcGIS> [6] :

<http://resources.arcgis.com/fr/help>

[7] : PDF : Ressources - Esri France - Géocoder des données à l'adresse ou à la voie  
avec ArcGIS -3/3/2014-

[8] : [http://link.springer.com/referenceworkentry/10.1007%2F978-0-387-35973-1\\_1485](http://link.springer.com/referenceworkentry/10.1007%2F978-0-387-35973-1_1485).