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A new approach to layer models at web based geographical information systems

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Abstract

Internet, which covers all the network of information systems have changed the direction of digital communication with various communication protocols. Unquestionably these new innovations in information technologies affect Geographical Information Systems (GIS). Thus; GIS databases used to be shared and carried with compact discs but now with the help of desktop GIS (DGIS) applications can be shared more easily. On the other hand web based GIS (WebGIS) applications are able to reach their databases at servers with different internet protocols. This allows mobile users to access easily; as a result popularity of WebGIS has recently increased.

WebGIS applications are able to share data requested by mobile users via HyperText Transfer Protocol (http) with the help of its dynamic content. This has caused the need for a different layer model and a work that shows compilation degree. This study explains how DIV layers are constructed with Hyper Text Markup Language (HTML) and laminated with Style sheet (CSS) codes. In this study it is explained how created layer will be shown on the place that we want of the x,y level, also the codes that are used to present with dynamic content with Active Server Pages (ASP) web programming language are explained.

Sharing of the codes that are used in this simple application is not only important for avoiding dependence to GIS programs which are the monopoly but also for introduction of DIV layer model that is tried in WebGIS applications for the first time. Therefore, the obtained results will be helpful to researchers.

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Keywords: DIV Layer; Dynamic Content; Web Based Geographical Information Systems; Web Programming.

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1. Introduction

When GIS appeared in the first years, it was called a map that was stared spatial and geographic information. Today, it is described as computerized geographic database system. There is no doubt that GIS’s turning into a tool storing and presenting geographic information has become effective in this process (ESA, 2011). GIS is used for matching, analyzing and management of a geographic area’s spatial data. With composing for making numerical mapping, it becomes an important tool that it is used for decision processes in different areas (Mohammad, 2003). In this development process, there are important contributions of Computer Aided Design (CAD) and satellite image analysis systems (Tecim and Kncal, 2004).

Increasing the need for spatial information and the giant GIS market growing in parallel to the advances of information technologies, direct its users to use dynamic maps which allow them to work with database, do questioning and make analysis. This brings out Internet GIS applications which provide an opportunity to many users which desired place (Aras and Yildiz, 2011). It is certain that internet has played an important role in turning GIS into such a different appliance in a short period of time (İneç and Akpinar, 2012).

2. Material and Method

In this work, it is emphasized that a different layer model offers in WebGIS and it is explained how dynamic content is added to created layers. For using in WebGIS applications, after DIV layers are created with Hyper Text Markup Language (HTML) codes, it is explained stratifying with Cascade Style Sheet (CSS) codes.

The WebGIS application is created with HTML, CSS and ASP codes. DIV element is stratified with Z-Index element and these layers are displayed a desired points on x, y coordinate plane. The created DIV layers are showed coding with CSS in the web page on or under which layer. The dynamic content is supplied with ASP web programming language.

3. A different layer model for WebGIS: DIV layer

3.1. Necessary Softwares

The web pages working on internet are created with some encodings. As there are some coding and programming languages which belong to different companies, there are also other languages created by independent experts. However, it is necessary to write HTML codes in a specific regularity in creating a web page. HTML codes include labels and elements. Labels are created with “<”, “>” signs. The objects desired to display on web page are written in square brackets. Effect of the command in the label is ended with “/>” sign placed before the command in the square brackets (Fig. 1).

```xml
<title>Sample</title>
```

Fig. 1. HTML label showing the title of web pages on browsers.

Indeed, HTML codes can be resembled a rough construction of a building. To create a real appearance, the dynamic content and data base connection; it is necessary to create the functions with the languages like CSS, ASP, NET, PHP, JS, etc. The codes related to these languages can be written with free applications like Notepad, and also there are some programs having characteristics to remove complexity of these complex applications resource codes. ASP.NET Web Matrix, Adobe Dreamweaver, Adobe Muse, Apple iWeb, CoffeCup, Microsoft Expression Web, Microsoft SharePoint Designer, Microsoft Visual Studio, Microsoft Visual Web Developer Express and Microsoft Publisher are these kinds of programs. For WebGIS applications, there is a need of one of these programs. Some of them are paid and some others are free. In WebGIS applications’ creating process, some other graph operating programs can be needed. This is because of the maps needing digital graphic specialty.

To follow simultaneously the developments and the failures in the created WebGIS applications, intercession with some programs personal computers can be turned into a web presenter. While there are some commercial
programs for turning personal computers into a web presenter, there are also other free applications. There are
different versions of Internet Information Services (IIS) which can run the windows-based languages like ASP and
.NET. In addition to IIS, there are other minor free applications like BabyServer which can turn windows-based
computers into a web presenter. However, to run Unix-based languages like PHP, there are needed extra different
programs (Fig. 2).

```
function name1() {
    return 'Fatih Inec';
}

echo My name is '.. name1() .'!'
```

Fig. 2. A simple code written with PHP.

3.2. Creating DIV Layers

After writing simple HTML labels on the webpage’s source codes, HTML code again is needed to create DIV
element as DIV element is a HTML label. One can create HTML and DIV label like this:

```
<html>
<head>
    <title>Sample</title>
</head>

<body>
    <div>
    </div>
</body>
</html>
```

Fig. 3. Creating DIV element.

The used computers' screens use a unique standard coordinate system on x, y plane. Then, the images on the
screen are shown by being reflected to the monitor. A similar system is valid for web pages. In this context, to
determine web page in where of WebGIS application, one should use CSS language. The simplest necessary codes
are like that:

```
<html>
<head>
    <title>Sample</title>
    <style type="text/css">
        .DIV1 {
            position:absolute; left:210px; top:150px;
        }
    </style>
</head>

<body>
    <div class="DIV1"></div>
</body>
</html>
```

Fig. 4. Determining the location in WebGIS applications, that is created with DIV label.

A definition that is named “DIV1” is made between the labels which starts with `<style type="text/css"> and
finishes </style> in the codes above. Determining “position” worth of “DIV” as “absolute” means it is slid from the beginning of page. The definition of “left” and “top” that comes after this explanation has value in pixel. Indeed this worth is a kind of little boxes on our screen. Multiplication of pixels, that explained from above to below and from left to right, explains definition of screen and definition of graphics card and monitor. It is possible to evaluate pixel units explained from above to below and from left to right as x, y plane that is reflected on computer screen. So when objects’ positions are determined in CSS codes, with pixel values from above to below, the pixel values from left to right must be given. For working this description with true DIV element, there must be written class label related with CSS code in DIV label. Because of the description done with CSS codes is “.DIV”, browsers must do relation as if class=”DIV” when they saw DIV label. Left and top distances are seen in pixel perspective defined as DIV label, are on the right 210 pixel from left and on the below 15 pixel from above of graphic (Fig. 5).

![Sample](localhost/webpages/sample.html)

Fig. 5. DIV element that its position is changed and the graph in it.

In addition to positioning objects in areas that is done with DIV element, it can be added layer characteristic to these elements with CSS. This layer model can be used to perform in WebGIS (İneç, 2012). To add layer characteristic into forms with DIV element, it must be done some simple codes with CSS. This code is Z-Index element of CSS (Fig. 6).
With Z-Index element, an unlimited number of DIV elements can be placed over and over. Also with position element, DIV elements which their positions are defined can be displayed in the desired place (Fig. 7).

These codes are needed to define DIV layers formed with Z-Index that are in which level:

```html
<html>
<head>
<title>Sample</title>
<style type="text/css">
.DIV1 {
    position: absolute; left: 210px; top: 150px; z-index: 1;
}
</style>
</head>

<body>
<div class="DIV1">img src="erz2.fw.png" width="450" height="348"></div>
</body>
</html>
```

Fig. 7. Turning DIV element into layer which its Z-Index value is 1.
Fig. 8. Image of DIV layer
In the codes above, when Z-Index value is “1” for .DIV1, for .DIV2 Z-Index value is defined as “2”. When one runs these codes in the browsers, the map showing Erzincan city borders becomes a bottom layer and the DIV layer in which it requires graph showing Erzincan’s political divisions is shown as upper layer. Graphics' being in different sizes makes different second DIV layer. .DIV2’s left and above distance value from .DIV1 in pixel. The reason of this is the second graph’ being on first graph. Another important point is that transparency color of graphs which will be showed in layer. Many numerical image coding formats support transparent ground color. Therefore, it is paid attention that the graphic extensions in the layers must be Portable Network Graphics (*.png) (Fig. 8).

3.3. Creating Dynamic Content With ASP

ASP is a Windows server-based web programming language which is distributed to the software market by the Microsoft Company. ASP contains different objects in it and develops applications which can broadcast on internet. Besides, some WebGIS applications can be written with it. To create a dynamic content, it is required to report the form in the first page by sending data to the target page about which layer must be showed. Achieving this process depends on writing the code with ASP.

Turning the layers into the dynamic layers is possible with adding new HTML codes to previous HTML codes. These codes are in these forms:

```html
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<title>Deneme</title>
</head>
<body>
<form id="form1" name="form1" method="post" action="index2.asp">
<p>
<input type="checkbox" name="katman1" id="katman1" value="1" />
Erzincan İl Sınırları<br />
<input type="checkbox" name="Katman2" id="katman2" value="2" />
Erzincan İl İdari Sınırları<br />
<input type="submit" name="Tamam" id="Tamam" value="İstediğim Katmanları Göster" />
</p>
</form>
</body>
</html>
```

![Fig. 9. Presentation of created codes in the browser.](image)

Appearance of written codes in the browser is presented below (Fig. 9): Yellow codes, which users want to see data belong to layers, belong to data base form will send to `index2.asp`
page which layers will be showed. Data sending method must be written as “post”. The place pointed with light grey is approval button that asks user first layer show. This button must require value worth for sending data to yellow data form area and index2.asp page. Moreover approval box’s worth must be appropriate to Z-Index worth. As “Katman1” is in the bottom; Z-Index value must be deficient “1” unit from “Katman2”.

Dark grey places require value weather second layer will be displayed or not. This value is written in value label. Light blue code is the button’s code which sends data in the form to index2.asp page. After pressing submit button, the data in the form is sent to index2.asp file. Index2.asp file’s codes are written in this form:

```html
<html>
<head>
<title>Deneme</title>
</head>
<body>

   <style type="text/css">
   .DIV1 { 
   position: absolute;
   left: 322px;
   top: 53px;
   z-index: <%=katman1%>;
   }
   .DIV2 { 
   position: absolute;
   left: 335px;
   top: 148px;
   z-index: <%=katman2%>;
   }
   </style>
   
</body>
</html>
```

In the codes above, ASP codes take Z-Index value which comes from index.asp page and according to holding value, they are displayed desired layer or layers. Light grey painted codes are determined by researcher and the data sent to index2.asp page are hold with ASP’s request object. The codes determined with dark grey take data with holding request object and operate them as Z-Index value (Fig. 10).

3.4. The WebGIS Created with DIV Layer

The WebGIS application prepared by the researchers has been tested on ISS (v.7) and BabyServer (v.2.7); there has not been observed any problem both in the software and the hardware view. In addition, it has been tried with moving a web browser on ftp protocol and there has not occurred any problem.
4. Conclusion and suggestion

After GIS’s turning into a global technology via internet, there is a common usage area of GIS allowing users to reach easily to cell phones from homes. This situation prepares a place to create a vast financial market. The products of many global companies which present new products to the market by aiming to have a larger share from this pie can be sometimes insufficient in spite of their many superior characteristics. There is a need to the works of researchers at the point of solving these in deficiencies and problems which appear. It can be said that there are some advances which facilitate the works of researchers and companies that work on this field with this WebGIS application formed by the researchers.

This created model has been tried before. It has been observed that it can be added many layers and it has worked even with data base. Also even it can be turned into the applications which are written with the most complex codes. The suggested model has been generated with simple codes. Indeed with iframe element losing time in dynamic structure can be reduced. Also with Z-Index element many DIV element can be stratified, with complex JS encodings some removing and approaching specific characteristics can be added these layers. DIV label and Z-Index label are standard elements and if they are used with together it can be seen to stratifying of DIV element. Fixing this application has been tried by some webmasters, but it is understood that it is firstly used in the literature as a GIS solution in the first author’s Master Thesis.
References


