Lab Assignment 3 – Google Maps API

Due Date: 01/12/2012

Overview

This lab assignment is designed to help you become familiar with Google Maps API and its potential. More importantly, you will be required to tackle a real-world project using Google Maps API. Specifically, you need to design an application to help users explore and navigate the UMD campus.

This assignment is divided into two parts:

- Part I: Getting to know Google Maps API
- Part II: Creating UMD Campus Map with Google Maps API

Part I: Getting to know Google Maps API

In past few years, Google Maps has become one of the most popular web mapping service applications. It allows the users to find any location or shortest path between stops. Users can also view the map by integrating with satellite images, all-angle camera view, and even traffic information. A more recent development of Google Maps is that it allows the users to embed maps on third-party websites via the Google Maps API using JavaScript. This means, you can "create" your own version of Google map service on your web site.

So, what is API? An API (application programming interface) is a method for an application to use the functions of an operating system or programming library. It typically consists of a set of functions, procedures, methods, classes or protocols that an operating system, library or service provides to support requests made by computer programs.

The Google Maps API provides a number of utilities for manipulating maps and adding content to the map through a variety of services, allowing you to create robust maps applications on your website. And it is free to use! To learn more about Google Maps API, you can check out the following links:

- http://code.google.com/apis/maps/index.html,
- http://code.google.com/apis/maps/documentation/JavaScript/

The Google Maps JavaScript API Version 3 is now the official JavaScript API. Version 2 of this API has been officially deprecated. The Google Maps JavaScript API lets you embed Google Maps in your own web pages. Version 3 of this API is especially designed to be faster and more applicable to mobile devices, as well as traditional desktop browser applications.

The Google Maps API application is not just for fun. In fact, it can be very useful, even in the business world. Here are two examples of application scenarios:

- Suppose you are the manager of a small business. You can create a mapping service on the website of your company. The web map can show the location of your company at

the map center. This allows the visitors quickly get a sense of your company's location and also the surrounding areas.

- The previous web mapping service can be further improved. You can add routing functions to allow users to find the driving direction from their homes to your company. The reversal routing function is also possible.

Such simple yet thoughtful mapping services on your company's website might greatly enhance the function of the website.

In this exercise, your task is to create a web mapping service with Google Maps API V3.

First, you will need to go to this page and follow the instructions to get an API key: http://code.google.com/apis/maps/documentation/javascript/tutorial.html

Then, you can start to create the most basic Google Maps API by creating a new html file (in Notepad or Komodo) and type in the code as follows.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Google Maps JavaScript API v3 Example: Map Simple</title>
    <meta name="viewport"
        content="width=device-width, initial-scale=1.0, user-scalable=no">
    <meta charset="UTF-8">
    <style type="text/css">
      html, body, #map_canvas {
        margin: 0;
        padding: 0;
        height: 100%;
      }
    </style>
    <script type="text/javascript"
        src="http://maps.googleapis.com/maps/api/js?sensor=false"></script>
    <script type="text/javascript">
      var map;
      function initialize() {
        var myOptions = {
          zoom: 8,
          center: new google.maps.LatLng(-34.397, 150.644),
          mapTypeId: google.maps.MapTypeId.ROADMAP
        };
        map = new google.maps.Map(document.getElementById('map_canvas'),
            myOptions);
      }

      google.maps.event.addDomListener(window, 'load', initialize);
    </script>
  </head>
  <body>
    <div id="map_canvas"></div>
  </body>
</html>
```

A step by step explanation on this small piece of fully functional code can be found at:
http://code.google.com/apis/maps/documentation/JavaScript/tutorial.html

This is a very simple mapping service because there are not much interaction between the users and the map. The default map center is somewhere in Sydney, New South Wales, Australia. Wouldn't it more interesting to make your home or your company as the map center?! Also, it will be nice to modify the layout and add more information to make this page more presentable. You can also modify the original codes as well. For example, you can change the map center by replacing the latitude and longitude (highlighted in green color). You can replace it with a new one of your interest. In this exercise, you will use the coordinates that you found in Lab 1.

Note: The coordinates here must be in DD format.

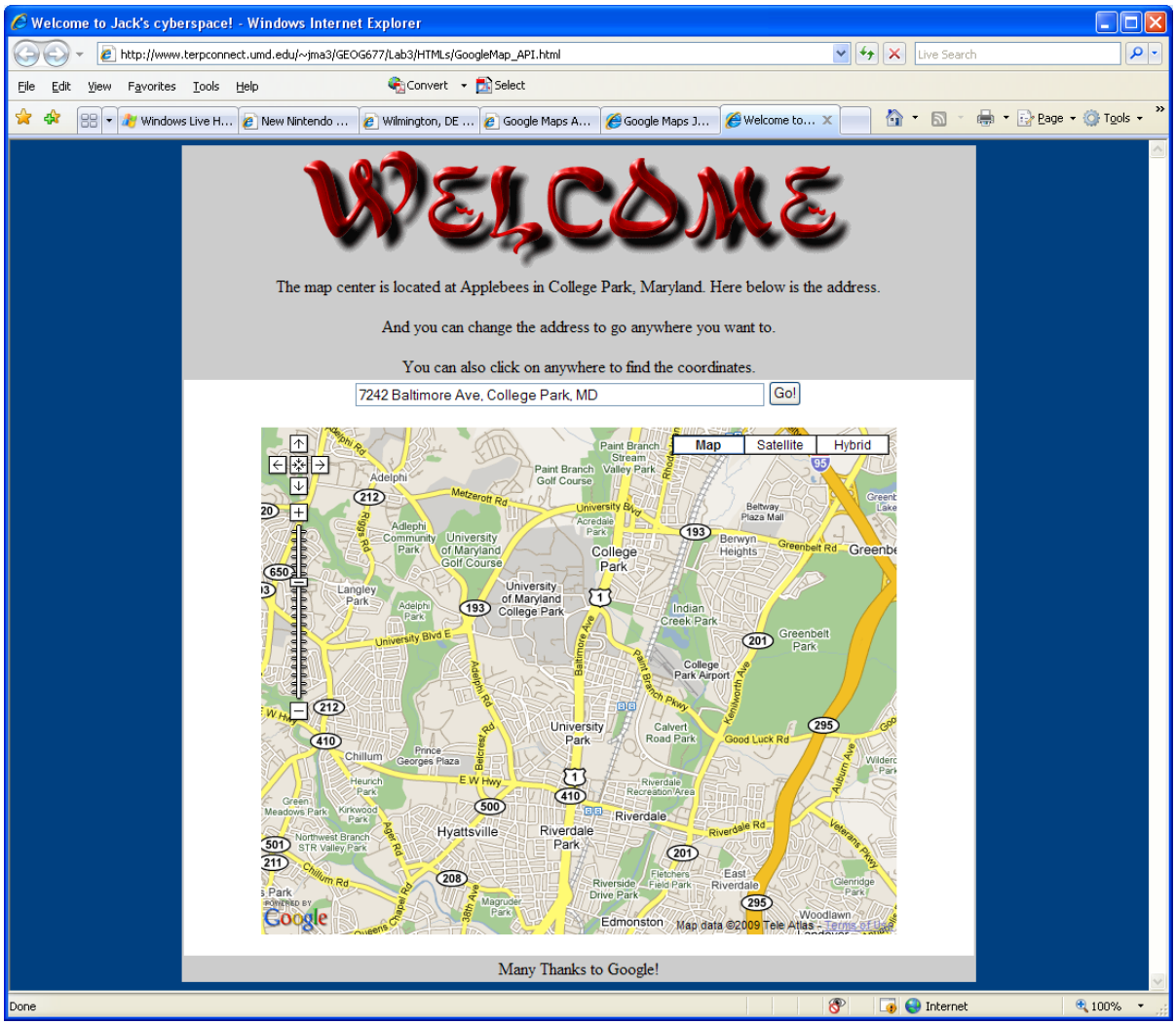
In addition, you can also change the dimensions of the map. By default, it is 500x300 Pixels. However, you can change it to any size that you prefer. For example, you can define the map as 600x400 Pixels. To do so, you will modify "width" and "height" in the codes (highlighted in green color).

There are much more you can do to improve the mapping service. For example, you can add geocoding, routing, etc. Of course, the codes will become more sophisticated. However, the updating procedures are still similar to the examples above.

To find more examples and thus codes, you can visit this link:
http://code.google.com/apis/maps/documentation/javascript/examples/index.html

You will be surprised by the potential.

Here is an example of mine:
http://www.terpconnect.umd.edu/~jma3/GEOG677/Lab3/HTMLs/GoogleMap_API.html



Your tasks:

- Create a web page.
- Modify the codes to add more functions. The minimum functions include:
  - Zoom control (by default)
  - Map type switch control (by default)
  - Change the map center of your specific interested location (e.g. home, work place, favorite landmark, etc.)
  - **Note:** Since there are a lot of possibilities, you can be creative by adding any functions you want to. The only requirement is that the web site must be robust and functioning well.
- Notice that I have added some extra functions (e.g. routing or identifying the coordinates of any location on map) beyond the default codes. You don't need to worry about them for now. And you will use them in Part II.
- Upload the HTML file to the server

Part II: Creating UMD Campus Map with Google Maps API

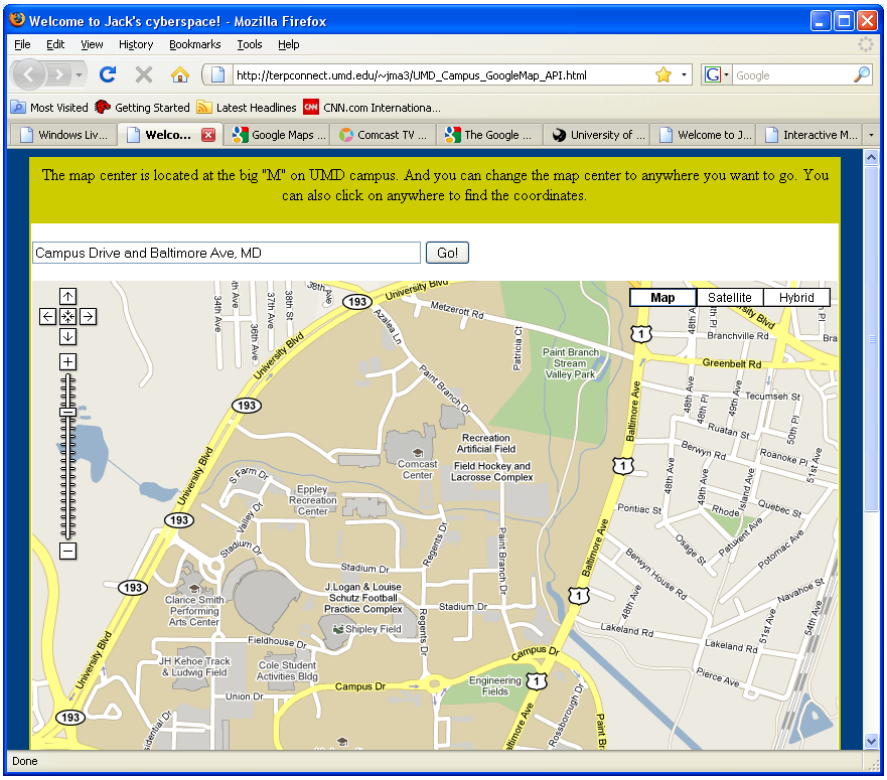
Now that you have learned the basics of Google Maps API and how it works, it is time to implement in real-world issue.

There have been many complaints about the current mapping service in the University of Maryland. For example, currently the campus map is only available in static PDF format - http://www.uga.umd.edu/admissions/visit/directions/campusmap.asp The major drawback is that you cannot do any search or query with the static map.

There is another map of parking which is more interactive but is particularly difficult and ineffective to use - http://www.parking.umd.edu/themap/ The major drawback is that the map is small and difficult to use the basic mapping tools such as Zoom In/Out.

Dr. Stephen Prince in the Geography Department has tried to raise the issue many times with the University but nothing has changed so far. We have had some discussions recently about developing some simple demos to show that we can actually create something that is more powerful and easier to use than the current campus map online.

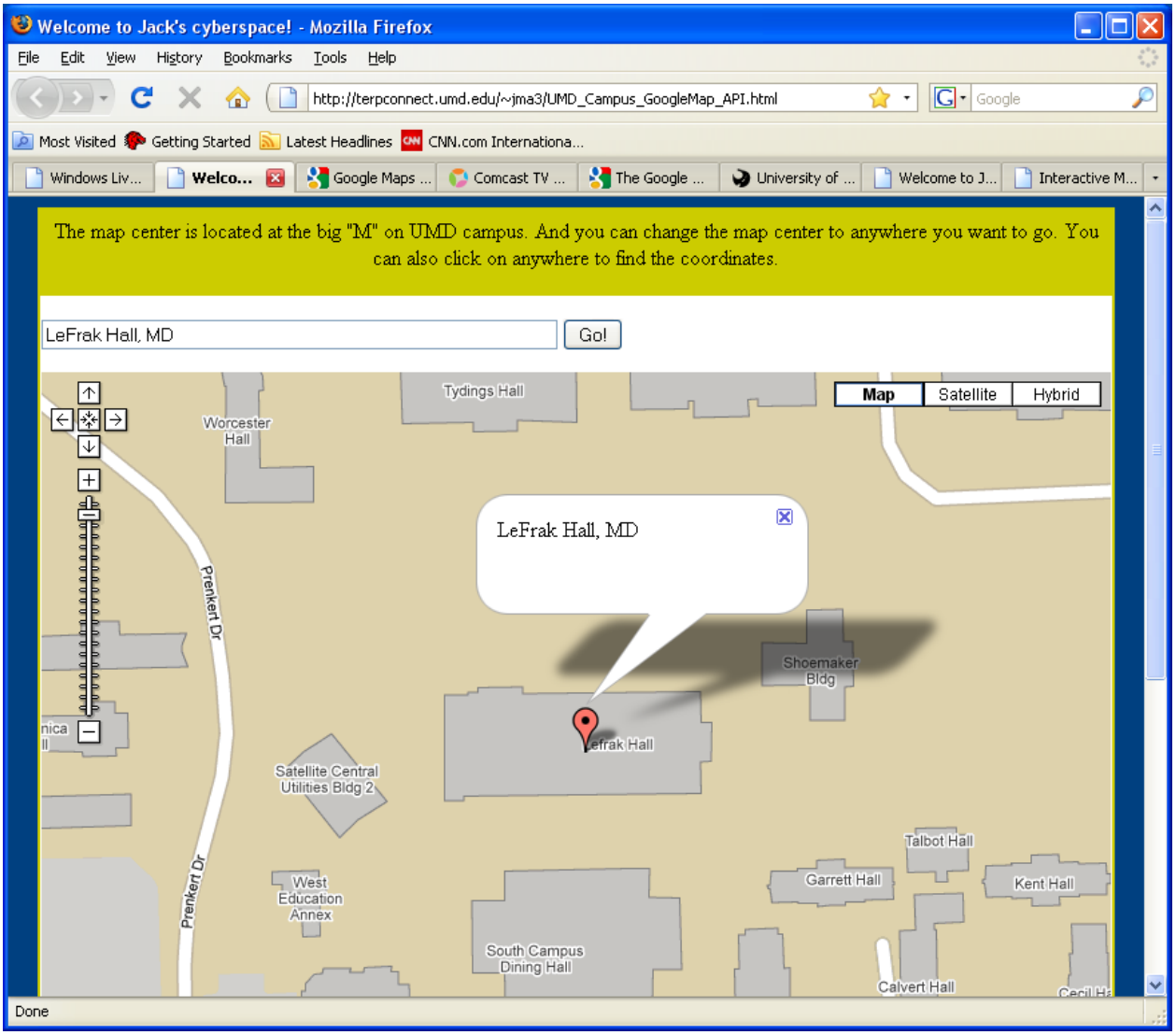
So, I have modified the example that I created previously to create a demo about UMD campus map using Google Maps API.
http://terpconnect.umd.edu/~jma3/UMD_Campus_GoogleMap_API.html



Note:

- Unlike any other places on Google Map, the buildings on campus are actually shown with polygons representing the shapes of the buildings. This is something new that just becomes available since December 2009! I have done some tests recently. It seems that all the major universities and colleges in the country have been provided these features by Google.
- When you zoom in the map, all the buildings are labeled.
- Using the search bar, you can type in an address or even the interaction of roads to create an icon representing the location. This feature is very helpful if you know the address.

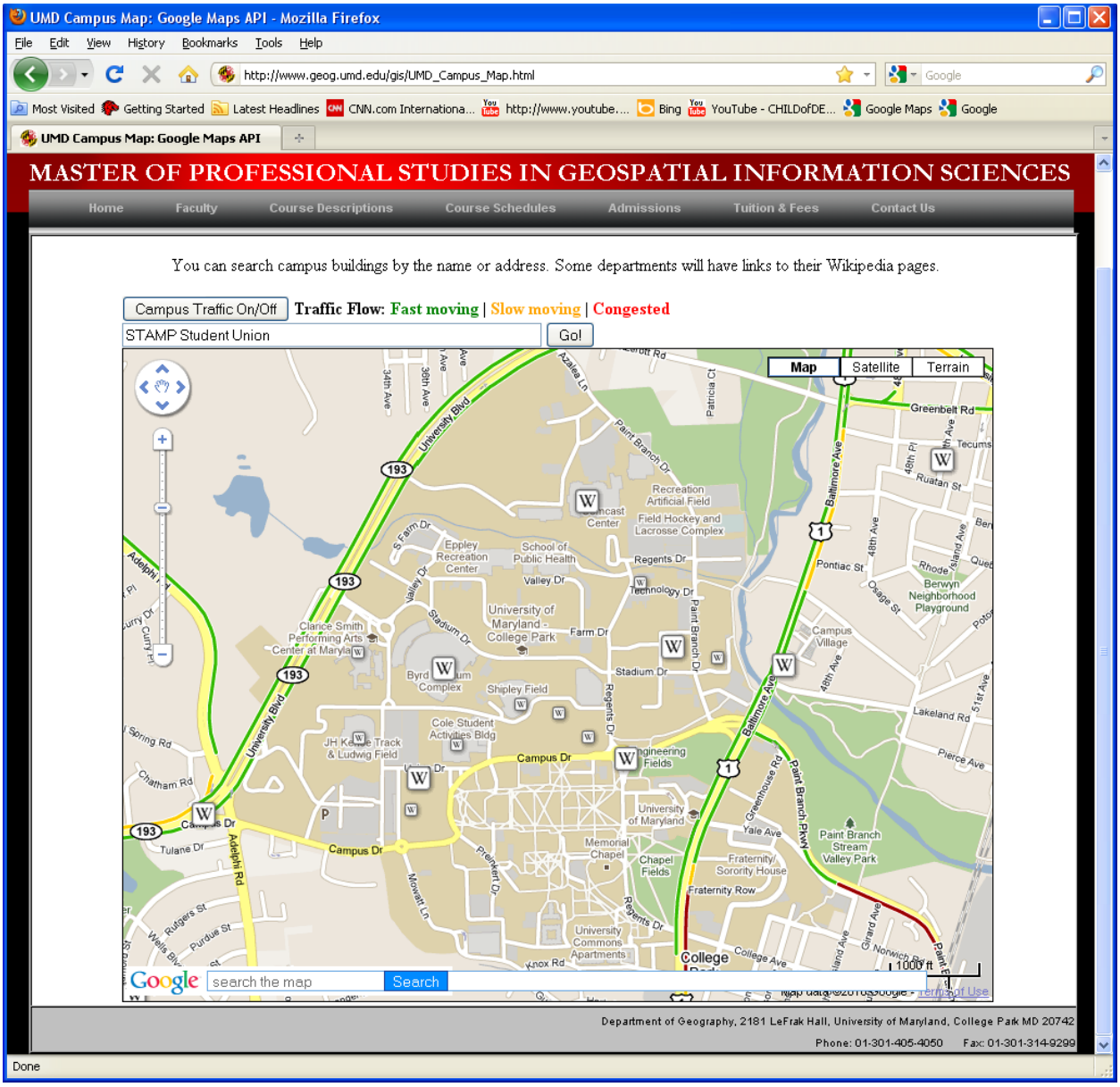
However, the best feature of this service is that a user can search any building on campus by typing the building name. For example, I can search and find LeFrak Hall.



Obviously, these features can be very helpful to users when they try to navigate the UMD campus.

Here below is another example that is similar but has more functionalities or features:

http://www.geog.umd.edu/gis/UMD_Campus_Map.html



Your tasks:

- Create a Google Maps API (i.e. a new web page) using the skills you learned in Part I.
- Check out the source code of those two examples (http://terpconnect.umd.edu/~jma3/UMD_Campus_GoogleMap_API.html OR http://www.geog.umd.edu/gis/UMD_Campus_Map.html). Then you will modify it so that those functions will work in your own web site.
- Now you want to add some new features by referring to this source - http://code.google.com/apis/maps/documentation/javascript/examples/index.html There are a lot of features that can be potentially used to enhance this UMD Campus API. Just imagine that you have never been UMD campus, how you want to explore the campus and what kind of online tools you would prefer.
    - Suggestions: You may want to try some of the "Overlays" and "Layers" samples.
    - For example: layer-kml.html You can combine some skills from Lab 2 and integrate it into this lab.
- Before you wrap up the work, I strongly recommend you to spend some time on the web design to make it more user-friendly. The example I provided has a very simple design. Yours should look much nicer.

Be creative!

This is ongoing process. We may redesign this UMD Campus Map using ArcGIS Server or even combine with APIs later on.

Make sure you create a link to your Lab3 results on your Web site. The TA will grade your work from there.

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