

Dynamic Maps in Acemap

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***Abstract.** The work is based on the Acemap. We will adjust the information in the scholarly networks according to user's actions and change the maps of the networks dynamically. The work is divided in terms of fields and we can return the information of certain authors, papers and fields in order to help user find the best match*

***Keywords:** dynamic, MySQL, highchars, force-directed graph.*

1. Introduction

It is known to us that Acemap is used for quick search in the areas of academic fields. Since it is designed for the users in the academic areas, we are supposed to meet as many users as possible in order to expand our share. In daily life we often run into such situation that we want to search information related to an author or a field, but we have no idea about something like the hottest papers or the co-authors. So we need to implement such function that help the user focus on what he wants to find swiftly and directly. Also, a map which shows the relationships between the searched information and other things related to the information is more helpful for users since we may have a vague target. Therefore, we choose to implement such map in a dynamic way.

2. Models and Steps

Since we are supposed to implement the dynamic maps in Acemap, it is a tough journey which can be divided into the following parts: Front end layout, 3D dynamic map implementation, Back end implementation and Data select from MySQL. And I will introduce and explain them in a detailed way.

2.1. Front end layout

In order to match the origin style of the Acemap, we have taken some methods to rearrange our layout. We apply the similar arrangement as the previous one. The website is used as an entrance to our map and we can demonstrate the fields in an elegant way in the figure 1.

The fields of each icon and the origin map of each field will be shown in the middle of the website. We have sorted the fields by their layers as well and each field we click will lead us to certain website to diminish our range of search and this is shown in the figure 2.

During the process of implementation, we use the function of responsive mode and it can be archived easily through our click and thus it is linked to our dynamic map.

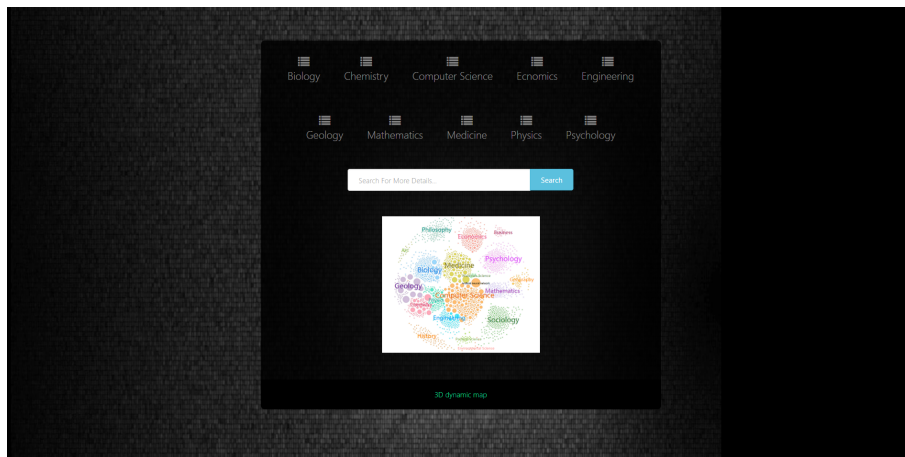


Figura 1. The layout of the entrance

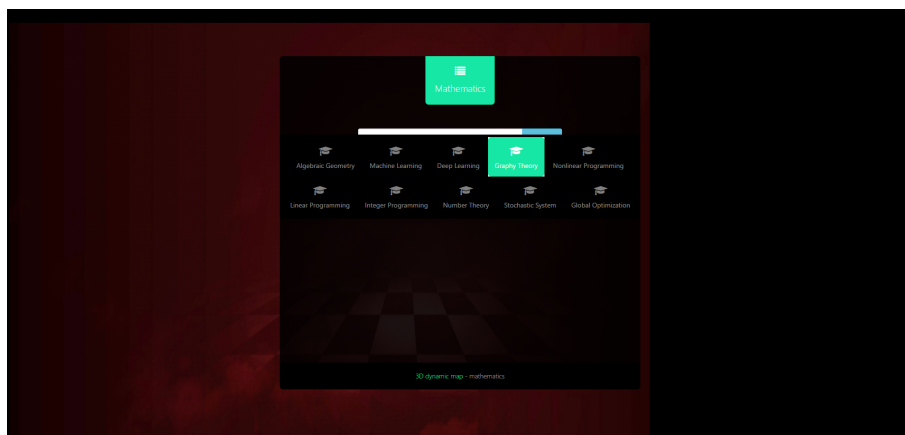


Figura 2. The layer of the fields

2.2. 3D dynamic map implement

This is the main part that we have to take into consideration. In order to show the academic maps in react to users' clicks in order to get close to the final result, we need to apply a certain framework to show the different layers in a 3D way. After we comparing the advantages and disadvantages of each framework, we finally choose the Highcharts.js as our implementation since it has the 3D scatter chart function whose effect is shown in the Figure 3.

However, only this method cannot meet our standard, we have to dealing with certain problems while trying to implement the dynamic maps. Firstly, we have to show the relationship between the certain results in the maps, so we are suppose to establish links between each part. In order to change that plot from points to lines, first change the `colorByPoint` to `false`. Then add `lineWidth: 1`. That will get you lines. To remove the vertex markers, add to `plotOptions.scatter`. The sample function is shown in the form of code.

```

1 |
2 | chart.addSeries({
3 |   type: 'scatter',
4 |   data: [[x, y, z], [tx, ty, tz]],

```

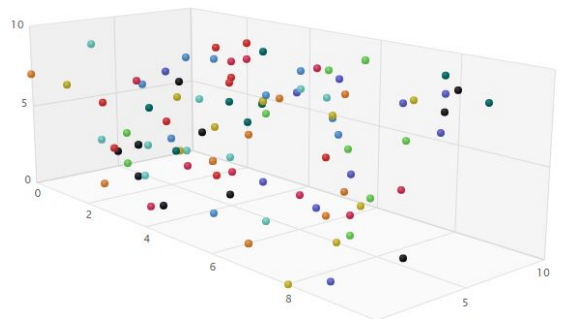


Figura 3. Example of 3D scatter chart

```

5 |
6 | // data:[[x,y,0],[100,200,200]],
7 | marker: {
8 |   enabled: false
9 | },
10 | },
11 | lineWidth:1
12 |
13 | });

```

Meanwhile, it has troubled us a lot that how can we illustrate the map in a elegant way instead of in a chaos. We decided to take the advantage of the D3.js and apply its idea of force-directed graph. We can realize the effect that a physical simulation of charged particles and springs places related characters in closer proximity, while unrelated characters are farther apart. After combing the two methods, we can get the follwing chart:

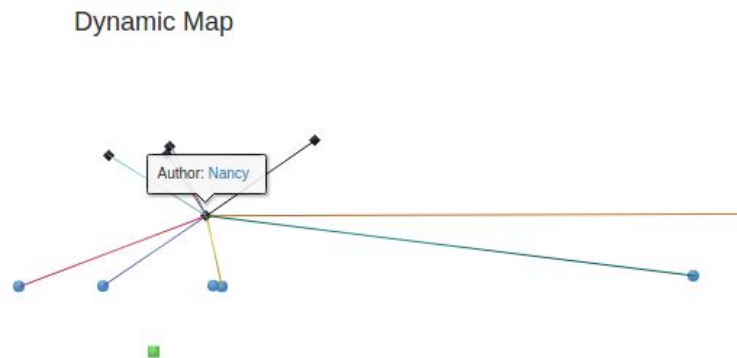


Figura 4. 3D map with force-directed function

2.3. Back end implement

From the graph that showed in the above, when we clicked the circle that represent the author, paper or the fields, we will get the top related authors, papers and the fields in return. We can also get the related information and description about the certain author, paper or the field as well. The response is archived in the back end. We implement the function by using the fragment as the following sentences:

```

1 |
2 | public function queryauthor() {

```

```

3 |         $id = $this->input->get('AuthorID');
4 |         $this->db_mag = $this->load->database('mag', TRUE);
5 |         $sql="SELECT AuthorName FROM Authors WHERE AuthorID=?";
6 |         $tmp=$this->db_mag->query($sql,array($id)->result_array
7 |             ( );
8 |         $result['Name']=$tmp[0]['AuthorName'];
9 |         echo json_encode($result);
    |     }

```

Also, after it shows the basic information of different relationships, the map will expand to a larger scale and we need to obtain such information like PaperID of the expanded information. The part of the code is similar as the above in the logic.

2.4. Data select from MySQL

As known to all, mysql provide quick seek for our request. There are several databases in our SQL and what we need to do is to select the useful information that we need and apply it to the user's actions. Firstly, if the user clicks on the author, we need to obtain related information of , this will be implemented in the back end and require certain reaction in the database. If we are given the author name, we will return the information about his co-authors and related papers and the authors' affiliation the following code shows the main logic of the function:

```

1 |
2 | $sql = "SELECT distinct PaperID FROM PaperAuthorAffiliations
3 |     WHERE AuthorID like '$originalauthor'";
4 | $result = $conn->query($sql);
5 | if ($result->num_rows > 0) {
6 |     // output data of each row
7 |     while($row = $result->fetch_assoc()) {
8 |         echo "PaperID: " . $row["PaperID"] . "\r\n ";
9 |         $papers[$papernum]=$row["PaperID"];
10 |        $papernum = $papernum +1;
11 |     }
12 | } else {
13 |     echo "0 results";
    | }

```

Secondly, just like the above function, when we click on the paper, the maps will show the related information of the paper by selecting from the sql. Those functions will be used as part of the dynamic map in order to demonstrate the related information shown under the map site.



Author Nancy

Paper:

- *Quantitative Reverse Transcription–Polymerase Chain Reaction to Study mRNA Decay: Comparison of Endpoint and Real-Time Methods , 2000
- *Effect of experimental treatment on housekeeping gene expression: validation by real-time, quantitative RT-PCR , 2000
- *Diverse gene expression pattern during 5-fluorouridine-induced apoptosis. , 2005
- *Expression of prostate specific membrane antigen and three alternatively spliced variants of PSMA in prostate cancer patients , 2003
- *Characterization of nitric oxide production following isolation of rat hepatocytes. , 2000

Co-author:

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Figura 5. Examples of the related information

Last step, if we decide to click on a certain field, we are supposed to retrieve top ten papers in such fields. However, we cannot deal with the step directly, so we need to operate on the database and obtain a file with top ten papers in a format of csv. The logic of the step is we obtain the related papers and restore them in an array in a php file. Then we can deal with the array by sorting and return the top ten papers by its citations. The core code of sorting is shown in the below:

```

1 |
2 | function my_sort ($arrays, $sort_key, $sort_order=SORT_DESC,
   | $sort_type=SORT_NUMERIC ) {
3 |     if(is_array($arrays)) {
4 |         foreach ($arrays as $array) {
5 |             if(is_array($array)) {
6 |                 $key_arrays[] = $array[$sort_key];
7 |             }else{
8 |                 return false;
9 |             }
10 |         }
11 |     }else{
12 |         return false;
13 |     }
14 |     array_multisort ($key_arrays, $sort_order, $sort_type, $arrays);
15 |     return $arrays;
16 | }

```

After implementing such function, we should restore the information in a format of csv and it is shown in the below:

27	2246634	79b42012	24		
28	2246634	7D35DB8E	18		
29	2246634	8105FB48	16		
30	2246634	7EC12739	12		
31	02C1553B	798D9D81	123		
32	02C1553B	7E9899D1	85		
33	02C1553B	7747F12E	77		
34	02C1553B	5D52D4F1	28		
35	02C1553B	75DCCE30	17		
36	02C1553B	6FAF81CD	12		
37	02C1553B	733B5620	4		
38	02C1553B	7AB7005C	4		
39	02C1553B	79467ABF	1		
40	02C1553B	7A61153E	1		
41	02CF7C78	809C49CD	321		

Figura 6. Top ten papers in the format of csv

3. Demo

All the work is now combined preliminarily and shown in the figure and we can see that the map can react to user's operation. The whole dynamic maps is shown in the Figure 7.

4. Future work

For future work, we need to improve and perfect our interface and take advantage of the above methods. Also the design of the site will be rearranged in order to be suitable for

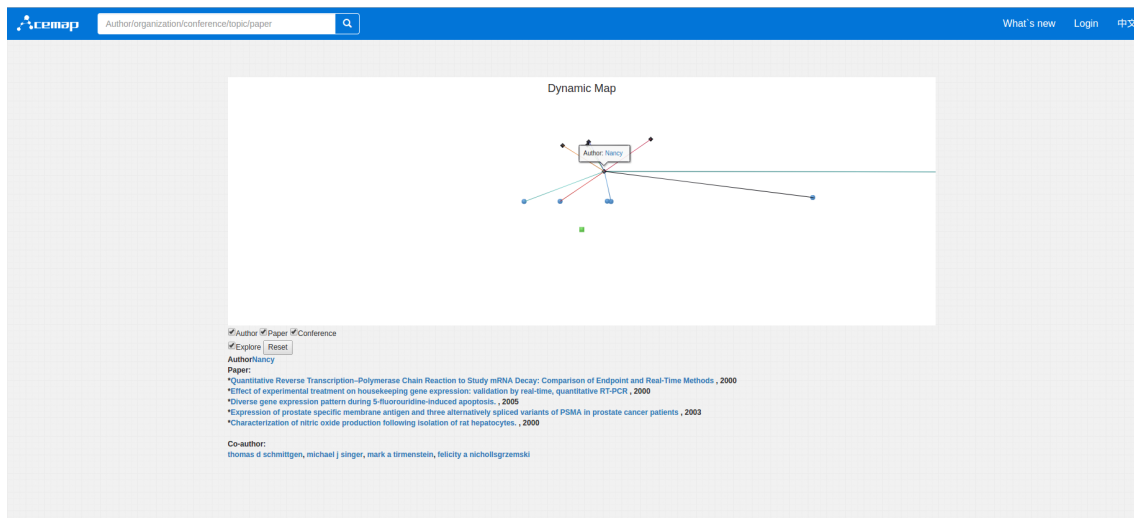


Figura 7. The total website and the display

a more complex environment. Apart from this, we will improve the appearance of our interface and make it more felxible for more use. Since the user may require a better interaction between the map and himself, we are supposed to make the interaction more easier and more efficient. Thus we can provide them with a enjoyable seeking journey. All these still require our efforts.

5. Conclusion

By the week thirteen, we have done the main framework of the dynamic map. It requires excellent cooperation of all the group. In order to improve the experience of the users in Acemap, there is still a long tough journey for us to complete. In addition, from the course and the project, I can have a rough understading of academic group work and cooperation, so I need to thank Professor Wang and Professor Tian for their excellent guide and the TAs for their great help.