BF768 Spring 2022 Homework 4

Due: Saturday April 30, 2022 at 11:59 pm EST

General Policy on Homework Collaboration: Except as otherwise noted, all problem sets/homeworks are to represent individual effort and are to be written up and turned in individually. This does not preclude talking about a problem set with other class members; in fact, working together is encouraged, since it is one of the skills of modern science. The only requirement is that if you work on a problem set with other people, please note on the write-up with whom you worked.

Description: You'll be using javascript AJAX to query the miRNA database and produce a table output, and using Google charts to produce a histogram of miRNA results.

Problem. Create an HTML file called **yourname_AJAX_and_charts.html** and a python file called **yourname_AJAX.py**. The objectives are:

- the html file will contain html elements and javascript that sends AJAX requests to the python program and produces a table and a histogram from the AJAX returned results without refreshing the page (no forms in the html).
- The python program will accept AJAX requests, query the miRNA database, and send back data to the html page.

HTML file:

The **html <head>** should load jquery and google charts.

The **html <body>** should contain two parts, each with an <h2> header, as shown in bold below, and the specified elements:

1. **Target Scores Histogram**: A text box to take the name of a miRNA, a button that says "target scores histogram", and a to hold a google chart histogram of the target scores of genes targeted by that miRNA.
2. **miRNA Sequence Search**: A text box to take an RNA search sequence of three to eight characters (ACGU is the alphabet), a button that says "find miRNAs", and a to hold a table of the names and sequences of miRNAs that have sequences containing the search sequence (regexp search).

The **javascript <script>** should contain functions that provide the following actions:

3. When the "target scores histogram" button is clicked,
    a. Check that there is text in the miRNA name textbox and return an alert if there isn't, otherwise:

   b. erase any existing histogram or error message from the
   c. send an AJAX request to the python program, with the miRNA name and a selector variable indicating that this request is for the chart data
   d. if the return data is empty, print an error message in the : "There was no data for the miRNA name [name entered]" with the entered miRNA name replacing the square brackets, otherwise:
   e. format the returned data for the histogram
   f. call google charts to create the histogram
   g. display the new histogram in the appropriate
4. When the "find miRNAs" button is clicked,
   a. check that the input is valid (three to eight characters, all from the ACGU alphabet) and return an alert if it's not, otherwise:
   b. erase any existing table or error message
   c. send an AJAX request to the python program, with the search sequence and a selector variable indicating the request is for the sequence search
   d. if the return data is empty, print an error message in the : "There were no miRNAs matching your sequence [sequencer entered]" with the entered sequence replacing the square brackets, otherwise:
   e. format the return data for a table
   f. display the new table in the appropriate

Python Program:

The python file should contain code that receives input from the AJAX requests, queries the miRNA database and returns results. Your program should:

5. Check for form data and if there is none, return an empty page (only return print("Content-type: text/html\n"))
6. Use the selector variable to determine if the request is for the chart or the table
7. Query the database and return the desired results as a JSON object (using print(json.dumps(results))

Additional requirements:

8. Near the miRNA name text box, there should be two examples of miRNA names that the user can test.
9. Near the RNA sequence text box, there should be a statement about the allowed alphabet characters.
10. There should be no error messages on first accessing the html page.
11. The histogram should have a title: "Histogram of gene targeting scores for [miRNA name entered]".
12. The table should have a title: "Table of miRNA sequences matching [sequence entered]".

13. The columns of the table should be labeled “miRNA” and “sequence”.
14. There should be a summary statement at the top of the html page stating what the page does.
15. The input text boxes and buttons should always be displayed on the page since there is no page refresh. It’s not necessary to erase the contents from the text boxes.

To submit this homework:

1. Put the python program in your cgi-directory and give it execute privileges for all. It should be reachable at:

   https://bioed.bu.edu/cgi-bin/students_22/username/yourname_AJAX.py

2. Put the html file in your html directory and give it read privileges for all. It should be reachable at:

   https://bioed.bu.edu/students_22/username/yourname_AJAX_and_charts.html

3. On blackboard, under HW4, submit your python CGI program and your html file.