Web Technology for bioinformatics

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Aim:
To create a webpage using html, css, php and mysql.

Task - 1:

Write a PHP script to input the sequence and display the output.

Algorithm:

Step 1 : Write html script to input protein sequence and redirect to php script(html file).

Step 2 : Write php scripts to take input protein sequences by using the $_POST method(php file).

Step 3 : Extract the one letter from sequence using substr function and iterate letter through loops and calculates the properties of amino acids.

Step 4: print the result with properties.

Program:

The code below is written in an html file:

```
<!DOCTYPE html>
<!--
   Author : Dharineesh K S
   Regno  : 123013012
-->
<head>
   <title>ex2_task1_html</title>
   <style>
      body{
         font-family: "Times New Roman";
      }
   </style>
</head>
<body>
   <form method="POST" action="ex2_task1_php.php">
      <table align="center">
         <tr>
            <td><textarea rows="20" cols="30" name="seq" placeholder="Enter protein sequence"></textarea></td>
         </tr>
         <tr><td colspan="2">
               <pre>       <input type="submit" value="calculate">      <input type="reset" value="clear"> </pre>
            </td>
         </tr>
      </table>
   </form>
</body>
</html>
```

Output of html script:

Input sequence:

“VHLTAEEKAHVSGLWGKVNTEEVGGEALGRLLVVYPWTQRFFETFGDLSSANAIMNNPKVKAHGKKVLSSFSDGLKN
LDNLKGTFAALSELHCDKLHVDPENFKLLGNVLVCVLAHHFGKEFTPQVQAAYQKIVAGVANALAHKYH”.

The code below is written in a php file:

```
<?php
/*
   Author : Dharineesh K S
   Regno  : 123013012
*/
echo "
<html>
<head>
  <title>ex2_task1_php</title>
  <style type=\"text/css\">
     body {
        font-family: \"Times New Roman\";
        margin-top: 10%;
     }
     table {
         width: 50%;
     }
     tr:nth-child(even) {
         background-color: #f2f2f2 ;
     }
   </style>
</head> ";

echo"<body>";

$seq = $_POST["seq"];

$tiny = 0;
$small = 0;
$aliphatic = 0;
$aromatic = 0;
$nonpolar = 0;
```

```
$polar = 0;
$charged = 0;
$basic = 0;
$acidic = 0;

for($i=0;$i<strlen($seq);$i++)
{
   $sub = substr($seq,$i,1);
   #tiny
   if ($sub == "A" || $sub == "C" || $sub == "G" || $sub == "S" || $sub == "T")
   {
      $tiny++;
   }
   #small
   if ($sub == "A" || $sub == "C" || $sub == "D" || $sub == "G" || $sub == "N" ||
$sub == "P" || $sub == "S" || $sub == "T" || $sub == "V")
   {
      $small++;
   }
   #aliphatic
   if ($sub == "A" || $sub == "I" || $sub == "L" || $sub == "V")
   {
      $aliphatic++;
   }
   #aromatic
   if ($sub == "F" || $sub == "H" || $sub == "W" || $sub == "Y")
   {
      $aromatic++;
   }
   #nonpolar
   if ($sub == "A" || $sub == "C" || $sub == "F" || $sub == "G" || $sub == "I" ||
$sub == "L" || $sub == "M" || $sub == "P" || $sub == "V" || $sub == "W" || $sub
== "Y")
   {
```

```
        $nonpolar++;
    }
    #polar
    if ($sub == "D" || $sub == "E" || $sub == "H" || $sub == "K" || $sub == "N" ||
$sub == "Q" || $sub == "R" || $sub == "S" || $sub == "T" || $sub == "Z")
    {
        $polar++;
    }
    #charged
    if ($sub == "B" || $sub == "D" || $sub == "E" || $sub == "H" || $sub == "K" ||
$sub == "R" || $sub == "Z")
    {
        $charged++;
    }
    #basic
    if ($sub == "H" || $sub == "K" || $sub == "R")
    {
        $basic++;
    }
    #acidic
    if ($sub == "B" || $sub == "D" || $sub == "E" || $sub == "Z")
    {
        $acidic++;
    }
}
echo"
<table align = center >
<tr><td>Tiny      </td><td>(A+C+G+S+T)              </td><td>".$tiny."
</td></tr>
<tr><td>Small     </td><td>(A+C+D+G+N+P+S+T+V)       </td><td>".$small."
</td></tr>
<tr><td>Aliphatic </td><td>(A+I+L+V)
</td><td>".$aliphatic."</td></tr>
<tr><td>Aromatic  </td><td>(F+H+W+Y)                </td><td>".$aromatic."
```

```
</td></tr>
<tr><td>Nonpolar  </td><td>(A+C+F+G+I+L+M+P+V+W+Y)
</td><td>".$nonpolar." </td></tr>
<tr><td>Polar     </td><td>(D+E+H+K+N+Q+R+S+T+Z)
</td><td>".$polar."    </td></tr>
<tr><td>Charged   </td><td>(B+D+E+H+K+R+Z)
</td><td>".$charged."  </td></tr>
<tr><td>Basic     </td><td>(H+K+R)                </td><td>".$basic."
</td></tr>
<tr><td>Acidic    </td><td>(B+D+E+Z)               </td><td>".$acidic."
</td></tr></table>";
echo"</body>";
echo"</html>";
?>
```

Output of php script:

Tiny	(A+C+G+S+T)	42
Small	(A+C+D+G+N+P+S+T+V)	75
Aliphatic	(A+I+L+V)	50
Aromatic	(F+H+W+Y)	22
Nonpolar	(A+C+F+G+I+L+M+P+V+W+Y)	82
Polar	(D+E+H+K+N+Q+R+S+T+Z)	64
Charged	(B+D+E+H+K+R+Z)	38
Basic	(H+K+R)	24
Acidic	(B+D+E+Z)	14

Task 2 - A :

Develop a Graphical user interface for Ligand Database using PHP and Mysql.

Algorithm:

Step 1: write a html code to get input molecular weight from the user.
Step 2: write a php script to create the user interface and search the whole ligand database based on molecular weight.
Step 3: write a separate php script for the display image.

Program:

The code below is written in an html file.

```
<!DOCTYPE html>
<!--
  Author : Dharineesh K S
  Regno  : 123013012
-->
<head>
  <title>ex2_task2_A_html</title>
  <style>

    input[type=text] {

      border: 1.5px solid;
    }

    input[type=submit] {
      border: 3px solid;
      padding-left: 5px;
      padding-right: 25px;
      padding-top: 3px;
      padding-bottom: 3px;
```

```
        }
        table {
            border: 2px solid;
            padding: 10px;
        }
        body {
            font-family: "Times New Roman";
        }
    </style>
</head>
<body>
<form method="POST" action="ex2_task2_php.php">
    <table cellpadding = 10px align="center">
        <tr>
            <td></td>
            <td align="center"><b>From</b></td>
            <td align="center"><b>To</b></td>
        </tr>
        <tr>
            <td><b>Molecular Weight</b></td>
            <td><input type="text" name="from" placeholder="from"></td>
            <td><input type="text" name="to" placeholder="to"></td>
        </tr>
        <tr>
            <td></td>
            <td colspan="2" align="center"><input type="submit"
value="submit"></td>
        </tr>
    </table>
</form>
</body>
</html>
```

Output of html scrip:

Input :

From : 115

To : 120

The code below is written in a php file:

```
<?php
/*
   Author : Dharineesh K S
   Regno  : 123013012
*/
echo "
<html>
<head>
<title>ex2_task2_A_php</title>
<style type=\"text/css\">
body {
   font-family: \"Times New Roman\";
   align-text : center;
}
table {
   border-collapse : collapse
}
</style>
</head> ";
echo"<body>";
$con = mysqli_connect("localhost","root","") or die("Error in connection");
mysqli_select_db($con,"imp") or die("Database is not exists");
$from = $_POST["from"];
$to = $_POST["to"];
$sql = "select * from ligands where molecular_weight>=$from and
molecular_weight<=$to";
$query = mysqli_query($con,$sql) or die("Error in sql query syntax");
echo "
<table align= 'center' border='2'>
<tr>
<th>Ligand_id       </th>
<th>Pubchem_id      </th>
```

```
<th>Ligand_name      </th>
<th>Molecular weight </th>
<th>HBD              </th>
<th>HBA              </th>
<th>Rotatable bond   </th>
<th>Structure        </th>
</tr> ";
while($row = mysqli_fetch_array($query))
{
   $id               = $row['id'];
   $pubchem_id       = $row['pubchem_id'];
   $name             = $row['name'];
   $molecular_weight  = $row['molecular_weight'];
   $Hbond_donor_count = $row['Hbond_donor_count'];
   $Hbond_accep_count = $row['Hbond_accep_count'];
   $rotatable_bond    = $row['rotatable_bond'];
   $str              = $row['str'];
   echo "
   <tr>
   <td>$id</td>
   <td align=right>$pubchem_id</td>
   <td align=right>$name</td>
   <td align=right>$molecular_weight</td>
   <td align=right>$Hbond_donor_count</td>
   <td align=right>$Hbond_accep_count</td>
   <td align=right>$rotatable_bond</td>
   <td><img src=ex2_task2_structure.php?ids=$id
width='200'height='200'></td>
   </tr> ";
}
echo "</table>";
echo "<p align = center>HBD corresponds to Hydrogen Bond Donor Count and
HBA corresponds to
Hydrogen Bond Acceptor Count.</p>";
```

```
mysqli_close($con);
echo"</body>";
echo"</html>";
?>
```

The code below is written in a php file:

```php
<?php
/*
   Author : Dharineesh K S
   Regno  : 123013012
*/
header("content-type:image/png");
$ligand_id = $_GET["ids"];
$con = mysqli_connect("localhost","root","") or die("Error in connection");
mysqli_select_db($con,"imp") or die("Database is not exists");

$sql = "select str from ligands where id='$ligand_id'";
$query = mysqli_query($con,$sql) or die("Error in sql query syntax");
$row = mysqli_fetch_array($query) or die("Error in mysql fetch syntax");
$struct = $row['str'];
echo "$struct";

mysqli_close($con);
?>
```

Output of php script:

Ligand_id	Pubchem_id	Ligand_name	Molecular weight	HBD	HBA	Rotatable bond	Structure
LDA000001	247	Abromine (betaine)	117.146	0	2	2	
LDB000002	247	Betaine	117.146	0	2	18	

HBD corresponds to Hydrogen Bond Donor Count and HBA corresponds to Hydrogen Bond Acceptor Count.

Task 2 -B :

Design a web page that contains alphabetical letters starting from A to Z. Provide a hyperlink or internal references to each alphabetical letter which redirects a PHP script that retrieves the ligand details staring with that alphabetical letter.

Algorithm:

Step 1: write a html script to create hyperlinks for alphabets.

Step 2: write a php script to search the whole ligand database based on the first letter.

Step 3: print the output.

Program:

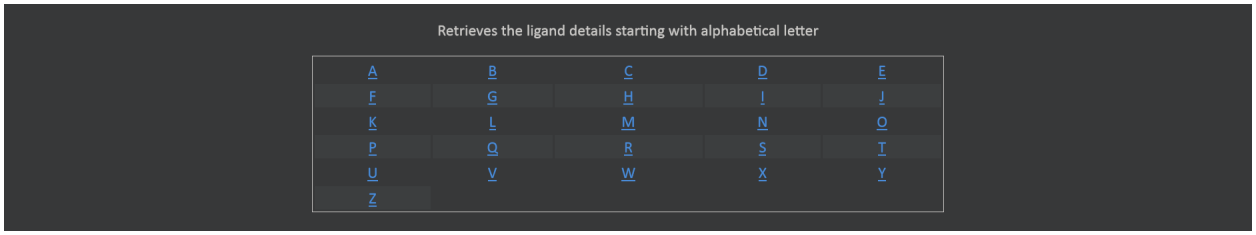
The code below is written in an html file.

```
<!DOCTYPE html>
<!--
  Author : Dharineesh K S
  Regno  : 123013012
-->
<head>
  <title>ex2_task2_B_alpha_hyperlinks_html</title>
  <style>
    table{
      border: 1px solid;
    }
    body {
      font-family: "Times New Roman";
    }
    table {
      width: 50%;
    }
    tr:nth-child(even) {
      background-color: #f2f2f2 ;
    }
  </style>
</head>
<body>
  <p align = "center">Retrieves the ligand details starting with alphabetical letter</p>
  <table align="center" cellpadding = 2px>
    <tr>
      <td align="center"><a href ="ex2_task2_alpha.php?var=A">A</a></td>
      <td align="center"><a href ="ex2_task2_alpha.php?var=B">B</a></td>
      <td align="center"><a href ="ex2_task2_alpha.php?var=C">C</a></td>
```

```
        <td align="center"><a href ="ex2_task2_alpha.php?var=D">D</a></td>
        <td align="center"><a href ="ex2_task2_alpha.php?var=E">E</a></td>
      </tr>
      <tr>
        <td align="center"><a href ="ex2_task2_alpha.php?var=F">F</a></td>
        <td align="center"><a href
="ex2_task2_alpha.php?var=G">G</a></td>
        <td align="center"><a href
="ex2_task2_alpha.php?var=H">H</a></td>
        <td align="center"><a href ="ex2_task2_alpha.php?var=I">I</a></td>
        <td align="center"><a href ="ex2_task2_alpha.php?var=J">J</a></td>
      </tr>
      <tr>
        <td align="center"><a href
="ex2_task2_alpha.php?var=K">K</a></td>
        <td align="center"><a href ="ex2_task2_alpha.php?var=L">L</a></td>
        <td align="center"><a href
="ex2_task2_alpha.php?var=M">M</a></td>
        <td align="center"><a href ="ex2_task2_alpha.php?var=N">N</a></td>
        <td align="center"><a href
="ex2_task2_alpha.php?var=O">O</a></td>
      </tr>
      <tr>
        <td align="center"><a href ="ex2_task2_alpha.php?var=P">P</a></td>
        <td align="center"><a href
="ex2_task2_alpha.php?var=Q">Q</a></td>
        <td align="center"><a href ="ex2_task2_alpha.php?var=R">R</a></td>
        <td align="center"><a href ="ex2_task2_alpha.php?var=S">S</a></td>
        <td align="center"><a href ="ex2_task2_alpha.php?var=T">T</a></td>
      </tr>
      <tr>
        <td align="center"><a href ="ex2_task2_alpha.php?var=U">U</a></td>
        <td align="center"><a href ="ex2_task2_alpha.php?var=V">V</a></td>
        <td align="center"><a href
```

```
="ex2_task2_alpha.php?var=W">W</a></td>
        <td align="center"><a href ="ex2_task2_alpha.php?var=X">X</a></td>
        <td align="center"><a href ="ex2_task2_alpha.php?var=Y">Y</a></td>
      </tr>
      <tr>
        <td align="center"><a href ="ex2_task2_alpha.php?var=Z">Z</a></td>
      </tr>
   </table>
</body>
</html>
```

Output of html scrip:



The code below is written in a php file:

```
<?php
/*
   Author : Dharineesh K S
   Regno  : 123013012
*/
echo "
<html>
<head>
  <title>ex2_task2_B_alpha_hyperlinks_php</title>
  <style type=\"text/css\">
      body {
         font-family: \"Times New Roman\";

      }
      table {
         width: 50%;
      }
      tr:nth-child(even) {
         background-color: #f2f2f2 ;
      }
   </style>
</head> ";

echo"<body>";

$con = mysqli_connect("localhost","root","") or die("Error in connection");
mysqli_select_db($con,"imp") or die("Database is not exists");
$alpha = $_GET["var"];
$arr = array("A" => "select * from ligands where name like 'A%'",
          "S" => "select * from ligands where name like 'S%'",
          "D" => "select * from ligands where name like 'D%'",
          "F" => "select * from ligands where name like 'F%'",
```

```
          "G" => "select * from ligands where name like 'G%'",
          "H" => "select * from ligands where name like 'H%'",
          "J" => "select * from ligands where name like 'J%'",
          "K" => "select * from ligands where name like 'K%'",
          "L" => "select * from ligands where name like 'L%'",
          "Q" => "select * from ligands where name like 'Q%'",
          "W" => "select * from ligands where name like 'W%'",
          "E" => "select * from ligands where name like 'E%'",
          "R" => "select * from ligands where name like 'R%'",
          "T" => "select * from ligands where name like 'T%'",
          "Y" => "select * from ligands where name like 'Y%'",
          "U" => "select * from ligands where name like 'U%'",
          "I" => "select * from ligands where name like 'I%'",
          "O" => "select * from ligands where name like 'O%'",
          "P" => "select * from ligands where name like 'P%'",
          "Z" => "select * from ligands where name like 'Z%'",
          "X" => "select * from ligands where name like 'X%'",
          "C" => "select * from ligands where name like 'C%'",
          "B" => "select * from ligands where name like 'B%'",
          "N" => "select * from ligands where name like 'N%'",
          "M" => "select * from ligands where name like 'M%'",
          "V" => "select * from ligands where name like 'V%'",
         );

$sql = $arr[$alpha];
$query = mysqli_query($con,$sql) or die("Error in sql query syntax");
echo " <table cellpadding = 5px align='center'>
          <tr>
           <th>Name</th>
           <th>ID</th>
          </tr> ";
while($row = mysqli_fetch_array($query))
{
   $lidid = $row["id"];
```

```
    $name = $row["name"];
    echo "
    <tr>
    <td>$name</td>
    <td>$lidid</td>
    </tr>
    ";
}
echo "</table>";
mysqli_close($con);

echo"</body>";
echo"</html>";
?>
```

Output of php script:

Name	ID
Benzamide	LDB000003
Beta-amyrin	LDA000003
Beta-asarone	LDA000010
Beta-fagarine	LDF000002
Beta-sitosterol	LDS000004
Betaine	LDB000002
bikhaconitine	LDB000004
Bilobetin	LDB000001

Result:

The given task is successfully executed.