Editor - E:\Downloads\m\q4\q4.m

q4.m

```
clc
clear

%read the table
t = readtable('worldcities-short.xlsx');
t.country = categorical(t.country);
i = (t.country == 'Iran') | (t.country == 'Japan') | (t.country == 'Iraq') | (t.country == 'Turk
t=t(i,:);
filename = 'cities_distance.xlsx';
cities = table2array(t(:,1));
xlswrite(filename,cities,'Sheet1','A2');
xlswrite(filename,cities.','Sheet1','B1');
tt = table2array(t(:,2:3));

%compute the distances
r = 6371;
mat = [];
for i = 1:size(tt,1)
    row_p = tt(i,:);
    vec = [];
    for j = 1:size(tt,1)
        row_a = tt(j,:);
        ph1 = deg2rad(row_p(1,1));
        ph2 = deg2rad(row_a(1,1));
        lambda1 = deg2rad(row_p(1,2));
        lambda2 = deg2rad(row_a(1,2));
        delta_lambda = abs(lambda1-lambda2);
        delta_sigma = acos( sin(ph1)*sin(ph2) + cos(ph1)*cos(ph2)*cos(delta_lambda) );
        d = r*delta_sigma;
        vec = [vec,d];
    end
    mat=[mat;vec];
end
```

```
34 -    xlswrite(filename,mat,'Sheet1','B2');
35
36      %part 1
37 -    indx = find(ismember(cities,'Tehran'));
38 -    my_vec=mat(indx,:);
39 -    my_vec(my_vec == 0 ) = NaN;
40 -    [my_min, indx_min]=min(my_vec);
41 -    [my_max, indx_max]=max(my_vec);
42 -    disp("Min distance to Tehran:")
43 -    disp(cities(indx_min))
44 -    disp(my_min)
45 -    disp("Max distance to Tehran:")
46 -    disp(cities(indx_max))
47 -    disp(my_max)
48
49      %part 2
50      %all available cities are less than 20000km to Tehran! change 20000 to 2000
51 -    indx=find(my_vec<2000);
52 -    disp('number of citier closer than 2000km to Tehran: ')
53 -    disp(size(indx,2))
54 -    disp(cities(indx))
55
56      %part 3
57 -    i=(t.country=='Japan');
58 -    [val , indx]=min(my_vec(i));
59 -    disp('nearest Japanese city to Tehran: ')
60 -    disp(cities(indx))
61 -    disp(val)
62
```

```
63    %part 4
64 -  i=(t.country=='Iran');
65 -  j=(t.country=='Iraq');
66 -  new_mat=mat(i,j);
67 -  val = min(new_mat(:));
68 -  [r,c] = find(new_mat==val);
69 -  a=find(i>0);
70 -  b=find(j>0);
71 -  disp('Iran-Iraq closest cities:')
72 -  disp(cities(a(r)))
73 -  disp(cities(b(c)))
74 -  disp(val)
75
76 -  j=(t.country=='Turkey');
77 -  new_mat=mat(i,j);
78 -  val = min(new_mat(:));
79 -  [r,c] = find(new_mat==val);
80 -  a=find(i>0);
81 -  b=find(j>0);
82 -  disp('Iran-Tuekey closest cities:')
83 -  disp(cities(a(r)))
84 -  disp(cities(b(c)))
85 -  disp(val)
86
87
```

Workspace

Name	Value
a	*64x1 double*
b	*91x1 double*
c	60
cities	*257x1 cell*
d	0
delta_lambda	0
delta_sigma	0
filename	'cities_distance.xl...
i	*257x1 logical*
indx	51
indx_max	223
indx_min	20
j	*257x1 logical*
lambda1	0.7955
lambda2	0.7955
mat	*257x257 complex...*
my_max	7.6986e+03
my_min	43.4226
my_vec	*1x257 double*
new_mat	*64x91 double*
ph1	0.6024
ph2	0.6024
r	13
row_a	[34.5124,45.5772]
row_p	[34.5124,45.5772]
t	*257x4 table*
tt	*257x2 double*
val	111.1139
vec	*1x257 double*

```
Min distance to Tehran:
    'Karaj'

   43.4226

Max distance to Tehran:
    'Chiba'

   7.6986e+03
```

```
number of citier closer than 2000km to Tehran:
   166
```

```
nearest Japanese city to Tehran:
    'Nagano'


   6.9839e+03
```

```
Iran-Iraq closest cities:
    'Madan'

    'Al Basrah'

   49.0974

Iran-Tuekey closest cities:
    'Orumiyeh'

    'Hakkari'

  111.1139
```