CS1112 Lab Exercise 12

0 Review class `Interval` and function `intervalArray`

Download the files `Interval.m` (a class definition file) and `intervalArray.m` (a "normal" function file). Read them and ask questions if you have any! Note that the constructor of `Interval` checks that there are enough arguments *before* attempting to assign values to the properties. If `nargin` (the number of input arguments) is not two, a "default" `Interval` object is created—`left` and `right` both get empty vectors (type `double`).

1 Is one `Interval` in some array of `Intervals`?

Suppose we have an array of `Intervals` (.1,.5), (.2,.7), and (.8,.9). If we ask whether an `Interval` (.3,.4) "is in" the array of `Intervals`, we will answer "yes, yes, no" since
(.3,.4) is in (.1,.5),
(.3,.4) is in (.2,.7), but
(.3,.4) is not in (.8,.9).

Recall that in class `Interval` we have an `isIn` method that would be useful here. Implement the following function (in its own file):

```
function tf = isInRange(inter, interArray)
% inter: an Interval
% interArray: 1-d array of Intervals
% tf: a logical vector (1s and 0s) the same length as interArray where
%     tf(k)=1 if inter "is in" interArray(k); otherwise tf(k)=0.
```

Test your function by typing the following in the *Command Window*:

```
a = intervalArray(4);  % Create a length 4 array of Intervals using the
                       %   function implemented in lecture.
b = Interval(.3,.5)
v = isInRange(b,a)     % Why isn't the function call   something.isInRange(...)  ?
                       % Answer: isInRange isn't an instance method; it's its own function.
```

2 More on class `LocalWeather`

Download file `LocalWeather.m` and read it. Ask questions if there are parts from what we did in lecture (constructor, method `showMonthData`) that you do not understand. Two of the methods, `getAnnualPrecip` and `getMonthlyAveTemps`, are incomplete (contains "dummy code" that does no calculation and only assigns a value to the return parameter); you will complete them later.

2.1 Experiment! First, download the file `ithacaWeather.txt` which contains weather data for the City of Ithaca. In the *Command Window*, instantiate (create) a `LocalWeather` object using the data file:

```
dataObj= LocalWeather('ithacaWeather.txt')
```

You should see the properties of `dataObj` displayed. Note that one of the properties, `temps`, is an *array of* `Interval` *objects*. Type the following commands in the *Command Window*; make sure you understand the syntax for accessing values.

```
disp(dataObj.city)  % display the value in the property city

disp(dataObj.precip)  % display the values in the property precip--a vector!

disp(dataObj.precip(11))  % What is displayed?  What is it? ___________________

disp(dataObj.temps)  % Matlab says it's a 1-by-12 array of INTERVALs

disp(dataObj.temps(11))  % Notice that the disp method in class Interval is
                         % used to show the data using Interval notation.

disp(dataObj.temps(11).left)  % What is displayed?  What is it? _______________
```

2.2 Implement function `getAnnualPrecip` which calculates and returns the total annual precipitation. If any month's precipitation data is missing, the returned value should be `NaN`, a value in `Matlab` of type `double` that indicates that a value is not-a-number.

Test your updated class. Save class `LocalWeather`, and type the following in the *Command Window*:

```
clear all  % clear objects created using old class definition
dataObj= LocalWeather('ithacaWeather.txt')  % instantiate object
% Which of the following two method calls is correct?  Try them!
a = getAnnualPrecip()
b = dataObj.getAnnualPrecip()
```

2.3 Implement function `getMonthlyAveTemps` which returns the vector (length 12) of monthly average temperatures. Calculate a month's average temperature as the average between the month's high and low temperatures. If a month is missing temperature data, its average temperature should be set to `NaN`.

Again, save and test your updated class. Make sure you know how to call this newly implemented instance method `getMonthlyAveTemps`.

Please delete your files before leaving the lab!