Nanoquiz Week 13

The questions below are due on Thursday May 10, 2018; 09:50:00 AM.

Nanoquiz Instructions

Nanoquizzes are just like any other tutor exercise, except that they are timed, and that some questions allow a limited number of submissions. When the timer hits zero, you will be prevented from making any further submissions to the nanoquiz, and the answers will be displayed, so **please make sure you have submitted something before that occurs**.

Note that you are free to use any materials you want (electronic or otherwise, including notes, calculators, Python, and Wikipedia) during the nanoquiz, but you are **not** allowed to converse with other humans (including through text message, email, etc).

Nanoquiz

Consider the following one dimensional data points:

- Negative: (3)
- Positive: (1), (2), (4)

1) Construct a decision tree using the algorithm described in lecture for the data above. Enter the tree as a list of nodes in **left-to-right pre-order traversal** (see Wikipedia article for definition (https://en.wikipedia.org/wiki/Tree_traversal)). Each node is either:

- a feature test, writen as a feature index (integer: 0, since only 1D) and value (floating point), e.g. [0, 0.5], representing "Feature 0 < 0.5". **We are assuming that the floating point values in these tests are always chosen to be half-way between the feature values in training data points**
- a leaf node representing a label, one of 1 or -1.

Note that the left child of a feature test represents the Yes branch and the right represents the No branch. So a possible tree is:

```
[[0, 0.5], 1, [0, 1.5], -1, 1]
```

Enter a tree as a list, as described above:

Save Submit Clear Answer

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

Solution: `[[0, 2.5], 1, [0, 3.5], -1, 1]`

2) The **weighted** average entropy of a split is: (fraction of points in left data set) * (entropy of left data set) + (fraction of points in right data set) * (entropy in right data set)

For this dataset, enter a list of the **weighted** average entropies for the following potential splits of the data. You can use a program or calculator if you need to.

- Feature 0 < 1.5
- Feature 0 < 2.5
- Feature 0 < 3.5

Make sure that you use log base 2 in computing entropies

Enter a list of 3 floats with 2 decimal points:

Save Submit Clear Answer

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

Solution: `[0.69, 0.5, 0.69]`

3) Using the tree from part 1, enter a list of predicted labels (1 or -1) for the following points:

- (0.0), (3.25), (5.0)

Enter a list of 3 labels (-1 or 1):

Save Submit Clear Answer

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

Solution: `[1, -1, 1]`