Midterm Practice (405692)

1 (</>) 2 (</>) 3 (</>) 4 (</>) 5 (-)

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00:08:11

Submit

4.

6pts	0 pts	0 pts
Correct	Unanswered	Incorrect

[6 points] Huffman coding

Assume original alphabet S={A,B,C,D,E}, probabilities P={0.13, 0.21, 0.39, 0.19, 0.08}

a) Build a Huffman code table

b) Encode the input string DEBADE and calculate the compression factor (which takes into account the sizes of the encoded string and the code table)

c) Decode the incoming stream 100011010101

In the process of building the tree, the left child should always be the smaller one, and the right child should be the bigger one (see **note 1**). This will ensure the uniqueness of the code.

After solving, enter your solution:

- the code table from part a) of the task as a **table** variable, which is a dictionary that contains symbols as keys, and their associated code words as values
- encoded string from part b) of the task as **encoded** variable which is a string
- the compression factor from part b) of the task as a variable **R** which is a float
- the decoded string from part c) of the task as a variable **expanded** which is a string

The numerical tolerance is 10^{-2}.

An example of a valid solution input format (it is not an exact solution to the task, e.g. the table is not even a prefix-free code):

```
table={'A':'0', 'B':'01', 'C':'10', 'D':'111', 'E':'110'}

encoded='011110111011'

R=1.4

expanded='ACCCC'
```

Note 1

In the process of building the code table, use the following **tie-breaker** (resolving situations when you have equal probability comparisons):

Let's introduce node naming in the Huffman tree as follows:

- if it is a leaf, then its name is its associated symbol
- if it is an internal node, let its name be the ascending sorted concatenation of the symbols of its leaves. For example if in the subtree of that node there are leaves of symbols 'C', 'A', 'E' then the name of that internal node will be 'ACE'.

If two nodes have equal probabilities, then the one with the lexicographically smaller name is considered the smaller node. An example of true comparisons are: 'AB' < 'AC' < 'ACE'.

Note 2

You **must not** add your own additional variables, functions, etc. in the tasks.

- Only requested variables are expected
- You must define all variables, even if they are empty, otherwise your tests will fail!
- If you have additional variables, functions or classes, all your tests will fail!

Upload photos of the procedure for this task in a separate exam

- You will receive 0 points if you do not have uploaded photos of the process of solving this task from the signed paper

```
1  table={'A':'010', 'B':'10', 'C':'00', 'D':'11', 'E':'011'}
2
3  encoded='110111001011011'
4
5  R=0.7164
6
7  expanded='BCDAB'
8
9
```

Run

Save

Correct	Incorrect	Partial	Unanswered	Score	Score %	Hint
✅				6	100	Correct. Well done!

Status: Finished

Started at: November 18th 2024, 10:35:36 pm | Finished at: 10:35:36 pm | Duration: 741 ms

Language	Compiler options	Compiler output	Message(s)
Python (3.8.1)			

Tests(12):

1. **Incorrect** -0.00% Hint: Incorrect output | Dekodirani string se razlikuje

2. **Correct**

3. **Correct**

4. **Correct**

5. **Correct**

6. **Incorrect** -0.00% Hint: Incorrect output | Kodna tablica nema ispravne kodove

7. **Correct**

8. **Correct**

9. **Correct**

10. **Correct**

11. **Correct**

12. **Incorrect** -0.00% Hint: Incorrect output | Enkodirani string se razlikuje