LE1.6

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LE1.6.1: Huffman Encoding

ponto 1 / 1 (sem classificação)

A Huffman code assigns a 6-bit codeword for message A and a 5-bit codeword for message B. It is known that A and B have different probabilities, and hence carry different amounts of information. Which message carries more information?

More info in:

- (●) A ✔
- ( ) B
- ( ) Can't tell

Explanation

The Huffman algorithm ensures that longer codewords correspond to messages with a lower probability. So because A has a longer codeword, it is the less likely message and so carries more information.

Enviar

ⓘ Answers are displayed within the problem

LE1.6.2: Huffman's Algorithm

pontos 5 / 5 (sem classificação)

After spending the afternoon in the dentist's chair, Ben Bitdiddle has invented a new language called AEIOU made up entirely of vowels (the only sounds he could make with someone's hand in his mouth). The AEIOU alphabet consists of the five letters "A", "E", "I", "O", and "U" which occur in messages with the following probabilities:

Letter	**p(Letter)**
A	0.11
E	0.25
I	0.20
O	0.35
U	0.09

Use Huffman's algorithm to construct a variable-length code that minimizes the expected number of bits used to encode each letter of a message one-at-a-time.

Please enter the *length* of the variable-length code for each letter.

Length of encoding for A (in bits): 3 ✔ Answer: 3

Length of encoding for E (in bits): 2 ✔ Answer: 2

Length of encoding for I (in bits): 2 ✔ Answer: 2

Length of encoding for O (in bits): 2 ✔ Answer: 2

Length of encoding for U (in bits): 3 ✔ Answer: 3

Calculator

Explanation

Here are the steps in applying Huffman's algorithm:

1) select A and U, the two letters with the lowest probability, combine in a subtree whose root has probability 0.11 + 0.09 = 0.2

```
      +-- A
   --+
      +-- U
```

2) select I and the subtree from step 1, the two remaining items with the lowest probability. Combine in a subtree whose root has probability 0.4.

```
    +-- I
 --+
   |  +-- A
   +--+
      +-- U
```

3) select O and E, the two remaining items with the lowest probability, combine in a subtree whose root has probability 0.6.

```
    +-- O
 --+
   +-- E
```

4) combine the two subtrees from steps 2 and 3 since they are the only items remaining.

The final tree looks like:

```
       +-- O
    +--+
    |  +-- E
 --+
    |  +-- I
    +--+
       |  +-- A
       +--+
          +-- U
```

Enviar

Answers are displayed within the problem

Discussion

Topic: 1. Basics of Information / LE1.6

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- LE1.6.1 Which is the relation between probability and amount of information? — 6
  The exercise says *"A Huffman code assigns a 3-bit codeword for message A and a 4-bit codeword for message B. It is known that...
- Can't we have further probabilities tables to practice more with Huffman's trees? — 2
  I understood the material in this lecture but some of my answers to the exercises followed another path. In particular, my Huffman's...
- O? — 7
  Wouldn't O be on a separate branch with a 1 bit value? Can someone help me clarify why this is not?
- O

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Calculator

Calculator