MITx 6.004.1x
Computation Structures 1: Digital Circuits

Help

Course   Progress   Datas   Discussion   Course Notes

🏠 Course / 1. Basics of Information / Lecture Videos (38:24)

‹ Previous

Next ›

LE1.8

🔖 Bookmark this page

Calculator

LE1.8.1: Error Correction

pontos 4 / 4 (sem classificação)

Let's choose an encoding for our four symbols ("heart", "diamond", "club", and "spade") in a way that will allow us to correct single-bit errors and detect double-bit errors. In this problem we'll assume that either only 0, 1, or 2 bit errors have occurred.

We'll use four code words with a minimum Hamming distance of 4; call these the "legal" code words. Now use the following scheme to process the received code word R. Let HD(A,B) be the Hamming distance between A and B.

- If HD(R,C) is 0 or 1 for some legal code word C, then the received symbol is the one whose encoding is C. Note that our encoding, with it's minimum Hamming distance of of 4, guarantees that there is at most one such C!

- If HD(R,C) is 2 for any of the four possible legal code words C, then a double-bit error has been detected. Note that with a minimum Hamming distance of 4 between legal code words, the set of code words which are Hamming distance two from some legal code word can't be any closer than Hamming distance 2 from any legal code word.

Here's a 7-bit encoding with a minimium Hamming distance of 4

```
heart: 0000000   diamond: 1010101   club: 1101010   spade: 0111111
```

For each of the following received code words, indicate the received symbol or "double-bit error".

1010101

- ( ) heart
- (●) diamond
- ( ) club
- ( ) spade
- ( ) double-bit error

✔

Explanation
HD(1010101,encoding for diamond) = 0.

1111111

- ( ) heart
- ( ) diamond
- ( ) club
- (●) spade
- ( ) double-bit error

✔

Explanation
HD(1111111,encoding for spade) = 1.

1000001

- ( ) heart

Calculator

○ diamond

○ club

○ spade

◉ double-bit error

✔

Explanation
HD(1000001,encoding for heart) = HD(1000001,encoding for diamond) = 2.

1101110

○ heart

○ diamond

◉ club

○ spade

○ double-bit error

✔

Explanation
HD(1101110,encoding for club) = 1.

Enviar

ⓘ Answers are displayed within the problem

Discussion

Topic: 1. Basics of Information / LE1.8

Ocultar discussão

Adicionar publicação

Show all posts ⌄   by recent activity ⌄

💬 Direct & Articulate Questions   10
I really do not appreciate all the unnecessary narrative before the actual question. What is being asked is rather elementary, it does not ...

‹ Previous   Next ›

---

edX

edX

About

Affiliates

edX for Business

Calculator

Open edX
Careers
News

Legal

Terms of Service & Honor Code
Privacy Policy
Accessibility Policy
Trademark Policy
Sitemap
Cookie Policy
Your Privacy Choices

Connect

Idea Hub
Contact Us
Help Center
Security
Media Kit

Calculator