

CPSC 530 - Information Theory and Security
Group 17 Project Quiz

Aiden Taylor - B.Sc. in Computer Science
Noah Pinel - B.Sc. in Computer Science
Ty Irving - B.Sc. in Computer Science

Mar. 26th, 2023

Quiz Questions and Answers

Q1: What specific type of Binary Tree is used in the implementation of the BCCBT Data Compression Algorithm? Describe at least one discussed property of this type of Binary Tree.

A1: The specific type of Binary Tree used is a **Complete Binary Tree**. The relevant properties of this type of Binary Tree that will be discussed during our presentation are as follows.

- In a Complete Binary Tree all levels, EXCEPT potentially the last level, are completely full.
- In a Complete Binary Tree nodes are filled in from left to right at each level.
- In a Complete Binary Tree the number of nodes at level n is 2^n .

Q2: Given the specific binary tree needed for the BCCBT algorithm, where the tree's nodes correspond to symbols in an arbitrary alphabet Σ . Denote a symbol ϕ , such that ϕ is in our arbitrary alphabet Σ . Note, ϕ is **NOT** the root of the tree. How is the bit code generated for the symbol ϕ ?

A2: To find ϕ 's bit code, we start at the root of the complete binary tree and traverse the tree until we reach the node corresponding to ϕ . At each step, append the weight of the edge we are traversing to our code. We stop encoding once we reach ϕ in the tree.

Q3: Does the BCCBT Data Compression Algorithm make use of the frequency/probability of each unique symbol in the source file? Explain why or why not.

A3: Yes it does. This is because the algorithm requires the frequencies of each unique symbol in order to construct a frequency table which in turn is used to initialize the Complete Binary Tree, which is the core feature of this algorithm.