**Why is LZW using 4 bits for the dictionary and is it enough?**

-In computer science and data compression, "LWZ" typically refers to Lempel-Ziv-Welch, a lossless data compression algorithm. LWZ is a dictionary-based compression algorithm that uses variable-length codes to represent sequences of data. The number of bits used for codes in the dictionary varies as the dictionary grows and new codes are added.

-LWZ starts with an initial dictionary of individual symbols (e.g., characters) and assigns fixed-length codes to them. As the algorithm processes the input data, it adds new sequences to the dictionary and assigns variable-length codes to them. The variable-length codes are shorter for frequently occurring sequences and longer for less common sequences. This adaptive approach helps improve compression efficiency.

-The 4 bits might be referring to the initial fixed-length codes assigned to the symbols in the dictionary. In a basic implementation, LWZ might start with 4-bit codes for the initial symbols. However, the algorithm adapts and adds new entries to the dictionary with variable-length codes as it encounters new sequences in the input data. So, while the initial dictionary uses 4-bit codes, the dictionary size and code lengths can change dynamically as the algorithm processes more data.

**WHY ARE 8 BITS USED FOR ASCII VALUES AND IS IT ENOUGH? WHAT ARE THE REALISTIC BENEFITS GAINED? CAN WE USE MORE OR LESS?**

* ASCII stands for American Standard Code for Information Interchange.
* ASCII code allows computers to understand how to represent text (numbers, letters, symbols) which are represented in binary form.
* ASCII was originally developed for basic computers and printers and it used a 7 bit code to represent data. This however was not enough since a 7 bit code was not enough which represented 128 characters. It was not enough to cover all languages and therefore manufactures therefore developed a 8 bit character sets consisting of ASCII plus 128 of the unused codes so to accommodate much more texts and symbols.
* It has been of benefit since it allowed us to accommodate various types of symbols and characters that we previously were not printable while using a 7 bit code.
* It has also enabled us to design interfaces that enables both humans and computers to understand.
* The standard ASCII character set is only 7 bits, and characters are represented as 8-bit bytes with the most significant bit set to 0. Modern computers almost universally use 8-bit bytes, and the extended ASCII character set includes 127 more 8-bit characters, where the most significant bit is set to 1