

# Encoding Techniques

**Encoding techniques** are methods used to convert data into a specific format for efficient storage, transmission, or processing. These techniques are widely applied in fields such as telecommunications, data storage, and information security to optimize performance and ensure data integrity.

In addition to encoding, **encryption** is a crucial technique used to secure data by converting it into a coded format that is only decipherable with the appropriate key, ensuring privacy and protection against unauthorized access.

## BCD

**BCD (*Binary-Coded Decimal*)** is a method of encoding decimal numbers where each digit is represented by its own binary sequence, typically using 4 bits. This coding simplifies the conversion between binary and decimal systems, making it useful in applications like digital clocks, calculators, and financial systems, where precise decimal representation is important. BCD is particularly favored in hardware-level computations for improved accuracy in handling decimal data.

## Exercise

W.I.P.

## LZW

**LZW (*Lempel-Ziv-Welch*)** coding is a lossless data compression algorithm that replaces repeated sequences of data with shorter codes, thus reducing file size without losing information. It is widely used in applications such as image compression (e.g., GIF), PDF files, and in systems that require efficient storage and transmission, like data archives and network protocols.

## Exercise

W.I.P.

## Huffman

**Huffman** coding is a lossless data compression algorithm that assigns variable-length codes to input characters based on their frequencies: more frequent characters receiving more shorter codes. This technique efficiently reduces the size of data for storage or transmission. It is widely used in applications such as file compression (e.g., ZIP), multimedia encoding (e.g., JPEG and MP3), and in communication systems where optimizing bandwidth is crucial.

## Exercise

W.I.P.

## RSA

**RSA (Rivest-Shamir-Adleman)** is a widely used asymmetric cryptographic algorithm that secures data through a pair of public and private keys, enabling secure encryption and decryption. Its strength lies in the difficulty of factoring large prime numbers, providing robust protection for sensitive information. RSA is commonly applied in secure communication protocols, such as SSL/TLS for internet security, digital signatures, and email encryption.

## Exercise

W.I.P.

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