Code

The mapping of events to messages is called encoding. Messages are recorded in information storage units. The recorded message itself is an *event system*. Encoding is a transformation, based on the mutual and unambiguous correspondence between two event systems.

The tool of encoding is code. A code consists of a finite set of symbols (an alphabet) and coding rules (groups of symbols).

A *code-word* is an elementary message, which consists of a finite number of symbols. The set of code symbols and the rules for forming codewords constitute the code's syntax.

Encoding changes the form of the information, but other characteristics of the information remain unchanged. There are fixed-length and variable-length codes.

Basic Types of Codes:

Fixed-length code	Variable-length code
Technical codes	Morse code
Communication Codes	Human languages
Computer codes	Technical languages

For a fixed (n) length binary code, the number of possible codewords is:

$$ N = 2^n $$

If we form codes from m different symbols, then the number of possible n-length codewords is:

$$ N = m^n $$

The fundamental problem of coding theory is the *preservation*, *security*, and *maximization* of the information content of transmitted messages.

Morse Code

Morse code is a method of encoding text characters into sequences of *dots* and *dashes* (or short and long signals) that can be transmitted over telecommunication lines or other mediums like light or sound. It was originally developed in the 1830s by **Samuel Morse** and **Alfred Vail** for use in telegraphy.

Key features:

- **Dot** (.): A short signal or sound.
- **Dash** (-): A longer signal or sound, typically three times the duration of a dot.
- **Spacing**:
  - Intra-character space: The space between dots and dashes within a single character (typically silent, as no signal).
  - Inter-character space: The space between characters (equivalent to three dots).
  - Inter-word space: The space between words (equivalent to seven dots).

Examples:

- **A**: .- (dot-dash)
- **B**: -... (dash-dot-dot-dot)
- **C**: -.-. (dash-dot-dash-dot)
- **SOS**: ... — ... (dot-dot-dot, dash-dash-dash, dot-dot-dot) - a universal distress signal.

Example message:

- **HELLO**: .... . .-.. .-.. - - - (dot-dot-dot-dot, dot, dot-dash-dot-dot, dot-dash-dot-dot, dash-dash-dash)

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