INFORMATION PROCESSING

COS 101

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Information Processing

- Information processing contains two concepts:
  - INFORMATION
  - PROCESSING

INFORMATION

- Information is an organized or classified data that is meaningful to the receiver and on which decisions and actions are based.
- Difference between data and information

Data is the representation of raw facts, concepts, or instructions in a formalized manner suitable for communication, interpretation and processing using humans or electronic machine.

Information is processed data, that may be further processed to acquire knowledge

Examples of Data and Information

- The history of temperature readings in Nigeria for the past 100 years is data.
- If this data is organized and analyzed to find temperature rising, then that is information.
- The number of visitors to Babcock website is an example of data.
- Finding out that traffic from the Lagos to Babcock website is increasing while that from Gombe is decreasing is meaningful information.

Assignment

- Use google form to gather data about your class member personal data including:
  - Name
  - Date of birth
  - Gender
  - Nationality
  - Home address
  - Religion
  - Tribe
  - Hostel
  - Room number
- What information can you get from this?

Characteristics of quality Information

- Timely: information must be available when required or else it is useless.
- Accurate: information slightest error must be minimized, it implies all information must be true.
- Complete: it must capture all necessary parts or attributes
- Comprehensive: the receiver must understand the information or else it will be useless to the receiver

PROCESSING

- Processing is a set of techniques that includes:
  - Acquisition of information
  - Recording
  - Assembly
  - Retrieval or dissemination of information

Information Processing

- It is the manipulation or re-structuring or re-ordering of digitized information by computer or other digitized electronic devices to make it more useful or understandable for receiver.
- It involves four major stages:
  - Input
  - Processing
  - Storage
  - Output
- These four stages form the information processing cycle

Information Processing Cycle (INPUT)

- Input is the first stage of information processing
- It involves how data and instruction are acquired and accepted by the computer or any digitized device
- There are popular tools available for this:
  - Keyboard
  - Scanner
  - Joystick
  - Sensor (inserted inside devices like refrigerator, microwave,
- The data input is converted into binary format (1’s and 0’s) that can be understood by the computer
- The new type of computer called quantum represents data and instructions as q-bits

INPUT CONVERTION CYCLE

- Each time you press a key on the keyboard, move a mouse, touch a screen, you are sending an electric signal
- The process of converting input into 1’s and 0’s depends on the type of input
- We shall discuss the followings:
  - Text input
  - Audio input
  - Image input
  - Numeric input
  - Sensor input
  - Keystrokes and mouse input

Text input and Audio Input

- When you input text it goes through the following process:
  - ASCII encoding: text is encoded into ASCII **(American Standard Code for Information Interchange)** that is each alphabet is given a numerical value
  - The encoded text i.e., each numerical value corresponding to an alphabet is converted into binary format.
- When you input audio it goes through the following process:
  - Sampling of the amplitude i.e., the air pressure variations. This is measured in hertz.
  - Quantization: representing each amplitude as discrete numerical values e.g., 8-bit audio sample, 16-bit audio sample etc.
  - Binary representation: the quantized value is represented as binary values

Numeric Input and Image Input

- When you input numerical data it goes through the following process:
  - The numeric value is converted directly into binary value
- When you input image it goes through the following process:
  - Digitization: conversion of physical image into digital representation based on variation of light and color at discrete points.
  - Pixelization: this is breaking down of an image into pixel. A pixel is a picture element which is the smallest unit of an image. Each pixel is a single point of in an image which contains information about color and intensity.
  - Each pixel color is assigned a numerical value

Sensor Input and keystrokes/mouse Input

- For sensor input data it goes through the following process:
  - Analog to Digital Convertion (ADC) takes analog signal from sensor, measures its amplitudes at regular interval and assign a digital value .
  - The digital value is converted into binary value

- When input is from keystroke or mouse input, the process goes as followings:
  - Each specific keystrokes or mouse input has corresponding binary values that has been assigned to it.

Application Areas of Information Processing

- Information Processing can be applied to areas such as:

- ***Communication:***
- ***Business and Commerce:***
- ***Education:***
- ***Healthcare:***
- ***Entertainment:***
- ***Infrastructure and Transportation:***
- ***Security and Privacy:***
- ***Personal Productivity:***
- ***Government and Public Services:***
- ***Environmental Management:***

Roles of Information Processing in Communication

- Communication: is involves exchange of information
- At different stages of passing across information in computer, there are key roles played by information processing
- So here we are discussing how information passes through different stages of communication process

Roles of Information Processing in Communication

- Encoding and Decoding:
  - Encoding: information processing is needed here to convert thought or ideas or messages into a format that can be transmitted. Symbols or words are used to represent messages or thoughts or ideas. Encoding occurs from the sender side.
  - Decoding: This occurs at the receiver end. The encoded information needs to be decoded for the receiver to understand it. To extract meaning from the encoded messages, information processing needs to interprete and understand the encoded message.

Roles of Information Processing in Communication

- Storage and Retrieval: In communication information received can be stored and retrieved at appropriate time when it is needed.
  - Storage: Information processing is useful in storage to ensure availability, integrity and accessibility of data or information. Storage systems can be database, file system, cloud storage, persistent storage (e.g., hard drives, solid state drive (SSD))—for long-term storage, memory storage (RAM-random and access memory)—for short-term storage, back-up systems for data recovery in case of failure. It includes security features such as authentication, encryption, access control etc. Data stored are properly organized and indexed using criteria like keywords.
  - Retrieval: When information are needed, the retrieval information system uses query and search based on indexed criteria to retrieve information. The query and search is written based on data access methods such as structure query language (SQL).

Roles of Information Processing in Communication

- Transmission and Reception:
  - Transmission: The encoded information from the sender will be converted into binary form to be transmitted to the receiver.
  - Reception: this involves capturing of the transmitted signals to be later reconstructed into its original form.
- Filtering and Selective attention:
  - Filtering: information transmitted comes with a lot of information which are not needed by the receiver, these information are filtered so that there will be focus on relevant information.
  - Selective attention: focusing on relevant information is refered to as selective attention.