CSE3151

COMPUTER NETWORKS

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SYLLABUS

Presentation Layer: Data Compression techniques, Frequency Dependent Coding, Context Dependent Encoding.

Application Layer: Internet and intranets, Internet services and goals, DNS, SMTP, FTP, Telnet, HTTP, World Wide Web (WWW), DHCP and BOOTP.

Networking in Practice: Designing LAN, Cabling, Establishing Client- Server network, Configuring: Directory Server, Proxy server, FTP server, E-mail server, web server, DB server, Firewall, Network troubleshooting, network maintenance, network monitoring, Network programming.

PRESENTATION LAYER

- Specific responsibilities of presentation layer:
  - Data Representation
  - Data Compression
  - Encryption

Source: http://ecomputernotes.com/computer-graphics/basic-of-computer-graphics/data-compression

DATA REPRESENTATION

- Different computers have different representations for characters.
- If two dissimilar computers are to exchange text, say e-mail, they must agree on the representation to be used in the exchange. Then one must translate from, or into, the agreed upon representation.

DATA REPRESENTATION

- Converting the complex data structures used by an application (strings, integers, structures, etc.) into a byte stream transmitted across the network.
- Representing information in such a way that communicating peers agree to the format of the data being exchanged. E.g., How many bits does an integer contain?, ASCII or EBCDIC character set?

DATA COMPRESSION

- Compression is often used to maximize the use of bandwidth across a network or to optimize disk space when saving data.
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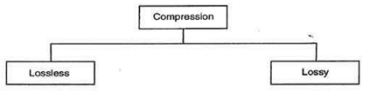

Types of Compression

LOSSLESS COMPRESSION

- Lossless compression compresses the data in such a way that when data is decompressed it is exactly the same as it was before compression *i.e.* there is no loss of data.
- … is used to compress file data such as:
  - executable code,
  - text files, and
  - numeric data, because programs that process such file data cannot tolerate mistakes in the data.
- … will typically not compress file as much as lossy compression techniques and may take more processing power to accomplish the compression.

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LOSSLESS COMPRESSION

Lossless Compression Algorithms

The various algorithms used to implement lossless data compression are :

1. Run length encoding
2. Differential pulse code modulation
3. Dictionary based encoding

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RUN LENGTH ENCODING

- This method replaces the consecutive occurrences of a given symbol with only one copy of the symbol along with a count of how many times that symbol occurs. Hence the names 'run length'.
- the string **AAABBCDDDD** would be encoded as **3A2BIC4D**.
- A real life example where run-length encoding is quite effective is the **fax machine**.
- This method of compression must be used carefully. If there is not a lot of repetition in the data then it is possible the run length encoding scheme would actually increase the size of a file.

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DIFFERENTIAL PULSE CODE MODULATION

- • In this method first a reference symbol is placed. Then for each symbol in the data, we place the difference between that symbol and the reference symbol used.
- • For example, using symbol A as reference symbol, the string **AAABBC DDDD** would be encoded as **AOOO1123333,** since A is the same as reference symbol, B has a difference of 1 from the reference symbol and so on.
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DICTIONARY BASED ENCODING

- One of the best known dictionary based encoding algorithms is Lempel-Ziv (LZ) compression algorithm.
- This method is also known as substitution coder.
- In this method, a dictionary (table) of variable length strings (common phrases) is built.
- This dictionary contains almost every string that is expected to occur in data. When any of these strings occur in the data, then they are replaced with the corresponding index to the dictionary.
- For example, let us say that the word "**compression**" has the index 4978 in one particular dictionary; it is the **4978thword** is usr/share/dict/words. To compress a body of text, each time the string "compression" appears, it would be **replaced by 4978**.

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LOSSY COMPRESSION

- Lossy compression is the one that does not promise that the data received is exactly the same as data send i.e. the data may be lost.
- This is because a lossy algorithm removes information that it cannot later restore.
- Lossy algorithms are used to compress still images, video and audio.
- Lossy algorithms typically achieve much better compression ratios than the lossless algorithms.

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LOSSY COMPRESSION

- Two types of techniques are used for audio compression:
  1. Predictive encoding
  2. Perceptual encoding

❖ **PREDICTIVE ENCODING**

- In predictive encoding, the differences between the samples are encoded instead of encoding all the sampled values.
- This type of compression is normally used for speech.
- Several standards have been defined such as GSM (13 kbps), G. 729 (8 kbps), and G.723.3 (6.4 or 5.3 kbps).

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PERCEPTUAL ENCODING

- Perceptual encoding is based on the science of **psychoacoustics**, a study of how people perceive sound.
- The perceptual encoding exploits certain flaws in the human auditory system to encode a signal in such a way that it sounds the same to a human listener, even if it looks quite different on an oscilloscope.
- The key property of perceptual coding is that some sounds can mask other sound.
- For example, imagine that you are broadcasting a live flute concert and all of a sudden someone starts striking a hammer on a metal sheet. You will not be able to hear the flute any more. Its sound has been masked by the hammer.

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DIRECTORY SERVER

- In computing, directory service or name service maps the names of network resources to their respective network addresses.
- It is a shared information infrastructure for locating, managing, administering and organizing everyday items and network resources, which can include volumes, folders, files, printers, users, groups, devices, telephone numbers and other objects.
- A directory service is a critical component of a network operating system.
- A directory server is a server which provides such a service. Each resource on the network is considered an object by the directory server.
- Information about a particular resource is stored as a collection of attributes associated with that resource or object.

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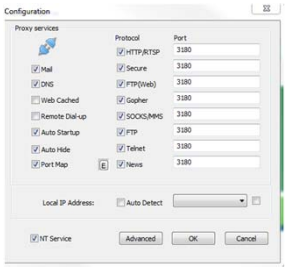
PROXY SERVER

- Default Port: 8080



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FTP Server

- File Transfer Protocol
- Default Port: 21

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EMAIL SERVER

- Simple Mail Transfer Protocol (SMTP)
- To Send Email
- Default Port: 25
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