

Huffman Codes

- Information coding:
 - Most info transmission machines (computer terminal, Voyager spacecraft) use a binary code.
 - Why? These electric signals are either present or absent at any specific time.
- Suppose Voyager on-board camera is sensitive to four shades of gray:
 - White
 - Light gray
 - Dark gray
 - black
- Camera picture is digitized into 24000 (400×600) “dots”, then transmitted by radio to Earth, in a single stream of signals, to be reconstructed and printed.

Huffman Codes

- In designing a binary code, we want to decide how to encode the “color” of each dot in binary, so that:
 - 1) No waste of signals (efficiency)
 - 2) Recognizable (later)
- Example: encode
 - White – 0001
 - Light gray – 0010
 - Dark gray – 0100
 - Black – 1000

WASTEFUL!! One picture would cost $4 * 24000 =$ almost 100 000 signals
4 “digits” per symbol (dot)
- How many digits do you need?
 - 1 not enough, only 2 values
 - 2 ok 4 values
 - 3 too much
 - ...

Huffman Codes

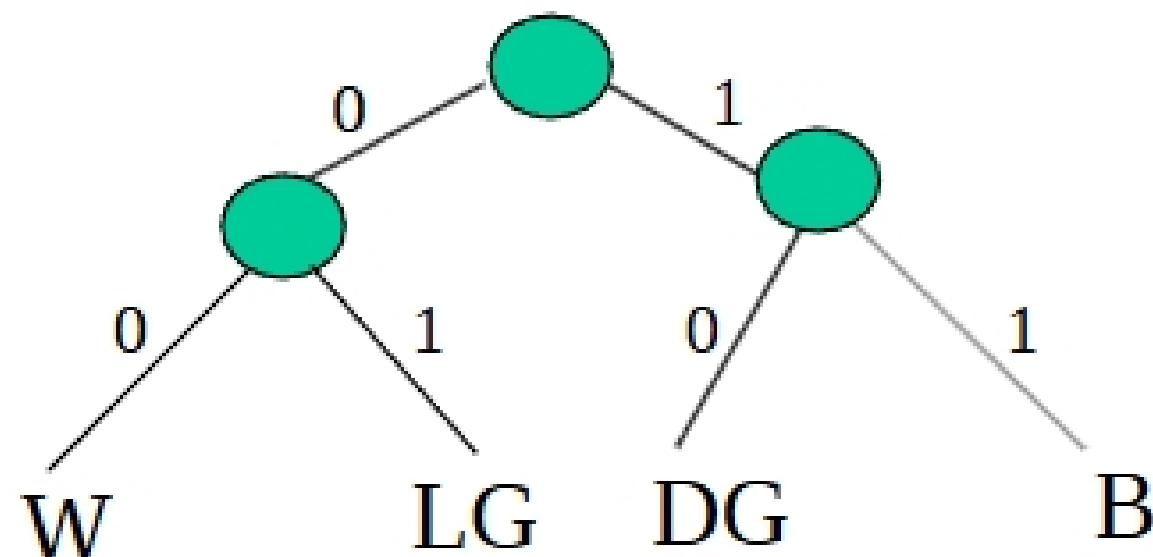
- Try 2:

- W – 00
- LG – 01
- DG – 10
- B – 11

Fixed-length code of length 2 (2 yes/no questions suffice to identify the color)

No problem on receiving end, every two digits define a dot.

Encoding mechanism: Decision tree



Start at root, follow till leaf is reached