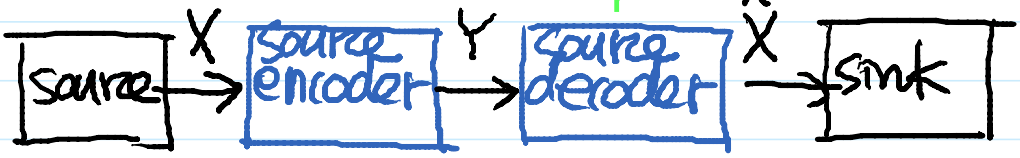
Lec. 02

2013년 3월 5일 화요일
오후 2:33

Review ↕ Preview

- Data compression
- Data transmission



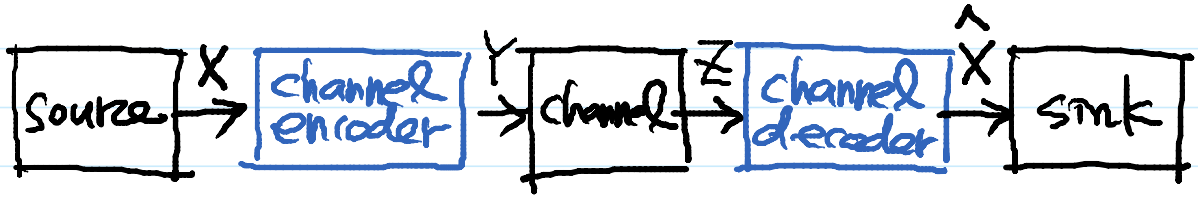
performance evaluation

"Two performance metrics"

- compression
- error

> rates

cf) meter



※ R. Gallager
I.T.R.C.

"Two performance metrics"

- transmission
- error

> rates

single-source single-destination < DC, DT

multiple-source multiple-destination < DC, DT.

→ Network Information Theory

S_2

- Probability, Random Variables and Processes
- Optimization
- Estimation & Detection Theory

2013년 2월 6일 수요일

오후 9:07

Data Compression ☹? ☺! "Simplify!"

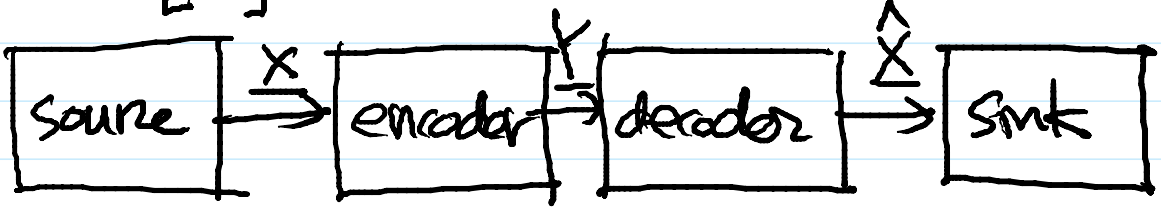
Zero-error data compression

Non-zero error " "

error-rate is zero!

abstract to concrete.

$\underline{X} = \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \\ \vdots \end{bmatrix} \in \{0,1\}^{100}$ of $\mathbb{R}^3$



$\underline{X} \in \left\{ \begin{bmatrix} 0 \\ 0 \\ \vdots \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ \vdots \\ 1 \end{bmatrix} \right\}$,

$X \sim$ $Pr(X=0) = \frac{1}{4}$

$Pr(X=1) = \frac{1}{4}$

$Pr(X=2) = \frac{1}{2}$

x	y
0	00
1	01
2	1

$2 \times \frac{1}{4}$

$2 \times \frac{1}{4}$

$1 \times \frac{1}{2}$

1.5 bits

$\log_2 3$ bits

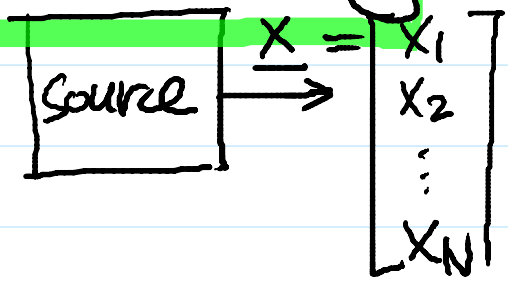
$= \frac{\log_{10} 3}{\log_{10} 2}$

$\simeq \frac{0.4771}{0.3010} \simeq 1.585$ bits

2013년 2월 6일 수요일

오후 9:08

Source modeling



Simplify!

Independent and identically distributed (i.i.d.)

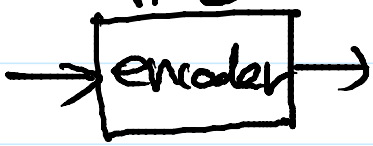
Google advanced search

"....." site:.edu

- X_i's are i.i.d.
- X_i's are discrete.
  ($\mathcal{X}$: sample space)
- $\mathcal{X}$ is finite.

encoder modeling

↳ a mapping rule (domain, mapping rule, range)



$(\mathcal{X}^N, \quad , \mathcal{Q}^M)$

$\underline{Y} = [Y_1 \ \vdots \ Y_M]$

$Y_i \in \mathcal{Q}$

$\mathcal{Q}^*$ ← Variable-length source coding

binary

ternary

quaternary

⋮

Example $\mathcal{Q} = \{0, 1\}$

$\mathcal{Q}^* = \{[0], [1], [00], [01], \cdots\}$

$|\mathcal{Q}^*| = \infty$. ⋯ }

$|\mathcal{Q}| = D$

D-ary encoder $|\mathcal{Q}| = D$

$D^{\#\text{ of D-ary symbols}}$

$2^{100} = 4^{50} = (2^2)^{50} = 2^{100}$.

{ Source alphabet : $\mathcal{X}$
code alphabet : $\mathcal{Q}$

the Law of Large Numbers. — S.L.L.n / W.L.L.n

→ Expectation! ☺