NETWORK INFORMATION THEORY

OMISSIONS TO ALL PRINTINGS

p. 220, Bibliographic Notes, line 14 should read:

The capacity region of the deterministic broadcast channel was established independently by Marton (1979a) and Pinsker (1978).

Marton, K. (1979a). The capacity region of deterministic broadcast channels. In C. F. Picard and P. Camion (eds.) *Théorie de L'information: Développements récents et Applications (Cachan, France, 1977)*, pp. 243–248. CNRS Editions, Paris. [220]

ERRATA TO THE FIRST PRINTING

p. xviii, Organization of the Book, line 5 should read:

. . . we first study channel coding settings, followed by . . .

p. 46, item 3 above Lemma 3.1 should read:

. . . conditionally independent given U^n that has . . .

p. 67, line 8 should read:

Because the maximal probability of error . . .

p. 69, Bibliographic Notes, line 10 should read:

Hence, we will adopt the random codebook generation and joint typicality decoding approach throughout.

p. 70, line -4 should read:

$$\lim_{n\to\infty} \mathsf{P}\{d(X^n, \hat{x}^n(m(X^n))) \le D\} = 1$$

p. 84, Proof of the converse, line 4 should read:

where ϵ_n tends to zero as $n \to \infty$. Thus, for any $\epsilon > 0$, $(R_1 - \epsilon, R_2 - \epsilon) \in \mathscr{C}^{(n)}$ for n sufficiently large. This completes the proof of the converse.

p. 85, Proposition 4.1, line 2 should read:

$\alpha R_{11} + \bar{\alpha} R_{21} \quad \longrightarrow \quad \alpha R_{11} + \bar{\alpha} R_{12}$

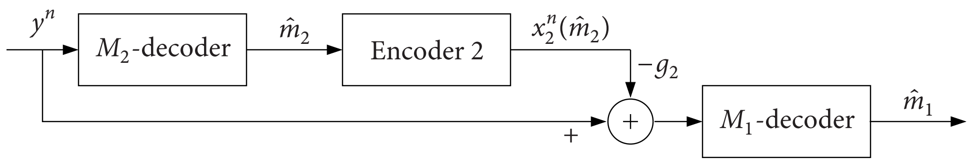
p. 86, Theorem 4.2 should read:

The capacity region $\mathscr{C}$ of the DM-MAC $p(y|x_1, x_2)$ is the convex closure of $\bigcup_{p(x_1)p(x_2)} \mathscr{R}(X_1, X_2)$.

p. 91, 2 lines above (4.4) should read:

...we have shown that the rate pair (R_1, R_2) must be in $\mathscr{C}'$, which is the closure of the set of rate pairs (R_1, R_2) such that

p. 97, Figure 4.10 should look:



p. 98, Theorem 4.5, line 4 should read:

for some pmf $p(q) \prod_{j=1}^{k} p(x_j|q) \ldots$

p. 101, last sentence of Problem 4.5 should read:

Show that the capacity region $\mathscr{C}$ can be characterized as the <u>closure</u> of $\bigcup_k \mathscr{R}^{(k)}$.

p. 113, 1 line above (5.3) should be an inequality:

$$\leq \sum_{i=1}^{n} I(X_i, M_1, Y_1^{i-1}; Y_{1i}|U)$$

p. 129, Problem 5.18, line 3 should read:

...sender 2 encodes only $\underline{M_0}$.

p. 134, Remark 6.1, line 6 should read:

...larger than the convex closure of <u>the union of</u> $\mathscr{R}(X_1, X_2)$ over all $p(x_1)p(x_2)$.

p. 151, 1 line above Theorem 6.6 should read:

...achievable <u>within</u> half a bit.

p. 155, line 4 should read:

...where A is an $L \times LC'_{\text{sym}}$ q-ary matrix. Decoder $j \ldots$

p. 163, Problem 6.16 (a) should read:

...when evaluated with Gaussian inputs (without power control), reduces to ...

p. 181, Analysis of the probability of error, line 6 should read:

$$\mathcal{E}_3 = \{(U^n(l), Y^n) \in \mathcal{T}_\epsilon^{(n)} \text{ for some } l \notin [1 : 2^{n(\tilde{R}-R)}]\}.$$

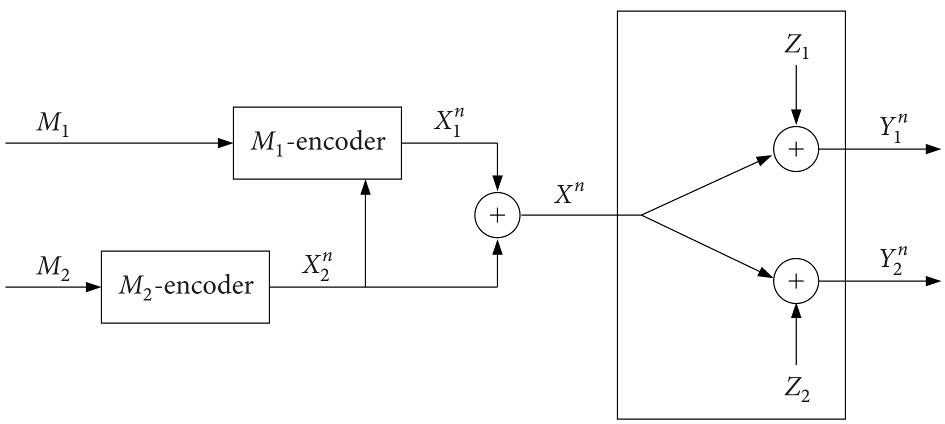
p. 186, Proof of Theorem 7.4, line 3 should read:

…with DM state and nonnegative cost function $b(x)$, $x \in \mathcal{X}$. We assume an input cost constraint

p. 209, Analysis of the probability of error, line 7 should read:

$$\mathcal{E}_{12} = \{(U_1^n(l_1), Y_1^n) \in \mathcal{T}_\epsilon^{(n)}(U_1, Y_1) \text{ for some } l_1 \notin [1 : 2^{n(\tilde{R}_1 - R_1)}]\}.$$

p. 211, Figure 8.10 should look:



p. 217, Theorem 8.6, line 8 should read:

for some pmf $p(u_1)p(u_2)p(u_0|u_1, u_2)$ and …

p. 221, 1 line above Problems should read:

ingenious counterexample …

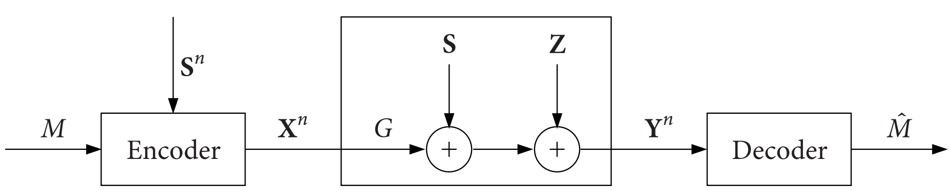
p. 230, 8 lines above Section 9.1.2 should read:

Noting that $\Psi\Psi^T \preceq I_r$, we then …

p. 231, Lemma 9.1, line 1 should read:

…channel gain matrix G and …

p. 241, Figure 9.7 should look:



p. 242, lines -3 and -2 should read:

$$R_1 < \frac{1}{2}\log|G_1K_1G_1^T + I_r|,$$
$$R_2 < \frac{1}{2}\log\frac{|G_2K_2G_2^T + G_2K_1G_2^T + I_r|}{|G_2K_1G_2^T + I_r|}$$

p. 295, Theorem 12.1, line 7 should read:

...with $\underline{|\mathcal{Q}| \le 4}$, $|\mathcal{U}_j| \le |\mathcal{X}_j| + 4$ ...

p. 315, Problem 12.6 (b), line 4 should read:

where $r_j = (1/2)\log(1 + N_j/\tilde{N}_j)$, $j = 1, 2$.

p. 324, line -6 should read:

$$D_{\min} = \inf\{D\colon (R_1, R_2) = (1/2, 1/2) \text{ is achievable for distortion } \underline{\text{triple}}\ (0, D, D)\}.$$

p. 331, Example 13.2, line 3 should read:

...binary symmetric test channels

p. 337, line 5:

$\hat{\mathcal{U}}_1^{k_1} \times \hat{\mathcal{U}}_2^{k_2} \quad \longrightarrow \quad \mathcal{U}_1^{k_1} \times \mathcal{U}_2^{k_2}$

p. 356, Problem 14.6, line 1 should read:

Show that every rate pair (R_1, R_2) in the optimal rate region $\mathscr{R}^*$ of the Gray–Wyner system must satisfy the inequalities

p. 370, 3 lines above Example 15.3:

vector $\alpha \quad \longrightarrow \quad$ vector $\boldsymbol{\alpha}$

p. 374, Theorem 15.4, line 3 should read:

$(D_1, \dots, D_{N-1}) \quad \longrightarrow \quad (\mathcal{D}_1, \dots, \mathcal{D}_{N-1})$

p. 378, line 18 should read:

...via an ingenious counterexample ...

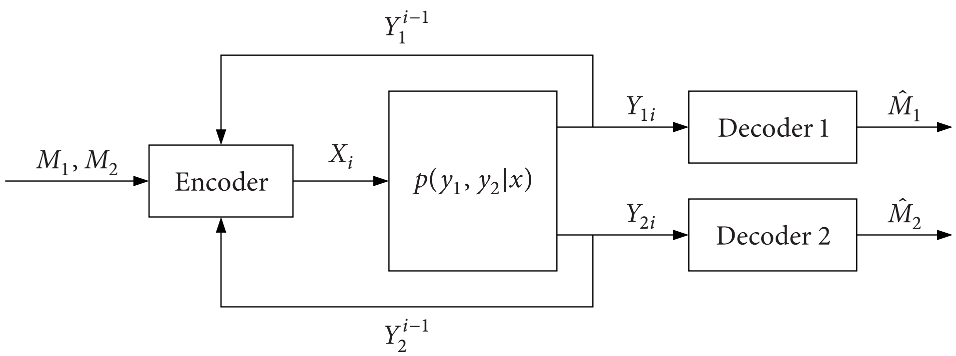
p. 395, Section 16.5, line 6 should read:

...and $Z_2 \sim \mathrm{N}(0, 1)$ and $Z_3 \sim \mathrm{N}(0, 1)$ are ...

p. 426, lines 3 and 6:

$X_3 \quad \longrightarrow \quad Y_3$

p. 443, Figure 17.5 should look:



p. 446, 4 lines above Figure 17.8 should read:

The capacity region of the DM-TWC …

p. 451, Section 17.6.2, lines 5 and 6 should read:

$$= \sum_{i=1}^{n} I(M_1, X_1^i; Y_i | M_2, X_2^i, Y^{i-1}) + n\epsilon_n$$
$$\le \sum_{i=1}^{n} I(X_1^i; Y_i | X_2^i, Y^{i-1}) + n\epsilon_n$$

p. 454, line -8 should read:

…Example 17.3. Elia (2004) improved the resulting inner bound using control theoretic tools. Cover and El Gamal (1979) …

p. 454, line -5 should read:

Shannon (1961) introduced …

p. 465, 1 line above Decoding should read:

…in block $j \in [1 : b]$.

p. 480, Remark 18.8 should read:

As for the interference channel, the rates achieved by the above coding schemes can be improved by using more sophisticated techniques such as superposition coding and rate splitting.

p. 539, Example 21.13, line 1 should read:

Let (X_1, X_2) be a DSBS(p), $Z_1 = Z_2 = X_1 \cdot X_2$. For two rounds …

p. 552, line -7 should read:

…is monotonically decreasing in

p. 555, Section 22.1.2, last three lines of displayed equations should read:

$$
\begin{aligned}
&\stackrel{(d)}{=} n\big(I(U;Y|V) - I(U;Z|V)\big) + n(\epsilon + \epsilon_n) \\
&\le n \max_{v}\big(I(U;Y|V=v) - I(U;Z|V=v)\big) + n(\epsilon + \epsilon_n) \\
&\stackrel{(e)}{\le} nC_{\mathrm{S}} + n(\epsilon + \epsilon_n),
\end{aligned}
$$

p. 557, displayed equations in Theorem 22.2 should read:

$$
\begin{aligned}
R_0 &\le \min\{I(U;Z),\ I(U;Y)\}, \\
R_1 &\le \big[I(V;Y|U) - I(V;Z|U)\big]^{+} + R_{\mathrm{L}}, \\
R_0 + R_1 &\le I(U;Z) + I(V;Y|U), \\
R_0 + R_1 &\le I(V;Y)
\end{aligned}
$$

p. 559, Wiretap channel with secret key, line 3 should read:

…then the secrecy capacity of a more capable DM-WTC $p(y,z|x)$ is

$$C_{\mathrm{S}}(R_{\mathrm{K}}) = \max_{p(x)} \min\big\{I(X;Y) - I(X;Z) + R_{\mathrm{K}},\ I(X;Y)\big\}. \qquad (22.7)$$

p. 624, Lemma A.2, line 2 should read:

Let $\mathscr{A}$ be a subset of the boundary points of $\mathscr{R}_1$ such that its convex hull includes $\mathscr{R}_1$.