information theory problem sets

1) Variable-to-variable blocklength source coding. All of the source coding schemes that we have considered so far (e.g., Huffman coding) convert a source sequence of fixed blocklength n into a sequence of codewords of variable blocklength. In many cases much simpler encoding and decoding rules for the same compression factor can be found by using a variable-to-variable blocklength source coding scheme.

Example: Consider a binary memoryless source that produces source strings $X_1, X_2, \ldots$, where the X_i are i.i.d. and take on values in $\{a, b\}$ with $p(a) = 0.7$ and $p(b) = 0.3$. Note that $H(X) = 0.881$. We will first encode source sequences of variable length into intermediate digits, using longer strings of the more frequent symbol and shorter ones of the less frequent one. Then we encode the intermediate digits into a binary code of variable length, assigning shorter codewords to more frequent intermediate digits. The smallest such scheme of interest is the following:

Source Sequence	Intermediate Digit	Probability	Binary Codeword
b	0	0.3	00
ab	1	0.21	01
aa	2	0.49	1

An example of the use of this code is the following:

$$aaaabaaabbabaaaaabaabbaaaa \longrightarrow \texttt{1100101000111011000011}\,.$$

The expected number of source symbols per intermediate digit is $M = 0.3 \times 1 + 0.21 \times 2 + 0.49 \times 2 = 1.7$ and the expected number of codeword symbols per intermediate digit is $N = 0.3 \times 2 + 0.21 \times 2 + 0.49 \times 1 = 1.51$, and thus the average number of codeword bits per source symbol is $L = N/M = 1.51/1.7 = 0.888$. This is remarkably close to $H(X)$ (especially when compared to a Huffman code of similar complexity, i.e., with blocklength $n = 2$, that only achieves $L = 0.905$).

In the code example above, we can interpret the intermediate digit as the "**run-length**" of a's. Thus, a logical extension of this coding scheme to maximum run-lengths of 4 is the following:

EE - Information Theory. Problem Set 1 Solution. February 21, 1. a) Random variable X= No. of coin tosses till the first head appears. If P(head)=p.EE Information Theory (Jan-Apr) Entropy, Relative Entropy and Mutual Information; The Asymptotic Equipartition Property; Entropy Set 6 Problem Set 7 Solutions to Problem Set 7 Problem Set 8 Solutions to Problem Set 8.ECEN - Information Theory and Coding. Peter Mathys, Fall Back Home Next. Problem Set 1. The solution is due Fri. 09/04/ Problem Set 2.Worked Example Problems. Information Theory and Coding: Example Problem Set 1. Let X and Y represent random variables with associated probability.CMPSCI GG Applied Information Theory. Fall Problem Set 3: Solutions. 1. [Cover and Thomas]. (a) Define the following notation,. C = Ip*(x)(X; Y).Information Theory and Coding. Problem Set 2 Solutions. Chapter 2: 32, 33, Chapter 3: 1, 3, 5. Chapter 4: 1, 2, 4, 6, 7, Chapter. 2.Page 1. Information Theory and Coding. Problem Set 4 Solutions. Chapter 5: 8, 11, 12, 14, 22, Chapter. 5: Page 2. Page 3. Page 4. Page 5.16 Information Theory and Portfolio Theory. sequence of yes-no questions of the form, Is X contained in the set S? Compare. H(X) to.Information Theory Problem Set 1. In the following exercises, p = (p1,p2,,pn) and q = (q1,q2,,qn) are probabil- ity densities. 1. Show that the distribution pmax.Lecture Notes on Information Theory by Yury Polyanskiy (MIT) and Yihong Wu (Yale) Other useful Problem Set 1 due in class on 2/15/18 Solutions Problem.E2 Information Theory. Discussion: Friday 14 October Mid-term: Friday 21 October Problem Set 5. Instructor: Rajesh Sundaresan. TAs: Nidhin.Cover and Thomas: Problem (Parallel Gaussian Channels) Asymptotic estimates in information theory with non-vanishing error.Information Theory and Coding () World Wide PROBLEM SETS and EXAMS (in postscript). Problem Set PROBLEM SET SOLUTIONS (in postcript).Problem Set 1 [ps] [pdf] [tex], January 24, , Jan 31 [ps] [pdf] [tex]. Problem Set 2 [ps] [pdf] [tex], January.View Homework Help - Information Theory Problem Sets from COMM at Imperial College. Information Theory Problem Sheet 1 (Most questions are from.Information Theory Problem Set 1. 1. Let. J (p1,,pn,?) = n. ? k=1 pklog (pk) ? ?. (n. ? k=1 pk ? 1.) where ? is a Lagrange multiplier. Differentiating J and setting.EE Introduction to Information Theory Fall Problem Sets and Solutions. The solutions are given in pdf. They are password protected.neighborhood of decoding sets; the single-shot (information-spectrum) approach uses .. theory problems, we thus obtain by far the only existing method for a.Information Theory and its applications in theory of computation, Spring Instructors: Course Description, Lectures, Problem sets, References.R. G. Gallager, Information Theory and Reliable Communication, Wiley, Problem sets are required to be handed in by the end of the class (usually on.The web page has been updated to include lecture notes on information theory . Feb Problem Set 1 and solution have been updated.ECE Information Theory is a graduate-level class that introduces the mathematical theory of communications. 08/26 Problem set 1.Capacities: From information theory to extremal set theory transmission we give an asymptotic solution to several hard problems in extremal set theory within a.Problem Set for PhD Student Position in Information Theory and Deep Learning. Below you find problems, which are closely related to the planned research.