05/09/2020 * Prob 5:-. The O/P of an inf. source consist of 150 symbols, 32 of which occur with a propability of I and the remaining 118 occur with a probability of 1. The source emits 2000 symbols/sec. Assuming that the symbols are choosen independently, find the average information rate of this source. H Troial = $\sum_{i=1}^{22} \frac{1}{64} \log_2(64) + \sum_{i=81}^{1} \log_2(36)$ H = 3 + 3.94 = 6.94 Rs = 85×H=2000 × 6.94 Rs = 7882.645

3-40 (10) - (3.60) DIB/SE

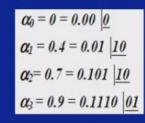
Shannon's Encoding Algorithm: O/P of an inf source is converted into an x-array sequence. X = 19,90, 903 . In binary: => X = (0,1) In tempory: $\Rightarrow x = (0,1,2)$ * steps to solve problems. 1. Arounge the source symbol in the decreasing propability. 2 Compute the sequence. * [a, =0] A do = 0, continue uptodo * de = Pi = Pitai eta * 0/9 = Pa+P1 = P2+0/2 * d4 = P3+Pa+P1 = P3+d3 (x--) * | Xq+1= Pq + Xq = 1 3 Setermine the smallest integer for li lingth of the code word) using the inequality for all i=1 to q 4. Expand the decimal numbers of in binary term upto hi places neglecting the expansion beyond 5. Remove the decimal point to get the desire

* Code efficiency: The average length 'L' of any code is given by L= E Pil; where listly * Code efficiency, no = H(s) * 100 Construct the Shannon's binary corde for the tollowing message symbols S = (S1.52.153.54) with probabilities P= (0.4,0.3,0.2,0.1) Sotto: Step1: Arranging probability in decreasing order. 0.470.370.270.1 -stepa:do = 0 d, = P++d0=0.4 d2 = P2+A, = 0.4 +0.3 =0.7 d3 = 0.4+0.3 +02 = 0.7 +0.2=0.9 d4 = 0.9+01 = 1.0 Here, 9=4/ 2 4 5 0.4 -211 > 1 1 = 2 -2 = 1 0.3

- Ex: 1. Construct the Shannon's binary code for the following message symbols $S=(s_{1,}s_{2,}s_{3},s_{4})$ with probabilities P=(0.4, 0.3,0.2,0.1).
- Solution:
- 0.4 > 0.3 > 0.2 > 0.1

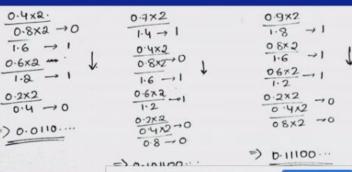
$$\alpha \theta = 0,$$
 $\alpha 1 = 0.4$
 $\alpha 2 = 0.4 + 0.3 = 0.7$
 $\alpha 3 = 0.7 + 0.2 = 0.9$
 $\alpha 4 = 0.9 + 0.1 = 1.0$

$$\begin{aligned} 2^{-l_1} &\leq 0.4 \to l_1 = 2 \\ 2^{-l_2} &\leq 0.3 \to l_2 = 2 \\ 2^{-l_3} &\leq 0.2 \to l_3 = 3 \\ 2^{-l_4} &\leq 0.1 \to l_4 = 4 \end{aligned}$$



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