CS 726: Quiz 1

Jan 14, 2020. 4:00pm – 4:20pm

Roll: _____

Name: _____

This quiz is open notes.

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1. Let $P(I), P(A)$ denote the probability that a student gets grade A in the Introductory ML and Advanced ML course respectively. $P(A|I)$ denote the probability that the student will get grade A in A if (s)he got grade A in course I. If $P(I) = 0.3, P(A|I) = 0.7$,

   (a) What is $P(A)$? Cannot be determined with the above information.

   (b) Assume $P(A) = 0.4$. What is the probability that a student who got grade A in I will get grade A in A

   (c) X and Y are independent 0 ..1

   (d) Let X and Y be two continuous uniformly distributed random variables between 0 and 1. Calculate the probability $\Pr(X + Y < 1 | X > 1/2)$ ..2 1/4

   (e) Let A and B be two discrete random variables for which the $\Pr(A|B)$ and $P(B)$ distributions are specified below. For example, from the table we know that $\Pr(A = 3|B = 2) = 0.2$

	B=1	B=2
A=1	0.4	0.3
A=2	0.3	0.5
A=3	0.3	0.2

B=1	B=2
0.4	0.6

      i. What is $\text{argmax}_{a,b} \Pr(A = a, B = b)$? That is, the values of A and B for which the probability highest is: A = _____ and B = _____ A=2, B=2

      ii. The value of $\Pr(A = B)$ is _____ $\Pr(B = 1) \Pr(A = 1|B = 1) + \Pr(B = 2) \Pr(A = 2|B = 2) = 0.4 * 0.4 + 0.6 * 0.5$

      iii. The probability that $(A + B) > 1$ is _____ 1

   (f) Let a random variable x follow a Gaussian distribution with mean $\mu = 10$ and variance 1.

      i. The median value of x is 10

      ii. The value of a for which the probability of $x \in [a, a + 1]$ is maximized is 9.5

      iii. If the probability that $x < 1$ is p, then the probability that $|x - 10| > 9$ is 2p

      iv. The expected value of x^2 is $1 + 10^2$

      v. The range of real values that are impossible to generate from this distribution is:

      vi. Which of the following samples of size 4 has the largest probability of being generated from this distribution

         A. 9, 9.1, 10, 11

B. 1, 2, 0, 11
C. 9.9, 10.1, 9.8, 10.3
D. 11, 9, 12, 8
E. 10, 10, 10, 1

c

Total: 3