7th Semester DATA MINING SESSIONAL EXAM -2, 2017

Time : 1 Hour | Answer all questions | Max. Marks: 15 (4+3+4+4)

1. Construct a decision tree with root node *Type* from the data in the table below. Each row after the first represents the values for one data instance. The output attribute is *Class*.

Scale	Type	Shade	Texture	Class
One	One	Light	Thin	A
Two	One	Light	Thin	A
Two	Two	Light	Thin	B
Two	Two	Dark	Thin	B
Two	One	Dark	Thin	C
One	One	Dark	Thin	C
One	Two	Light	Thin	C

2. Show that the entropy of a node never increases after splitting it into smaller successor nodes.

3. How does a Bayesian belief network different from naïve bayes classifier. Give two complete examples along with the attributes and the network where you will use Bayesian belief network.

4. Suppose we have a data of a few individuals who have been surveyed. The response to the promotional offer in the areas is listed below. Using Bayes Classification Algorithm classify the sex (output attribute) of a new tuple whose data is investment=No, Travel=Yes Reading = Yes and Health=No,

Investment promotion	Travel promotion	Reading promotion	Health Promotion	Sex
Yes	No	Yes	No	Male
Yes	Yes	No	No	Male
No	Yes	Yes	Yes	Female
No	Yes	No	Yes	Male
Yes	Yes	Yes	Yes	Female
No	No	Yes	No	Female
Yes	No	No	No	Male
Yes	Yes	No	No	Male
No	No	No	Yes	Female
Yes	No	No	No	Male

7th Semester DATA MINING SESSIONAL EXAM -1, 2017

Time : 1 Hour | Answer all questions | Max. Marks: 15

Q.1. Consider the market basket transactions shown in Table

TID	Items
1	{Milk, Beer, Diapers}
2	{Bread, Butter, Milk}
3	{Milk, Diapers, Cookies}
4	{Bread, Butter, Cookies}
5	{Beer, Cookies, Diapers}
6	{Milk, Diapers, Bread, Butter}
7	{Bread, Butter, Diapers}
8	{Beer, Diapers}
9	{Milk, Diapers, Bread, Butter}
10	{Beer, Cookies}

(a) What is the maximum number of association rules that can be extracted from this data (including rules that have zero support)?
(b) What is the maximum size of frequent itemsets that can be extracted (assuming minsup > 0)?

(c) Write an expression for the maximum number of size-3 itemsets that can be derived from this data set.

(d) Find an itemset (of size 2 or larger) that has the largest support.

(e) Find a pair of items, a and b, such that the rules {a} --> {b} and {b} --> {a} have the same confidence.

Q.2.For each of the following questions, provide an example of an association rule from the market basket domain that satisfies the following conditions. Also, describe whether such rules are subjectively interesting or not.

(a) A rule that has high support and high confidence. (b) A rule that has reasonably high support but low confidence. (c) A rule that has low support and low confidence. (d) A rule that has low support and high confidence.

Q.3. Consider the following transaction set given below.

TID	Items
1	{a, b, d, e}
2	{b, c, d}
3	{a, b, d, e}
4	{b, c, d, e}
5	{a, c, d, e}
6	{b, d, e}
7	{c, d}
8	{a, b, c}
9	{a, d, e}
10	{b,d}

(a) Draw an itemset lattice representing the data and then label each node in the lattice with the following letter(s):

- N: If the itemset is not considered to be a candidate itemset by the Apriori algorithm. There are two reasons for an itemset not to be considered as a candidate itemset: (1) it is not generated at all during the candidate generation step, or (2) it is generated during the candidate generation step but is subsequently removed during the candidate pruning step because one of its subsets is found to be infrequent.
- F: If the candidate itemset is found to be frequent by the Apriori algorithm.
- I: If the candidate itemset is found to be infrequent after support counting.

(b) What is the percentage of frequent itemset wrt all itemsets. Assume proper support.

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B.Tech. (Computer Engg.) VIIth Sem. , II Sessional Test-2017

Mobile Communication

Time:1 Hr. **Attempt all questions.** **MM: 15[5+5+5]**

Q1. In a cellular system the number of channels at the cell site is 60. The call holding time is 0.024 hour. The number of originating calls attempted per hour is 1834 and the number of handoff calls attempted per hour is 62. Calculate the blocking probability of the system when queuing is done for originating calls only, if the queue size is 4.

Q2. Create a Linear Feedback Shift Register (LFSR) with 4 cells in which $b_4 = b_0 \oplus b_1 \oplus b_3$. Show the value of output for 15 transitions if the seed is 1110.

Q3. What is burst? Explain about all types of burst used. Show the relationship between bursts and frames.

B.Tech. (Computer Engg.) VIIth Sem. , II Sessional Test(Makeup)-2017

Mobile Communication

Time:1 Hr. Attempt all questions. MM: 15[5+5+5]

Q1. In a cellular system, the probability that the signal below the specified receiver threshold is 20 percent and the probability that the signal above the specified co-channel interference level is 15 percent. Then what is the probability of a dropped call when the call has gone through three handoffs.

Q2. If the height of transmitting and receiving antennas are 40 m and 3 m respectively over a distance of 15 km in a dense urban mobile environment. Determine the propagation loss for a radio signal at 900 MHz using Hata propagation path loss model. If the free space propagation path loss is 110.5 db for the given system parameters. how is Hata propagation path loss comparable with that of free space propagation path loss?

Q3. A CDMA receiver gets the following chips: (-1 +1 -3 +1 -1 -3 +1 +1). Assuming the chipset sequence is used in the receiver as A, B, C, D, E, F, G, and H. Find which stations transmitted and which bits did each one send?

B.Tech. (Computer Engg.) VIIth Sem. Exam 2017
Mobile Communication (CEN-704)

Time:03 Hrs. **Attempt all questions. Assume suitable missing data if any.** **MM: 60**
All questions carry equal marks.

Q1. (a) Consider a wireless network with following data:

- Total population: 200,000
- Subscriber penetration: 25%
- Average call holding time for mobile-to-fixed line and fixed line-to-mobile subscribers: 100 seconds.
- Average calls/hour for mobile-to-fixed line and fixed line-to-mobile subscribers: 3.
- Calls/hour Average call holding time for mobile-to-mobile subscribers: 80 seconds.
- Average calls/hour for mobile-to-mobile subscribers: 4 calls/hour.
- Traffic distribution is: Mobile-to-fixed line : 50% fixed line-to-mobile: 40% and Mobile-to-mobile: 10% .

Calculate total traffic in Erlangs. If each MSC can handle 1800 Erlangs traffic, how many MSCs are required to handle the total traffic?

(b) If a transmitter produces 50 W of power, express the transmit power in units of:

i. dBm

ii. dBW

If 50 W is applied to a unity gain antenna with a 900 MHz carrier frequency, find the receiver power in dBm at free space distance of 100 m from the antenna. What is the P_r (10 km)? Assume unity gain for the receiver antenna.

OR

(b') Assume a 1 Amp-hour battery is used on a cellular mobile. Also assume that this cellular mobile draws 35 mA in idle mode and 250 mA during a call. How long would the mobile work if the user leaves the mobile on continually and has a one 3- minute call every day.

i. After every hour

ii. After every 6 hours.

Q2 (a) A hexagonal cell within a four-cell system has a radius of 1.387 km. A total of 60 channels are used within the entire system. If the load per user is 0.029 Erlangs and λ = 1 call/hour, compute the following for an Erlang C system which has a 5% probability of delayed call:

i. How many users per square kilometer will the system support?

ii. The probability that a delayed call will have to wait for more than 10 seconds?

iii. The probability that a call will be delayed for more than 10 seconds?

(From Erlang C chart, for 5% probability of delay with C= 15, traffic intensity = 9.0 Erlangs)

(b) The coverage area of a cellular system 2000 square km with each cell having a radii of 5 square km, and there are a total of 1000 radio channels available for handling the traffic.

i. Calculate the system capacity for 7-cell reuse pattern.

ii. If N= 7 . How many times the cluster has to be replicated in order to approximately cover the entire cellular area? Calculate the system capacity for the given case.

iii. Does decreasing the cluster size increase the system capacity? Explain.

OR

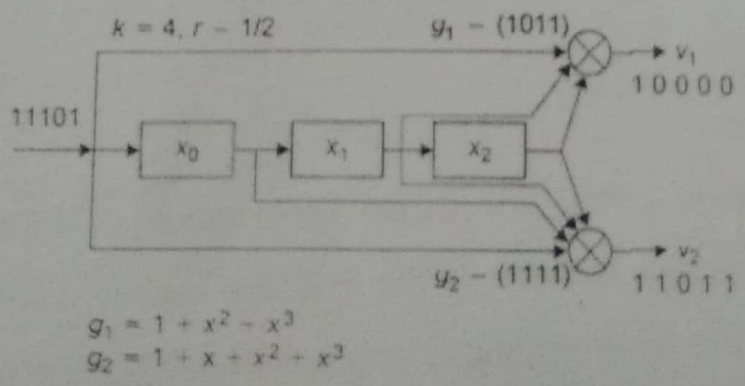
(b') A certain area is covered by a cellular radio system with 84 cells and a cluster size N. 300 voice channels are available for the system. Users are uniformly distributed over the area covered by the cellular system, and the offered traffic per user is 0.04 Erlang. Assume that blocked calls are cleared and the designated blocking probability is Pb =1%.

i. Determine the maximum carried traffic per cell if cluster size N = 4 is used. Repeat for cluster sizes N = 7.

ii. Determine the maximum number of users that can be served by the system for a blocking probability of 1% and cluster size N = 4. Repeat for cluster sizes N = 7.

(From Erlang chart it is given that for voice channel = 75 at 1% blocking, offered traffic A = 60.73 Erlangs and for voice channel = 43 at 1% blocking, offered traffic A = 31.66 Erlangs.)

Q3 (a) Following figure shows a convolution encoder used in GSM with k = 4 and r = ½. The generator polynomials g1 and g2 are $1 + x^2 + x^3$ and $1 + x + x^2 + x^3$ respectively. If the input is 1 1 1 0 1 (first bit), calculate the output of the encoder.



(b) Using following data for GSM 1800 network,

i. Subscriber usage per month = 150 minutes.

i. Days per month = 24.

ii. Busy hour per day = 06.

iii. Allocated spectrum = 4.8 MHz.

iv. Frequency raise plan = 4/12.

v. RF channel with = 200 KHZ (full rate).

vi. Present number of subscribers in the zone = 50,000.

vii. Subscriber growth = 5% per year.

viii. Area of the zone = 5000 km^2.

ix. Initial installation bused on a four year design.

x. Capacity of a base station transceiver (BTS) = 30 Erlangs.

xi. Traffic capacity of a GSM cell at 2% GoS (using Erlang B table) = 8.2 Erlangs.

Calculate:

i. Average busy hour traffic per subscriber.

ii. Traffic capacity per cell.

iii. Required member of base stations per zone and

iv. The hexagonal cell radius for the zone.

OR

(b') Using following data for group special mobile for communications GSM 1800, evaluate the impact of LUs on the radio resource and calculate the MSC/VLR transaction load using the fluid model.

- Density of mobiles in the cell = 10000 mobiles/km^2
- Cell radius= 500 m
- Average moving velocity of a mobile = 10 km/hr
- Number of cells per LA = 10
- Number of Las per MSC/VLR = 5
- Number of transactions and duration of each transaction to MSC/VLR per LU for different LU types are given in the following table.

Transaction type	No. of transaction/LU	Duration of transaction
Intra-VLR LU	2	600 ms
Inter-VLR with IMSI	16	4000 ms

Q4 (a) In what situation Handoff is required? Explain the various types of handoff occurred in cellular mobile system.

(b) Find the Autocorrelation and cross correlation in the Gold code sequence used in CDMA:

1 0 0 0 0 1 0 0 1 0 1 1 0 0 1 1 1 1 1 0 0 0 1 1 0 1 1 1 0 1 0 ($1+x^3+x^5$, seed 00001)

0 1 0 0 0 0 1 0 0 1 0 1 1 0 0 1 1 1 1 1 0 0 0 1 1 0 1 1 1 0 1 ($1+x^3+x^5$, seed 00010)

Q5. Explain any two of the following:

(a) GPRS

(b) WAP

(c) Call flow in CDMA