CBCS 51: Digital Image Processing Lab Exam

Date: Dec 17, 2018 **Duration: 3 hours**

Set 3

- Implement a histogram equalization function. If using Matlab, compare your implementation with Matlab's built-in function
- Implement a median filter. Add different levels and types of noise to an image and experiment with different sizes of support for the median filter. Compare your implementation with Matlab's.

16MCA047

CSCC53: Machine Learning and Soft Computing Lab Exam

Date: Dec 19, 2018 **Duration: 3 hours**

Set 2

1. Design a classifier for IRIS dataset using FFNN.

2. Apply Perceptron Learning Rule/error correcting learning for a single layer McCulloch-Pitts model to perform the following input-output mapping: Input= $A \vee (B \wedge C) = (A \vee B) \wedge (A \vee C)$

CBCS51: DIP and GPU Programming

Time: 1 Hour

Maximum Marks:15

- Attempt all questions.
- Use of Scientific Calculator is permitted.

Date: November 13, 2018

1. Explain the image Degradation/Restoration model. Explain the Noise Probability Density Functions and Filters associated with Noise-only Spatial Filtering of following Noise model: Gaussian Noise (5)
2. What is edge detection? How can it be achieved using frequency domain filtering? Explain, and write MATLAB program for the same. What is needed to be done for blurring an image using frequency domain filtering? (5)
3. Explain the importance of Bandpass filters in Noise Reduction using Frequency Domain Filtering. Why high and low pass filtering is not very suitable for Noise reduction? Write a complete MATLAB/Python program for band-pass filtering. (5)

MCA(SEM-V) EXAMINATIONS, 2018
MCA-53: Data Mining
Test-II

Time:1 Hour

Max Marks: 15

- Write your Roll No. on the top immediately on receipt of the question paper.
- Attempt any Two questions in all.
- Use of calculator is allowed.

1. What are various clustering techniques? Explain desired Features for Large Databases.
2. What is Data Warehouse? Differentiate between Data Warehouse and. Operational DBMS. Explain Efficient Processing OLAP Queries
3. What is frequent itemset? Finding frequent itemsets from th following dataset T.

Dataset T minsup=0.5

TID	Items
T100	1, 3, 4
T200	2, 3, 5
T300	1, 2, 3, 5
T400	2, 5

- What is Rare Item Problem?

MCA (SEM-V) Minor IEXAMINATIONS, 2018

CBCS51: DIP and GPU Programming

Time: 1 HourMaximum Marks:15

Date: September 25, 2018

- Attempt all questions.
- Use of Scientific Calculator is permitted.

1. Define the following terms: 4-,8-, m-Adjacency, 4-, 8-Connectivity, Region, Boundary, Foreground, and Background. (3)
2. How relevant is the concept of probability in image processing?Write formulae to define the following: (2)
-probability $p(z_k)$, of intensity level z_k (belonging to 0, 1, 2, ..., L – 1)occurring in a given image
-mean intensity
-variance of intensities
3. Write a MATLAB/Python program to read a color image: (2)
-change it to grayscale
-resize an MXN image to M/2XN/2
-separate out Red, Green, and Blue plane of image and to print them in a 1 X 3 grid
-print the image by halving the intensity of green plane
4. Compare the following: Image enhancement in Spatial v/s Transform domain. (1)
5. Write a Python/Matlab program to prepare a smoothing filter of size 5X5 and use it to filter an input image. How the output image is different from input image? (3)
6. How is Fourier transform relevant in image processing?Write a MATLAB/Python program for image sharpening using Ideal/Box for high pass and low pass filtering. How the two output images are different from the input image? (4)

DEPARTMENT OF COMPUTER SCIENCE, Jamia Millia Islamia, New Delhi-25

M.C.A., V Semester, First Mid Semester Examination, September 24, 2018

CSCC54: Pattern Matching using Python Programming

Time: 50 Minutes **Max. Marks:** 15

Ques. No. 1. Answer the following objective questions in brief. **(7)**

(i) Python String is .....data type. (mutable/immutable)

(ii) What is the output of the following python scripts?

```
>>>str = "Jamia"    >>>del str[1]
```

(iii) What is the output of the following python scripts?

```
>>>import re
>>>searchObj = re.search(r'M.', 'Jamia Millia Islamia is a University')
>>>searchOnj.group()
```

(iv) What is the output of the following python scripts?

```
>>>import re    >>>re.sub(r'\D', "", 'Total Amount = Rs. 32.56')
```

(v) What is the python regular expression in escape sequence to match all decimal digits?

(vi) Write the all possible matches by the python pattern *r'ba{1,2}t'*.

(vii) What is the output of the following python script?

```
>>>"India"*2
```

Ques. No. 2. Define the literal with the help of three types of literals. **(4)**

Ques. No. 3. Write a python program to print each word of the text file 'C:\abc.txt' in separate lines. **(4)**

MCA(SEM-V) EXAMINATIONS, 2018
MCA-53: Data Mining
Test-1

Time:1 Hour

Max Marks: 15

- Write your Roll No. on the top immediately on receipt of the question paper.
- Attempt any Two questions in all.
- Use of calculator is allowed.

1. What is a Data Mining Model? Explain Data Preprocessing.

2. (a) What is Supervised Learning? Explain **Data Reduction Strategies**

(b) How to Handling Redundancy in Data Integration?

Suppose that the data for analysis includes the attribute age. The Indian voter age values for the data tuples are (in increasing order) 12, 14, 17, 17, 19, 20, 20, 21, 22, 22, 25, 25, 26, 26, 30, 33, 33, 35, 35, 35, 36, 36, 42, 45, 47, 59, 65, 70. Use smoothing by bin means to smooth the above data, using a bin depth of 4. Illustrate your steps. Comment on the effect of this technique for the given data.

3 What is Naïve Bayesian Classification? Consider the following given example in tabular form.

Outlook	Temperature	Humidity	Windy	Class
sunny	hot	high	false	N
sunny	hot	high	true	N
overcast	hot	high	false	P
rain	mild	high	false	P
rain	cool	normal	false	P
rain	cool	normal	true	N
overcast	cool	normal	true	P
sunny	mild	high	false	N
sunny	cool	normal	false	P
rain	mild	normal	false	P
sunny	mild	normal	true	P
overcast	mild	high	true	P
overcast	hot	normal	false	P
rain	mild	high	true	N

This example classifying X an unseen sample X=(rain , cool, high, True), then find the following:

(i) $P(X|p)\cdot P(p)$

(ii) $P(X|n)\cdot P(n)$

In which class Sample X is classified.

Code: CSOC54

Roll No. 16MCA047

MCA (SEM-V) EXAMINATIONS – 2018

Pattern Matching using Python Programming

Time: 2 Hours **Max Marks: 75**

- *Write your Roll No. on the top immediately on receipt of the question paper.*
- *Attempt ALL questions by selecting any TWO parts. All questions carry equal marks.*

1. (a) Define the literal of a programming language and discuss different types of python literals in brief.

   (b) Describe the *while* statement of Python. Write a python program to read a positive integer and reverse its digits.

   (c) What is the benefit of opening a file, in python, using *with* statement? Write a python program to read content of text file 'doc.txt' and print each word in a separate line.

2. (a) Differentiate single quote, double quote, and triple quote python strings with examples. Suppose `s="Ph:011-26113211"` be a python string. Write the outputs of following python scripts: (i) `>>>x.count('11', 5)`, and (ii) `>>>x.center(25, '*')`.

   (b) Describe the string formatting operator % in python with suitable example. Suppose that `sn=7`, `name="Mohammad Aman"`, and `age=21` are three python variables. Write a python script using string formatting operator % to get the string `"insert into person values(7, 'Mohammad Aman', 21)"`.

   (c) Describe the escape sequence metacharacter `\d`, `\D`, `\w`, and `\W` with suitable examples. Suppose `ph="PoneNo: 2004-959-559 # This is Phone Number"` is a Python string write Python script to get output `'2004959559'`.

3. (a) Define `Matrix` class in python with `constructor`, `read()`, and `print()` methods, and overload `*` operator for `scalar` as well as `matrix` multiplication operations i.e. it can perform the scalar multiplication operation `5 * A`, and matrix multiplication operation `A * B`, on matrix objects `A` and `B`.

   (b) What is `dictionary` data type in Python? Suppose `x="Jamia Millia Islamia is a central university"` is a Python string. Write a python program to get frequency of each character of the above string using `dictionary` data type.

   (c) Define `Person(id, Name, age)` class in Python with a constructor method and override the `str()` method. Thereafter, write a python program to read information of `n` persons in a list and sort it in ascending order of their age using list's `sort()` method.

4. (a) What is default argument in a python function? Define *greet(name, msg)* python function by assigning default values to both arguments and call them by passing different number of arguments.

   (b) Describe the variable length arguments in python function by defining *sum(...)* function such that we can pass different number of arguments to this function. For example, if `a =10, b=20, c=30`, then `sum(), sum(a), sum(a, b), sum(a, b, c)` return `0, 10, 30, 60` respectively.

   (c) Write the steps to define a Python module. Define a python module `string` with `strlen(s)` and `strcpy(s1, s2)` functions.

5. (a) Write a python program to create `student(Rn, Name, Class)` table in oracle and insert five records in it.

   (b) What is GET and POST method? Write python CGI that accept person name and age from a client and return adult or minor message based on age. Call this CGI using url by passing `name="Aisf Jmi"` and `age=19`.

   (c) Write client program (.html) and Python CGI (.py) for discount calculation. In client program, there should be a text filed to accept total cost of the items, two radio buttons for getting the gender of the customer, and a command button "Calculate Discount". The Python CGI accept inputs from client and calculate the 10% discount for female and 5% for male customers.

❖ ❖ ❖

Code: CSCC54

Roll No... 16MCA047

MCA (SEM-V) EXAMINATIONS – 2018

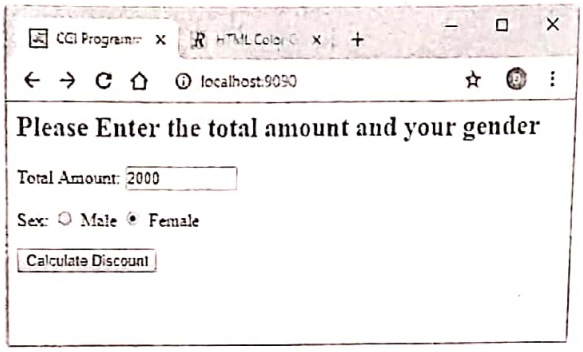
Pattern Matching using Python Programming (Lab)

Time: $1\frac{1}{2}$ **Hours**

Max Marks: 10

- *Write your Roll No. on the top immediately on receipt of the question paper.*
- *Question one is compulsory. Attempt any one question from question no. 2-12.*

1. Write client program (.html) and Python CGI (.py) to calculate the discount on sale of items using rules that female customers purchased amount greater than or equal to 2000 discount is 10% and less than 2000 discount is 8% and for male customers the discount is only 7%. In client program, there should be a text field to accept total amount, two radio buttons "Male" and "Female" and a command button "Compute Discount" as shown below. The Python CGI accept inputs from client and compute the discount accordingly and return back the result as html codes to client.



OR

Define `Matrix` class in python with `constructor`, `read()`, `print()`, `inverse()`, and `determinant()` methods, and overload * operator for `scalar` as well as `matrix` multiplication operations i.e. it can perform the scalar multiplication operation `5 * A`, and matrix multiplication operation `A * B`, on matrix objects `A` and `B`. Also overload the `*=` operator in this class.

2. Write an efficient python program to print all prime numbers and their sum between 1 and n.
3. Write a python program that accept a text file and print all unique words and their frequencies.
4. Define a python class for complex number by overloading + and * operators.
5. Define `Person(id, Name, age)` class in Python with a constructor method and override the `str()` method. Thereafter, write a python program to read information of `n` persons in a list and sort it in ascending order of their age using list's `sort()` method.
6. Define sum() function using variable length arguments and call it with different number of arguments.
7. Write a python function that accepts a positive integer and return positive integer that is obtained by reversing its digits.
8. Write a python CGI and html client that accept weight and height of a person and return his/her BMI in kg/m^2.
9. Write a python program that remove all python comments from a python program file.
10. Write a python program that performs 'find and replace' operation in a text file.
11. Write a python program that create Student(RollNo primary key, Name, 40 > age > 18 , class in MCA/PGDCA) table in MySQL or oracle DBMS and insert five records then display them.
12. Write a python program to define stack class and implement the gcd() recursive function using stacks.

Set-1

M.C.A (Vth Semester), 2018

Semester Practical Examination

Time: 2 Hours

maximum Marks: 15

Instructions: (i) Attempt any two:

(ii)Each question carries equal marks.

1. Overview

You are to construct a decision tree for the given data set (tennis.arff – see course website) using the ID3 decision tree algorithm in the Weka toolset. The dependent variable for the tree is 'play'. Once you have constructed the tree use the tree and the data Weka provides about the tree to answer the questions below.

Questions

1. Does the tree adequately describe the data? Why? Why not?
2. Use the decision tree to figure out the value for the dependent variable for the following instance:

outlook	*temperature*	*humidity*	*windy*	*play*
rainy	hot	high	false	?

Justify your answer!

Instructions

- Start the Weka explorer.
- Load the tennis.arff file using the 'preprocess' tab.
- Switch tabs to 'classify' and select the ID3 algorithm with the 'choose' button (you will find ID3 under trees)
- Set the 'test options' to 'use training set'.
- Make sure that 'play' is the attribute that shows below the test options.
- Hit the 'start' button – the big pane should display information about the decision tree built.

2. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm http://storm.cis.fordham.edu/~gweiss/data-mining/weka-data/contact-lenses.arff

3. Demonstration of Association rule process on dataset segment-test.arff using apriori algorithm. http://storm.cis.fordham.edu/~gweiss/data-mining/weka-data/segment-test.arff)

e: CBSE52

Roll No. 16MCA047

MCA (SEM-V) EXAMINATIONS - 2018
Data Mining and Data Warehousing

Time: 2 Hours

Max Marks: 75

- *Write your Roll No. on the top immediately on receipt of the question paper.*
- *Attempt all questions. Each question carries equal marks. Attempt two parts out of three.*

1.

(a) What is Data preprocessing? Discuss Evolution of Database Technology.

(b) What is a Data Mining Model? Discuss Data Mining Techniques.

(c) What are various major tasks in Data preprocessing? Explain data transformation normalization with a suitable example.

2.

(a) What is a data warehouse? Differentiate between data warehouse and operational DBMS.

(b) What are various typical OLAP Operations? Discuss Data Warehouse Design Process.

(c) What is the need of a separate Data Warehouse? Discuss Efficient Data Cube Computation.

3.

(a) What is aassociation rule mining? Explain Rule strength measures.

(b) What do you mean by Apriori algorithm? Find frequent itemsets from the following database of Transaction.

TID	Items
T100	1, 3, 4
T200	2, 3, 5
T300	1, 2, 3, 5
T400	2, 5

(c) What are the Problems with the association mining? Explain Multiple minimum class supports. The 'database' below has four transactions. What association rules can be found in this set, if the minimum support (i.e coverage) is 60% and the minimum confidence (i.e. accuracy) is 80% ?

Trans_id	Itemlist
T1	{K, A, D, B}
T2	{D, A C, E, B}
T3	{C, A, B, E}

4.

(a) What is a Decision Tree? Explain Estimating a-posteriori probabilities.

(b) What is Naïve Bayesian classification? Consider the following given example in tabular form.

Day	Outlook	Temperature	Humidity	Wind	PlayTennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

Draw decision tree by selecting humidity as root.

5. (c) What is independence hypothesis? Explain the problem of regression using example.

(a) What are various types of Clustering? Write an algorithm for agglomerative clustering.

(b) What is genetic algorithm? Use single and complete link agglomerative clustering to group the data described by the following distance matrix. Show the dendrograms.

	A	B	C	D
A	0	1	4	5
B		0	2	6
C			0	3
D				0

(c) What are desired Features for Large Databases? Compare various Clustering Techniques.

Code: CBCS51

Roll No. 16MCA047

M.C.A. (SEM V) EXAMINATIONS- 2018

Digital Image Processing and GPU Programming

Time: 2 Hours **Max Marks: 75**

- *Write your Roll No. on the top immediately on receipt of the question paper.*
- *Attempt ALL questions by selecting any TWO parts. All questions carry equal marks.*

1. (a) Briefly explain different tasks of image processing: low-level, mid-level, and high-level

   (b) Explain the following color models with their usefulness: RGB, HSV, CMYK

   (c) Explain the following and give MATLAB/Python commands for the same:
   (i) Log transformation (ii) Contrast stretching (iii) Bit-plane slicing

2. (a) Explain the usefulness of discrete Fourier transform and inverse transform in image processing. Write MATLAB/Python program for Gaussian high pass filtering of an input image.

   (b) Explain the use of first and second order derivatives for image sharpening. Give an example of Laplacian filter. Use it for image sharpening.

   (c) Briefly explain the characteristics of the following noise probability density functions: Gauss, Salt and Pepper, also suggest at least two denoising filters for both of these models.

3. (a) For an image, define the following: 8- and m-connected regions, foreground, background with example.

   (b) What is thresholding in an image? Explain how it can be used for image segmentation.

   (c) Define the following: Edge-based segmentation, Region-based segmentation

4. (a) Explain run length coding scheme and its usefulness.

   (b) Explain the following terms with example in the context of image compression:
   (i) Relative Data Redundancy (RDR) and Coding redundancy, (ii) Spatial/Temopral redundancy, (ii) Irrelevant Information

   (c) What is Discrete Cosine Transform? How is it useful in Image Compression?

5. (a) Explain the steps needed for designing of an image classifier by choosing a suitable machine learning algorithm.

   (b) Briefly explain the following jargans: GoogleNet, AlexNet, Transfer Learning

   (c) Explain the use of K-means algorithm for color image segmentation.

Code:CSCC53

Roll No. 16MCA047

M.C.A. (SEMV) EXAMINATIONS- 2018

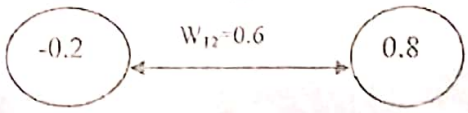
Machine Learning and Soft Computing

Time: 2 Hours **Max Marks: 75**

- *Write your Roll No. on the top immediately on receipt of the question paper.*
- *Attempt ALL questions by selecting any TWO parts All questions carry equal marks.*

1. (a) Whether A.I. will everreach human like intelligence? Where is it lacking? Give one real life example demonstrating that the best A.I. programs can be unreliable when faced with situations that differ, even to a small degree, from what they have been trained on.
   (b) What is the need for evaluating a learning algorithm? Explain the following terms: Confusion matrix, ROC plot
   (c) What is machine learning? Compare and contrast: regression and classification

2. (a) Define Gradient descent rule. Derive a Gradient descent training rule for a single unit with output O, where $O = w_0 + x_1 w_1 + x_1 w_1^2 + \cdots \ldots \ldots x_n w_n + x_n w_n^2$
   Extend gradient descent rule for multi-layer network.
   (b) Train a McCulloch and Pitts model of neural network for learning PVQ logic gate function. Assume random initial weights as (W_0, W_1, W_2) = (-1, 1, 1) where W_0 is bias. Show training upto 6 steps only.
   (c) Consider the following Hopfield network (bipolar i.e. a unit signals output in 1 or -1) with 2 units only. Find all stable states or patterns of this network and also compute energy of stable and other states. Assume binary units. What you observe about energy of different configurations of this network.



3. (a) Define the following learning methods: Hebbian learning, Agglomerative clustering. Are these methods supervised?
   (b) Explain neighborhood for rectangular grid feature map with radius R=0, 1 and 2, Competition, Cooperation, and Adaptation for Self Organizing Map (SOM).
   (c) What is good clustering? Define internal and external measures for finding quality of clusters.

4. (a) Define Genetic Algorithm. Apply it for training of a feed-forward neural network.
   (b) Define the following: Order-based crossover, Roulette wheel selection, fitness function
   (c) Write a complete MATLAB program for solving any optimization problem using genetic algorithm.

5. (a) Define the following: Fuzzy Logic, Fuzzy inferencing mechanism. Briefly explain steps of designing a fuzzy logic-based system.
   (b) Consider the following fuzzy sets:

   Tall men = {0/165, 0/175, 0/180, 0.25/182, 0.5/185, 1/190}

   Short men = {1/160, 0.5/165, 0/170}

   Average men = {0/165, 1/175, 0.5/180, 0.25/182, 0/185, 0/190}

   Using fuzzy set operations, obtain the following fuzzy sets:

   i. very tall men

   ii. tall and average men

   iii. not very tall men and not very short men

   iv. not very very tall and not very very short men

   v. α-cuts of tall men for values of α=0.2 and 0.7

   (c) Define the following: degree of membership for Trapezoidal and Guassian, linguistic, Cardinality, Union, Intersection of fuzzy sets