Sandip University

Neelam Vidya Vihar, Vill.: Sijoul. P.O. : Mailam, Dist.:Madhubani, Bihar -847235
Website : http://www.sandipuniversity.edu.in
Toll-Free No.- 1800-313-2714 Ph: 7549991044.

School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: Third Year	Semester -VI
Course: Data Science	Course Code: BCA601
Theory: 3Hours/Week	Max. University Theory Examination: 60 Marks
	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2:30 Hrs	Credit: 4

Objectives :	
1	To develop practical data analysis skills, which can be applied to practical problems
2	To develop fundamental knowledge of concepts underlying data science projects.
3	To develop practical skills needed in modern analytics.
4	To explain how math and information sciences can contribute to building better algorithms and software.
5	To give a hands-on experience with real-world data analysis

Unit Number	Details	Hours
1	Linear algebra for data science (algebraic view - vectors, matrices, product of matrix & vector, rank, null space, solution of over-determined set of equations and pseudo-inverse) , Linear algebra for data science (geometric view - vectors, distance, projections, eigenvalue decomposition)	12
2	Statistics (descriptive statistics, notion of probability, distributions, mean, variance, covariance, covariance matrix) Optimization; Typology of data Science problems and a solution framework	12
3	Univariate and multivariate linear regression Model assessment (including cross validation)	13
4	Verifying assumptions used in linear regression , Assessing importance of di-erent variables, subset selection	11

5	Introduction to classification and classification using logistic regression ,Classification using various clustering techniques	12
	Total (Hrs)	60

Course Outcome	
Student Should able to :	
CO1	Know basic notions and definitions in data analysis, machine learning
CO2	Know standard methods of data analysis and information retrieval
CO3	Be able to formulate the problem of knowledge extraction as combinations of data filtration, analysis and exploration methods.
CO4	Be able to translate a real-world problem into mathematical terms.
CO5	Possess main definitions of subject field.

Resources	
Recommended Books	1. James, G., Witten, D., Hastie, T., Tibshirani, R. An introduction to statistical learning with applications in R. Springer, 2013. 2. Han, J., Kamber, M., Pei, J. Data mining concepts and techniques. Morgan Kaufmann, 2011. 3. Hastie, T., Tibshirani, R., Friedman, J. The Elements of Statistical Learning, 2nd edition. — Springer, 2009. 4. Murphy, K. Machine Learning: A Probabilistic Perspective. - MIT Press, 2012
Reference Books	“Practical Data Science with R”. Nina Zumel, John Mount. Manning, 2014 “Data Science for business”, F. Provost, T Fawcett, 2013

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School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: Third Year	Semester -VI
Course: (Elective II) Android Programming	Course Code: BCA602II
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
Tutorial : 1 Hrs/Week	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2:30 Hrs	Credit: 4

Objectives :	
1	To understand the features and tools used in Android programming
2	To understand the concept OOPs using JAVA
3	To have ability to write a program using Android.
4	To understand the User Interface Architecture.
5	To be able to use User Interface Design.

Unit Number	Details	Hours
1	**Introduction:** History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture.	13
2	**Overview of object oriented programming using Java:** OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine.	11
3	**Development Tools:** Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating a android project – Hello Word, run on emulator, Deploy it on USB-connected Android device.	12
4	**User Interface Architecture:** Application context, intents, Activity life cycle, multiple screen sizes.	12

5	**User Interface Design:** Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners (Combo boxes), Images, Menu, and Dialog. **Database**: Understanding of SQLite database, connecting with the database.	12
	Total (Hrs)	60

Resources	
Recommended Books	Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.
Reference Books	Grant Allen, Beginning Android 4, Apress, 2012.

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School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: Third Year	Semester -VI
Course: (Elective II) Distributed System	Course Code: BCA602II
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
Tutorial : 1 Hrs/Week	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2:30 Hrs	Credit: 4

Objectives :	
1	To learn the computation model of synchronous and asynchronous systems.
2	To understand the basic concepts of programming model.
3	To be able to understand the security and authentication of prescribed model.
4	To learn the concepts of algorithm and mutual exclusion technique.
5	To be able to understand the distributed object and databases.

Unit Number	Details	Hours
1	Basic concepts. Models of computation: shared memory and message passing systems, synchronous and asynchronous systems. Logical time and event ordering.	13
2	Global state and snapshot algorithms, mutual exclusion, clock synchronization, leader election, deadlock detection, termination detection, spanning tree construction.	11
3	Programming models: remote procedure calls, distributed shared memory. Fault tolerance and recovery: basic concepts, fault models, agreement problems and its applications, commit protocols, voting protocols, checkpointing and recovery, reliable communication.	12
4	Security and Authentication: basic concepts, Kerberos. Resource sharing and load balancing.	12

5	Special topics: distributed objects, distributed databases, directory services, web services.	12
	Total (Hrs)	60

Resources	
Recommended Books	Mukesh Singhal and Niranjan Shivaratri, Advanced Concepts in Operating Systems, McGraw-Hill. Nancy Lynch, Distributed Algorithms, Morgan Kaufmann. Andrew S. Tanenbaum, Distributed Operating Systems, ACM Press. Jie Wu, Distributed Systems, CRC Press.
Reference Books	Hagit Attiya, Jennifer Welch, Distributed Computing: Fundamentals, Simulations and Advanced Topics, McGraw-Hill. Sape Mullender (ed.), Distributed Systems, Addison-Wesley.

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School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: Third Year	Semester -VI
Course: (Elective II) Machine Learning	Course Code: BCA602II
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
Tutorial : 1 Hrs/Week	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2:30 Hrs	Credit: 4

Objectives :	
1	To understand the concept of learning problem.
2	To understand the decision making problem.
3	To understand the artificial neural problem.
4	To know the basics of Bayesian learning and instance based learning.

Unit Number	Details	Hours
1	**Introduction:** Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. **Concept Learning:** Concept learning task, Concept learning as search, Find-S Algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.	10
2	**Decision Tree Learning:** Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesisspace search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning.	10
3	**Artificial Neural Networks:** Introduction, Neural Network representation, Appropriate problems, Perceptrons, Backpropagation algorithm.	8
4	**Bayesian Learning:** Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks, EM algorithm	10

5	**Evaluating Hypothesis:** Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. **Instance Based Learning:** Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning, **Reinforcement Learning:** Introduction, Learning Task, Q Learning	12
	Total (Hrs)	50

Course Outcome Student Should able to :	
CO1	Recall the problems for machine learning. And select the either supervised, unsupersvised or reinforcement learning.
CO2	• Understand theory of probability and statistics related to machine learning
CO3	• Illustrate concept learning, ANN, Bayes classifier, k nearest neighbor, Q,
Resources	
Recommended Books	1. Tom M. Mitchell, Machine Learning**,** India Edition 2013, McGraw Hill Education.
Reference Books	1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning, 2nd edition, springer series in statistics. 2. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.
E-Resources	http://nptel.ac.in/

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School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: Third Year	Semester -VI
Course: Electives Lab (Android Programming)	Course Code: BCA 62L
Practical : 3 Hrs/Week	Max. University Practical Examination: 25 Marks
Tutorial : 1 Hrs/Week	Lab Continuous Internal Assessment: 25 Marks
Max. Time for Exam.: 3 Hrs	Credit: 1

Practical Objectives :	
1	Describe Android architecture frame work.
2	Design Android UI Layout
3	Develop applications using menus and dialog boxes

Set of Suggested assignment list is provided in 3 groups – A, B, C.
Instructor is suggested to design assignment list by selecting/ designing at least 12 suitable assignments as a study assignments.

- At least 4 assignments from group A.
- At least 4 assignments from group B.
- At least 2 assignments from group C.

Sr. No.	Description
	Group 'A':Assignment (any Four assignment)
1	Create "Hello World" application. That will display "Hello World" in the middle of the screen in the emulator. Also display "Hello World" in the middle of the screen in the Android Phone.
2	Create an application with login module. (Check username and password).
3	Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.
4	Create a menu with 5 options and selected option should appear in text box.
5	Create and validate a login application using username as Email ID else login button must remain disabled.

6	Create an application to display “Hello World” string the number of times user inputs a numeric value. (Example. If user enters 5, the next screen should print “Hello World” five times.)
	Group B: (Any FOUR Assignments)
7	Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.
8	Create an application with three option buttons, on selecting a button color of the screen will change
9	Create and Login application as above. On successful login, pop up the message.
10	Create an application to Create, Insert, update, Delete and retrieve operation on the database
11	Create an application to change screen color as per the user choice from a menu.
12	Create an application that will display toast (Message) at some regular interval of time.
13	Create a background application that will open activity on specific time.
	Group C: (Any TWO Assignment)
14	Create an application to call a phone number entered by the user the Edit Text.
15	Create an UI listing the diploma engineering branches. If user selects a branch name, display the number of semesters and subjects in each semester.
16	Create an application to insert, update and delete a record from the database.

Term Work:
Term Work assessment shall be conducted for the Project, Tutorials and Seminar. Term work is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by subject teacher of the institute. At the end of the semester, the final grade for a Term Work shall be assigned based on the performance of the student and is to be submitted to the University.

Notes	
1	The experiments from the regular practical syllabus will be performed (15 Marks).
2	The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly (5 Marks).
3	Good Laboratory Practices (5 Marks)

Practical/Oral/Presentation:
Practical shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University, authenticate and seal it. Sealed envelope shall be submitted to the head of the department or authorized person.

Notes	
1	One experiment from the regular practical syllabus will be conducted. (Total 15 Marks).
2	Complete laboratory journal (05 Marks).
3	Viva-voce (05 Marks).

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Year: Third Year	Semester -VI
Course: Electives Lab (Distributed System)	Course Code: BCA 62L
Practical : 3 Hrs/Week	Max. University Practical Examination: 25 Marks
Tutorial : 1 Hrs/Week	Lab Continuous Internal Assessment: 25 Marks
Max. Time for Exam.: 3 Hrs	Credit: 1

Practical Objectives :	
1	To learn about Object Request Architecture.
2	To design the 3tier architecture.
3	Case Study on various system.

1. Case study on Common Object Request Broker Architecture.
2. Implementation of Deadlock through Simulation.
3. Study of 3 tier client server architecture.
4. Case study on Client and RMI Server.
5. WAP to Implement an Election algorithm.
6. S/W Simulation for Clock Synchronization in Distributed System using Lamport's Algorithm.
7. Implementation of Banker's Algorithm for avoiding Deadlock.
8. Case study on Inventory Management.
9. Case study on Supply Chain Management:
10. Case study on Reservation System:

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Year: Third Year	Semester -VI
Course: Electives Lab (Machine Learning)	Course Code: BCA 62L
Practical : 3 Hrs/Week	Max. University Practical Examination: 25 Marks
Tutorial : 1 Hrs/Week	Lab Continuous Internal Assessment: 25 Marks
Max. Time for Exam.: 3 Hrs	Credit: 1

Practical Objectives :	
1	Make use of Data sets in implementing the machine learning algorithms.
2	Implement the machine learning concepts and algorithms in any suitable language of choice

Sr. No.	Description
1	Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2	For a given set of training data examples stored in a .CSV file, implemen and demonstrate the Candidate-Elimination algorithm to output a descrip tion of the set of all hypotheses consistent with the training examples.
3	Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample
4	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
5	Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6	Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set
7	Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Da-

	ta Set. You can use Java/Python ML library classes/API
8	Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program
9	Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

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School: Computer Science & Application	Programme: BCA (Bachelor of Computer Application)
Year: Third Year	Semester -VI
Course: In Plant Project Work & Seminar	Course Code: BCA603
Practical UG--	Practical Examination: 100 Marks
	Team Work : 50 Marks
	Credit: 6

Objectives :	
1	To develop problem solving abilities using mathematics
2	Exposure to Learning and knowledge access techniques using Conferences, Journal papers and participation in research activities
3	To apply algorithmic strategies while solving problems
4	To develop time and space efficient algorithms
5	To develop software engineering documents and testing plans
6	To use algorithmic solutions using distributed, Embedded, concurrent and parallel environments
7	To encourage and expose students for participation in National/ International paper presentation activities.
8	To develop detail understanding for the selected Project Domain
9	To help in improving the presentation skills

Activity Planning:

1. Project workstation selection, installations and setup along with report to the guide. (recommended submission date:- 3 weeks after commencement of second term)
2. Programming of the project, GUI (if any) as per 1st Term work submission.(recommended submission date:- Progress report every week during laboratory)
3. Test tool selection for various testing and generate various testing result charts, graphs etc. including reliability testing. (7 weeks before Term II Conclusion)
4. Review of design and necessary corrective actions taking into consideration feedback report of Term I assessment, and other competitions/conference
5. Students to publish at least one technical paper in Conference/peer review journal.
6. Final term work submissions in the prescribed format given by the guides consisting of a project report consisting of a preliminary report prepared in term-I, detailed design (all necessary UML diagrams) document, User Interface design , test results generated by selected project testing tool, conclusions, appendix (if necessary), glossary, tools used and references at the end of Term-II after checking, removing/ avoiding the plagiarism
7. The Term II examination is conducted by panel of examiners (preferably guide and expert from Industry having at least 5 years subject experience (or senior teacher in the subject in case of non-availability of industry expert). The project assessment shall be done using Live Project Demonstration [in existing functional condition], using necessary simulators (if required) and presentation by the students. The remarks of Term I assessment and related corrective actions must be assessed during examining the term-work.

Preferably 64-bit FOSS tools, 3-tier architectures along with latest version of FOSS Operating systems like Fedora 21 or equivalent, LAMP tools, WEB server, Applications servers, Database servers, MongoDB or latest open source BigDATA tools, FOSS Programming Tools like gcc,g++,Eclipse, Python, Java and other tools are as per the requirement of the SRS. The documentation tools like Open Source, GIT, Latex.

Seminar Topic Selection and Evaluation

Seminar based on state-of-the art in the selected Project Domain**.** The presentation and the report should cover motivation, mathematical modeling, data-table discussion and conclusion. The reports to be prepared using LATEX derivative.
It is mandatory on the seminar guides to maintain a progressive record of the seminar of 1 Hrs per month per seminar which shall include the discussion agenda, weekly outcomes achieved during practical sessions, corrective actions and comments on the progress report as per the plan submitted by the students including dates and timing, along with the signature of the student as per the class and teacher time table, such record of progressive work shall be referred by the examiners during evaluation.