Savitribai Phule Pune University
Thirdd Year of Artificial Intelligence and Data Science (2019 Course)
317523: Software Laboratory I

Home

Teaching Scheme:	Credit	Examination Scheme:
PR: 04 Hours/Week	02	Term Work (TW): 25 Marks Practical(PR): 25 Marks

Prerequisite Courses, if any: Fundamentals of Data Structures (210242), Data Structures and Algorithms (210253)

Companion Course, if any: Artificial Intelligence (310253), Database Management Systems (310241)

Course Objectives:
- To learn and apply various search strategies for AI
- To Formalize and implement constraints in search problems
- To develop basic Database manipulation skills
- To develop skills to handle NoSQL database
- To learn understand to develop application using SQL or NoSQL databases.

Course Outcomes:
On completion of the course, learner will be able to–
   CO1: Implement SQL queries for given requirements, using different SQL concepts
   CO2: Implement NoSQL queries using MongoDB
   CO3: Design and develop application using database considering specific requirements
   CO4: Design a system using different informed search / uninformed search or heuristic approaches
   CO5: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
   CO6: Design and develop an interactive AI application

Guidelines for Instructor's Manual
The instructor's manual is to be developed as a reference and hands-on resource. It should include prologue (about University/program/ institute/ department/foreword/ preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.

Guidelines for Student's Laboratory Journal
The laboratory assignments are to be submitted by student in the form of journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, Date of Completion, Objectives, Problem Statement, Software and Hardware requirements, Assessment grade/marks and assessor's sign, Theory- Concept in brief, algorithm, flowchart, test cases, Test Data Set(if applicable), mathematical model (if applicable), conclusion/analysis. Program codes with sample output of all performed assignments are to be submitted as softcopy. As a conscious effort and little contribution towards Green IT and environment awareness, attaching printed papers as part of write-ups and program listing to journal must be avoided. Use of DVD containing students programs maintained by Laboratory In-charge is highly encouraged. For reference one or two journals may be maintained with program prints in the Laboratory.

Guidelines for Laboratory /Term Work Assessment
Continuous assessment of laboratory work should be based on overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grade/marks based on parameters, such as timely completion, performance, innovation, efficient codes, and punctuality.

Guidelines for Practical Examination
Problem statements must be decided jointly by the internal examiner and external examiner. During practical assessment, maximum weightage should be given to satisfactory implementation of the problem statement. Relevant questions may be asked at the time of evaluation to test the student's understanding of the fundamentals, effective and efficient implementation. This will encourage, transparent evaluation and fair approach, and hence will not create any uncertainty or doubt in the minds of the students. So, adhering to these principles will consummate our team efforts to the promising start of student's academics.

Group B (Artificial Intelligence) Perform 6 assignment (Any 5 Assignments from 1 - 6. Assignment 7 is compulsory)
1. Implement depth first search algorithm and Breadth First Search algorithm. Use an undirected graph and develop a recursive algorithm for searching all the vertices of a graph or tree data structure.
2. Implement A star (A*) Algorithm for any game search problem.
3. Implement Alpha-Beta Tree search for any game search problem.
4. Implement a solution for a Constraint Satisfaction Problem using Branch and Bound and Backtracking for n-queens problem or a graph coloring problem.
5. Implement Greedy search algorithm for any of the following application: - Selection Sort   - Minimum Spanning Tree   - Single-Source Shortest Path Problem   - Job Scheduling Problem   - Prim's Minimal Spanning Tree Algorithm   - Kruskal's Minimal Spanning Tree Algorithm   - Dijkstra's Minimal Spanning Tree Algorithm
6. Develop an elementary chatbot for any suitable customer interaction application.
7. Mini Project: Implement any one of the following Expert System   - Information management   - Hospitals and medical facilities   - Help desks management   - Employee performance evaluation   - Stock market trading   - Airline scheduling and cargo schedules
Group C [DBMS] Mini Project
Develop an application with following details: 1. Follow the same problem statement decided in Assignment-1 of Group A. 2. Follow the Software Development Life cycle and other concepts learnt in **Software Engineering Course** throughout the implementation. 3. Develop application considering: - Front End: Python/Java/PHP/Perl/Ruby/.NET/ or any other language   - Backend : MongoDB/ MySQL/ Oracle / or any standard SQL / NoSQL database   4. Test and validate application using Manual/Automation testing. 5. Student should develop application in group of 2-3 students and submit the Project Report which will consist of documentation related to different phases of Software Development Life Cycle: - Title of the Project, Abstract, Introduction   - Software Requirement Specification (SRS)   - Conceptual Design using ER features, Relational Model in appropriate Normalize form   - Graphical User Interface, Source Code   - Testing document   - Conclusion.   **Note:** Instructor should maintain progress report of mini project throughout the semester from project group.
Learning Resources

Text Books:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Third edition, Pearson, 2003, ISBN :10: 0136042597
2. Deepak Khemani, "A First Course in Artificial Intelligence", McGraw Hill Education(India), 2013, ISBN : 978-1-25-902998-1
3. Elaine Rich, Kevin Knight and Nair, "Artificial Intelligence", TMH, ISBN - 978-0-07-008770-5
4. SilberschatzA.,KorthH.,SudarshanS.,"DatabaseSystemConcepts",McGrawHillPublishers,ISBN 0-07-120413-X, 6th edition
5. ConnallyT,BeggC., "DatabaseSystems", Pearson Education,ISBN 81-7808-861-4
6. PramodJ.SadalageandMartinFowler,"NoSQLDistilled",AddisonWesley,ISBN-10:0321826620, ISBN-13: 978-0321826626

Reference Books:

1. Nilsson Nils J , "Artificial Intelligence: A new Synthesis", Morgan Kaufmann Publishers Inc. San Francisco, CA, ISBN: 978-1-55-860467-4
2. Patrick Henry Winston, "Artificial Intelligence", Addison-Wesley Publishing Company, ISBN: 0-201-53377-4Andries P. Engelbrecht, "Computational Intelligence: An Introduction", 2nd Edition-Wiley India-ISBN: 978-0-470-51250-0
3. Kristina Chodorow, Michael Dierolf, "MongoDB: The Definitive Guide", O'ReillyPublications,ISBN: 978-1-449-34468-9
4. AdamFowler,"NoSQLForDummies",JohnWiley&Sons,ISBN-1118905628
5. Kevin Roebuck, "Storing and Managing Big Data - NoSQL, HADOOP and More",EmereoptyLimited, ISBN: 1743045743, 9781743045749
6. JoyA.Kreibich,"UsingSQLite",O'REILLY, ISBN:13:978-93-5110-934-1
7. SeemaAcharya,"DemystifyingNoSQL",WileyPublications,ISBN:9788126579969

e-Books:
http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/labs/index.php

MOOC Courses:
http://www.nptelvideos.com/lecture.php?id=6518

@The CO-PO mapping table

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	2	2	-	-	3	2	1	-	-	1
CO2	-	1	2	2	-	2	3	1	-	1	-	1
CO3	2	2	3	3	1	-	3	-	2	1	2	2
CO4	1	2	2	1	2	-	-	-	1	1	-	-
CO5	3	2	2	1	-	-	-	-	1	-	-	-
CO6	2	2	2	2	2	-	-	-	1	-	-	1