Program Structure and Syllabus

BTech Minor In Artificial Intelligence

R20 Regulations

Department of Artificial Intelligence

ANURAG UNIVERSITY

Venkatapur (V), Ghatkesar (M), Medchal-Malkajgiri (Dt.),
Hyderabad, Telangana, INDIA

info@anurag.edu.in; http://anurag.edu.in

BTech Minor in Artificial Intelligence [4 T + 4 P]

S. No	Course Code	Category	Course	Hours per week			Credits
				L	T	P	
1	A522001 /02	PCC	Fundamentals of Artificial Intelligence	3	0	3	4.5
2	A522003 /04	PCC	Data Wrangling and Visualization	3	0	3	4.5
3	A522005 /06	PCC	Essentials of Machine Learning	3	0	3	4.5
4	A522007 /08	PEC	Data Structures and Algorithms using Python	3	0	3	4.5
5	A522009 /10		Database Management Systems				
6	A522011 /12		Web Data Mining				
7	A522015 /16		Computer Vision and Image Processing				
8	A522017 /18		Natural Language Processing				
9	A522019 /20		Deep Learning				
			TOTAL	12	0	12	18

*** L – Lecture, T – Tutorial, P - Practical**

FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

BTech Minor in AI					Dept. of Artificial Intelligence			
Code	Category	Hours / Week			Credits	Marks		
A522001/02	PCC	L	T	P	C	CIE	SEE	Total
		3	0	3	4.5	0	100	100

Course Objectives

1. The main objective of this course is to introduce the basic concepts of artificial intelligence, its foundations
2. To analyze various search strategies in intelligent systems
3. To apply search algorithms in games
4. To learn various representations of logic and knowledge
5. To understand production systems and its components

Course Outcomes

At the end of this course, students will be able to:

1. Understand Strong AI and Weak AI and identify problems applicable to AI
2. Compare and contrast various uninformed and informed search algorithms to find an optimal solution for a given problem
3. Apply appropriate search algorithms for winning games
4. Learn various representations applicable to logic and knowledge useful in reasoning
5. Learn to apply appropriate inference methods in production or expert systems

UNIT-I

Overview of Artificial Intelligence: Introduction. The Turing Test, Strong AI versus Weak AI, Heuristics, Identifying Problems Suitable for AI, Applications and Methods, Early History of AI, Recent History of AI to the Present, AI In the New Millennium

UNIT-II

Uninformed Search: Introduction: Search in Intelligent Systems, State-Space Graphs, Generate-and-Test Paradigm, Blind Search Algorithms, Implementing and Comparing Blind Search Algorithms Informed Search: Introduction, Heuristics, Informed Search Algorithms – Finding Any Solution, The Best-First Search, The Beam Search, Additional Metrics for Search Algorithms, Informed Search – Finding An Optimal Solution,

UNIT-III

Search Using Games: Introduction, Game Trees and Minimax Evaluation, Minimax With Alpha-Beta Pruning, Variations and Improvements To Minimax, Games of Chance and the Expectiminimax Algorithm

UNIT-IV

Logic in Artificial Intelligence: Introduction, Logic and Representation, Propositional Logic, Predicate Logic – Introduction, Several Other Logics, Uncertainty and Probability Knowledge Representation: Introduction, Graphical Sketches and the Human Window, Graphs and the Bridges of Königsberg Problem, Search Trees, Representational Choices, Production Systems, Object Orientation, Frames, Semantic Networks

UNIT-V

Production Systems: Introduction, Background, Production Systems and Inference Methods, Production Systems and Cellular Automata, Stochastic Processes and Markov Chains, Basic Features and Examples of Expert Systems

Text Book

1. Stephen Lucci, Danny Kopec. Artificial Intelligence in the 21st Century. A Living Introduction. Mercury Learning and Information. 2nd Edition. 2016

References

1. Russell, Norvig: Artificial Intelligence, A Modern Approach, Pearson Education, Second Edition. 2004
2. Rich, Knight, Nair: Artificial Intelligence, Tata McGraw Hill, Third Edition 2009
3. Saroj Kaushik. Artificial Intelligence. Cengage Learning. 2011

Lab:

1. Installation of Python Idle and Introduction to Interactive Shell with Mathematical Operations.
2. Implement if-else in Python for Rock-Paper-Scissor Game.
3. Implement while loop in Python for Guess the Word Game
4. Implement strings in Python for Caesar Cipher Algorithm.
5. Implement for loop in Python Script for Generation of Password for a System.
6. Implement functions in Python for Tower of Hanoi.
7. Implement Bagels game in Python using in-built Functions.
8. Implement File Handling operations in Python for Team Chooser Game.

DATA WRANGLING AND VISUALIZATION

BTech Minor in AI					Dept. of Artificial Intelligence			
Code	Category	Hours / Week			Credits	Marks		
A522003/04	PCC	L	T	P	C	CIE	SEE	Total
		3	0	3	4.5	0	100	100

Course Objectives

1. To introduce the basic concepts of data wrangling using Python
2. To obtain the input data from a variety of sources
3. To extract the data and convert it into representations suitable for data analytics
4. To visualize the data

Course Outcomes

At the end of this course, students will be able to:

1. Use the pandas library
2. Load, store data in different file formats
3. Clean and prepare the data
4. Plot and Visualize data
5. Do data aggregation

UNIT-I

Getting started with pandas: Introduction to pandas Data Structures, Series, Data Frame, Index Objects. Data Loading, Storage, and File Formats: Reading and Writing Data in Text Format, Reading Text Files in Pieces, Writing Data to Text Format, Working with Delimited Formats, JSON Data.

UNIT-II

Data Loading, Storage, and File Formats:XML and HTML: Web Scraping, Binary Data Formats: Using HDF5 Format, Reading Microsoft Excel Files, Interacting with Web APIs, Interacting with Databases

UNIT-III

Data Cleaning and Preparation: Handling Missing Data, Filtering Out Missing Data, Filling In Missing Data, Data Transformation, Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers, String Manipulation, String Object Methods, Regular Expressions

UNIT-IV

Plotting and Visualization: A Brief matplotlib API Primer, Figures and Subplots, Colors, Markers, and Line Styles, Ticks, Labels, and Legends, Annotations and Drawing on a Subplot,Saving Plots to File, matplotlib Configuration, Plotting with pandas and seaborn, Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots, Facet Grids and Categorical Data, Other Python Visualization Tools, Conclusion

UNIT-V

Data Aggregation and Group Operations: GroupBy Mechanics, Iterating Over Groups, Selecting a Column or Subset of Columns, Grouping with Dicts and Series, Grouping with Functions, Grouping by Index Levels, Data Aggregation, Column-Wise and Multiple Function Application, Returning Aggregated Data Without Row Indexes, Pivot Tables and Cross-Tabulation

Text Books

1. Wes McKinney. Python for Data Analysis: Data Wrangling with pandas, NumPy and IPython. O'Reilly, 2017, 2nd Edition
2. Jacqueline Kazil and Katharine Jarmul. Data Wrangling with Python. O'Reilly, 2016

References

1. Data Science Essentials in Python: Collect, Organize, Explore, Predict, Value. Dmitry Zinoriev, The Pragmatic Programmers LLC, 2016
2. TyeRattenbury, Joseph M. Hellerstein, Jeffrey Heer, Sean Kandel, and Connor Carreras. Principles of Data Wrangling: Practical Techniques for Data Preparation. O'Reilly, 2017
3. Python Data Analytics – Data Analysis and Science using Pandas, matplotlib and the Python Programming Language. Fabio Nelli, Apress, 2015

Lab:

1. Write programs to use the pandas data structures: Frames and series as storage containers and for a variety of data-wrangling operations
2. Write programs to parse text files, CSV, HTML, XML and JSON documents and extract relevant data. After retrieving data check any anomalies in the data, missing values etc.
3. Write programs for reading and writing binary files
4. Write programs for searching, splitting, and replacing strings based on pattern matching using regular expressions
5. Design a relational database for a small application and populate the database. Using SQL do the CRUD (create, read, update and delete) operations.
6. Create a Python MongoDB client using the Python module pymongo. Using a collection object practice functions for inserting, searching, removing, updating, replacing, and aggregating documents, as well as for creating indexes

7. Use matplotlib and draw plots using the datasets
8. Write programs to Split a pandas object into pieces using one or more keys (in the form of functions, arrays, or DataFrame column names), calculate group summary statistics, like count, mean, or standard deviation, or a user-defined function, Compute pivot tables and cross-tabulations

ESSENTIALS OF MACHINE LEARNING

BTech Minor in AI					Dept. of Artificial Intelligence			
Code	Category	Hours / Week			Credits	Marks		
A522005/06	PCC	L	T	P	C	CIE	SEE	Total
		3	0	3	4.5	0	100	100

Course Objectives

1. Understand the basic concepts of feature engineering and machine learning systems
2. Apply and evaluate supervised machine learning algorithms for classification and regression tasks
3. Apply and evaluate unsupervised learning algorithms for clustering tasks.
4. Understand the Bayesian and Ensemble learning, apply and evaluate different types of these algorithms for better prediction.
5. Understand and Design Artificial Neural Networks computational model

Course Outcomes

At the end of this course, students will be able to:

1. Understand the essentials of feature engineering, state-of-art tools and concepts of machine learning
2. Design and evaluate different types of supervised learning algorithms for classification and regression tasks
3. Design and evaluate different types of unsupervised learning algorithms for clustering tasks
4. Design and evaluate strong learners for better real time prediction such as Bayesian and ensemble learning algorithms
5. Design Artificial neural networks computational model

UNIT-I

Machine Learning: Definition and Applications, Types of Machine Learning Models - Supervised, Unsupervised, Reinforcement learning, Challenges of Machine Learning, State-of-art Languages and Tools in Machine Learning, Preparing to Model - Model Representation - Overfitting and Underfitting, Bias–variance trade-off

Feature Engineering: Feature Transformation, Feature Extraction and Feature Selection Process.

UNIT-II

Supervised Learning: Applications - Regression and Classification Tasks, Evaluating performance of regression and classification models, Regression Algorithms - Simple Linear Regression and Multiple Linear Regression, Classification Algorithms - Logistic Regression, k-Nearest Neighbor, Decision Tree

UNIT-III

Unsupervised Learning: Applications of Unsupervised Learning, Different types of Clustering techniques, K-Means Clustering, K-medoids, Agglomerative Hierarchical Clustering, Evaluating performance of clustering models.

UNIT-IV

Bayesian Learning - Bayesian Belief Networks, MAP hypothesis, Bayes Optimal Classifier, Gibbs Classifier, Naïve Bayes Classifier

Ensemble Learning– Bootstrap Aggregation (Bagging) - Random Forest, Boosting - AdaBoost and Gradient Boost

UNIT-V

Artificial Neural Networks - Understanding the Biological Neuron, Exploring the Artificial Neuron, Types of Activation Functions, Early Implementations of ANN, and Architectures of Neural Network- Feed forward network and Recurrent network, Backpropagation algorithm

Text Books

1. Machine Learning by Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, 2019, Pearson
2. Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013

References

1 Introduction to Machine Learning with Python by Andreas C. Müller, Sarah Guido, October 2016, O'Reilly Media, Inc
2 Ethem Alpaydin — Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004
3 Hands on Machine Learning with Scikit-Learn, Keras, and TensorFlow Concepts, Tools, and Techniques to Build Intelligent Systems, By Aurélien Géron, O'Reilly Media, Inc 2019

Lab:

Week 1

Get familiar with Python, NumPy and Pandas

Week 2

Perform Feature Engineering for a given dataset

Week 3

Implement linear and multiple regression algorithms on a given dataset

Week 4

Implement Binary Classification using ID3 Decision Tree Algorithm- Medical Application Domain - Diabetes Dataset or any standard dataset

Week 5

Implement logistic regression algorithm for stock prices prediction

Week 6

Write a program to implement k-Nearest Neighbour algorithm to classify the iris dataset. Print both correct and wrong predictions

Week 7

Implementation of decision tree based ID3 algorithm and use an appropriate dataset

Week 8

Implement K- means clustering algorithm for identifying cancerous data

Week 9

Implementation of Agglomerative Clustering 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

Week 10

Implementation of 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

Week 11

Implementation of Boosting-Ada Boost and Gradient Boost to convert weak learner to strong learners

Week 12

Develop a predictive model for predicting house prices using random forest Artificial Neural Network (ANN) for Diabetes Classification

Week 13

Perform Data Analysis - Data Cleaning, Feature Engineering, Data Visualization and Binary Classification for Census Income Dataset

Week 14

Project: Employ all the classification algorithms for Diabetes dataset, IRIS dataset and any dataset of your choice report the best result for each dataset.

Week 15

Project: Employ all the regression algorithms for house sales prediction dataset, of any dataset of your choice. Report the best result.

Week 16

Project: Employ all the clustering algorithms for an appropriate dataset of your choice. Report the best result.

NOTE: Datasets for the above exercises available in Kaggle and UCI repository mentioned below

1. https://www.kaggle.com
2. http://archive.ics.uci.edu/ml/datasets.html

DATA STRUCTURES AND ALGORITHMS USING PYTHON

BTech Minor in AI					Dept. of Artificial Intelligence			
Code	Category	Hours / Week			Credits	Marks		
A522007/08	PEC	L	T	P	C	CIE	SEE	Total
		3	0	3	4.5	0	100	100

Course Objectives

1. Understand the basic concepts of feature engineering and machine learning systems
2. Apply and evaluate supervised machine learning algorithms for classification and regression tasks
3. Apply and evaluate unsupervised learning algorithms for clustering tasks.
4. Understand the Bayesian and Ensemble learning, apply and evaluate different types of these algorithms for better prediction.
5. Understand and Design Artificial Neural Networks computational model

Course Outcomes

At the end of this course, students will be able to:

1. Understand the essentials of feature engineering, state-of-art tools and concepts of machine learning
2. Design and evaluate different types of supervised learning algorithms for classification and regression tasks
3. Design and evaluate different types of unsupervised learning algorithms for clustering tasks
4. Design and evaluate strong learners for better real time prediction such as Bayesian and ensemble learning algorithms
5. Design Artificial neural networks computational model

UNIT-I

Informal introduction to programming, algorithms and data structures via GCD, Downloading and installing Python, GCD in Python: variables, operations, control flow - assignments, conditionals, loops, functions, types, expressions, strings, lists, tuples, **Python memory model:** names, mutable and immutable values, **List operations:** slices etc

UNIT-II

Binary search, Inductive function definitions: numerical and structural induction, Elementary inductive sorting: selection and insertion sort, In-place sorting Basic algorithmic analysis: input size, asymptotic complexity, O() notation, Arrays vs lists, Merge sort, Quicksort, Stable sorting

UNIT-III

Dictionaries, More on Python functions: optional arguments, default values, Passing functions as arguments,

Higher order functions on lists: map, lter, list comprehension, Exception handling, Basic input/output, Handling files, String processing

UNIT-IV

Backtracking: N Queens, recording all solutions, Scope in Python: local, global, nonlocal names Nested functions,

Data structures: stack, queue, Heaps

UNIT-V

Abstract datatypes, Classes and objects in Python, "Linked" lists: find, insert, and delete, Binary search trees: find, insert, delete, Height-balanced binary search trees Efficient evaluation of recursive definitions: memoization, Dynamic programming: examples. Other programming languages: C and manual memory management, Other programming paradigms: functional programming

References

1. Madhavan Mukund, “Programming, Data Structures and Algorithms in Python”, NPTEL MOOC

DATABASE MANAGEMENT SYSTEMS

BTech Minor in AI					Dept. of Artificial Intelligence			
Code	Category	Hours / Week			Credits	Marks		
A522009/10	PEC	L	T	P	C	CIE	SEE	Total
		3	0	3	4.5	0	100	100

Course Objectives

1. Discuss Database management systems, databases and its applications
2. Familiarize the students with a good formal foundation on the relational model.
3. Outline the various systematic database design approaches
4. Describe the concepts of transactions and transaction processing and the issues, techniques related to concurrency and recovery manager.
5. Explore the File organizations, indexing and hashing mechanisms.

Course Outcomes

After completion of the course student will be able to:

1. Model Entity-Relationship diagrams for enterprise level databases [L3]
2. Formulate Queries using SQL and Relational Formal Query Languages [L3]
3. Apply different normal forms to design the Database [L3]
4. Summarize concurrency control protocols and recovery algorithms [L5]
5. Identify suitable Indices and Hashing mechanisms for effective storage and retrieval of Data [L3]

UNIT-I

Introduction to Database System Concepts: Database-System Applications, Purpose of Database Systems, View of Data, Database Language, Database Design, Database Architecture, Database Users and Administrators.

Introduction to the Relation Models and Database Design using ER Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations Overview of the Design Process, The Entity-Relationship Model, Constraints, Entity-Relationship Diagrams- Unary, Binary, ternary, Aggregation.

UNIT-II

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Aggregate Functions, Nested Sub queries.

Formal Relational Query Languages: The Relational Algebra, Tuple Relational Calculus.

UNIT-III

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Functional Dependencies, Closure set of Functional dependencies, Procedure for Computing F+, Boyce Codd Normal form, BCNF Decomposition Algorithm, Third Normal Form, Third Normal Form Decomposition Algorithm

Transactions: Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Serializability.

UNIT-IV

Concurrency Control: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols.

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, ARIES, Remote Backup Systems.

UNIT-V

File Organization: Fixed and variable length records, Sequential file organization, Data Dictionary, Buffer manager.

Indexing and Hashing: Basic Concepts, Ordered Indices, B+-Tree Index Files, B+-Tree Extensions, Multiple-Key Access, Static Hashing, Extendible Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices.

Text Book

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Sixth Edition, Tata McGraw-Hill 2006

References

1. Raghu Rama Kirshna, Johannes Gchrke, Database Management System, Third Edition, TATA MC Graw Hill, 2003
2. C J Date, AKannan, S Swamynathan, An Introduction to Database Systems, Eighth Edition Pearson 2006
3. P Raja Sekhar Reddy, A Mallikarjuna Reddy,Foundations of Database Management Systems,Lambert Academic Publishing, 2020 (e-Book)
4. https://www.pdfdrive.com/fundamentals-of-database-systems-pdf-e51477130.html

Lab:

Week 1

Data Base user creation, Data definition Language commands, Data Manipulation commands, Data Control Language Commands, Transaction Control Language commands

Week 2

Database Schema for a customer-sale scenario
Customer (Cust id : integer, cust_name: string)
Item (item_id: integer,item_name: string, price: integer)
Sale (bill_no: integer, bill_data: date, cust_id: integer, item_id: integer, qty_sold: integer)

For the above schema, perform the following—
1. Create the tables with the appropriate integrity constraints
2. Insert around 10 records in each of the tables
3. List all the bills for the current date with the customer names and item numbers
4. List the total Bill details with the quantity sold, price of the item and the final amount
5. List the details of the customer who have bought a product which has a price>200
6. Give a count of how many products have been bought by each customer
7. Give a list of products bought by a customer having cust_id as 5
8. List the item details which are sold as of today
9. Create a view which lists out the bill_no, bill_date, cust_id, item_id, price, qty_sold, amount
10. Create a view which lists the daily sales date wise for the last one week

Week 3

Database Schema for a Student Library scenario
Student (Stud_no : integer,Stud_name: string)
Membership (Mem_no: integer,Stud_no: integer)
Book (book_no: integer, book_name:string, author: string)
Iss_rec(iss_no:integer, iss_date: date, Mem_no: integer, book_no: integer)
For the above schema, perform the following—
a) Create the tables with the appropriate integrity constraints
b) Insert around 10 records in each of the tables
c) List all the student names with their membership numbers
d) List all the issues for the current date with student and Book names
e) List the details of students who borrowed book whose author is CJDATE
f) Give a count of how many books have been bought by each student
g) Give a list of books taken by student with stud_no as 5
h) List the book details which are issued as of today
i) Create a view which lists out the iss_no, iss _date, stud_name, book name
j) Create a view which lists the daily issues-date wise for the last one week

Week 4

Database Schema for a Employee-pay scenario
employee (emp_id : integer,emp_name: string)
department (dept_id: integer,dept_name:string)
paydetails(emp_id : integer,dept_id: integer, basic: integer, deductions: integer, additions: integer, DOJ: date)
payroll (emp_id : integer, pay_date: date)

For the above schema, perform the following—
a) Create the tables with the appropriate integrity constraints
b) Insert around 10 records in each of the tables
c) List the employee details department wise
d) List all the employee names who joined after particular date
e) List the details of employees whose basic salary is between 10,000 and 20,000
f) Give a count of how many employees are working in each department
g) Give a name of the employees whose netsalary>10,000
h) List the details for an employee_id=5
i) Create a view which lists out the emp_name, department, basic, deductions, netsalary
j) Create a view which lists the emp_name and his netsalary

Week 5

Database Schema for a Video Library scenario
Customer (cust_no: integer,cust_name: string)
Membership (Mem_no: integer, cust_no: integer)
Cassette (cass_no:integer, cass_name:string, Language: String)
Iss_rec(iss_no: integer, iss_date: date, mem_no: integer, cass_no: integer)
For the above schema, perform the following—
a) Create the tables with the appropriate integrity constraints
b) Insert around 10 records in each of the tables
c) List all the customer names with their membership numbers
d) List all the issues for the current date with the customer names and cassette names
e) List the details of the customer who has borrowed the cassette whose title is " The Legend"
f) Give a count of how many cassettes have been borrowed by each customer
g) Give a list of books which has been taken by the student with mem_no as 5
h) List the cassettes issues for today
i) Create a view which lists outs the iss_no, iss_date, cust_name, cass_name
j) Create a view which lists issues-date wise for the last one week

Week 6

Database Schema for a student-Lab scenario
Student (stud_no: integer, stud_name: string, class: string)
Class (classno: string,descrip: string)
Lab (mach_no: integer, Lab_no: integer, description: String)
Allotment (Stud_no: Integer, mach_no: integer, dayof week: string)
For the above schema, perform the following—

a) Create the tables with the appropriate integrity constraints
b) Insert around 10 records in each of the tables
c) List all the machine allotments with the student names, lab and machine numbers
d) List the total number of lab allotments day wise
e) Give a count of how many machines have been allocated to the 'CSIT' class
f) Give a machine allotment details of the stud_no 5 with his personal and class details
g) Count for how many machines have been allocatedinLab_no1 for the day of the week as "Monday"
h) How many students class wise have allocated machines in the labs
i) Create a view which lists out the stud_no, stud_name, mach_no, lab_no, day of week
j) Create a view which lists the machine allotment details for "Thursday"

Week 7

Write a program to find largest number from the given three numbers.
Simple programs using loop, while and for iterative control statement.
Write a program to check whether the given number is Armstrong or not
Write a program to generate all prime numbers below 100

Week 8

Write a program to demonstrate the GOTO statement.
Write a program to demonstrate %type and %row type attributes

Week 9

Write a program to demonstrate predefined exceptions
Write a program to demonstrate user defined exceptions
Create a cursor, which displays all employee numbers and names from the EMP table

Week 10

Create a cursor, which update the salaries of all employees who works in deptno 10.
Create a cursor, which displays names of employees having salary > 50000

Week 11

Create a procedure to find reverse of a given number
Create a procedure to update the salaries of all employees whose salary is between 25000 to 50000

Week 12

Create a procedure to demonstrate IN, OUT and INOUT parameters
Create a function to check whether given string is palindrome or not

Week 13

Create a function to find sum of salaries of all employees working in depart number 10.
Create a trigger before/after update on employee table for each row/statement

Week 14

Create a trigger before/after delete on employee table for each row/statemen.
Create a trigger before/after insert on employee table for each row/statement

Week 15

Overview

Text Book

1.Ivan Bay ross, SQL, PL/SQLThe programming Language of Oracle , Fourth Revised Edition, BPB Publications

WEB DATA MINING

BTech Minor in AI					Dept. of Artificial Intelligence			
Code	Category	Hours / Week			Credits	Marks		
A522011/12	PEC	L	T	P	C	CIE	SEE	Total
		3	0	3	4.5	0	100	100

Course Objectives

1. To have an idea of data mining and web mining, concepts of association rules in Mining
2. To understand supervised classification algorithms based on associations, Bayesian learning and SVM
3. To understand unsupervised hierarchical clustering, distance functions, handling standardized data
4. To expose the students to basic concepts of information retrieval and web page preprocessing
5. To understand web page ranking algorithms and social network analysis

Course Outcomes

At the end of this course, students will be able to:

1. Understand the concept of Data Mining and Web Mining and Association rules
2. Learn to apply Naïve Bayes and SVM algorithms for classification task
3. Learn to apply data standardization methods and handle mixed attribute data types, and also perform hierarchical clustering
4. Understand basic concepts of information retrieval methods and web page preprocessing steps
5. Learn the web page ranking algorithms in web mining

UNIT-I

The World Wide Web, History of the Web and the Internet, Data Mining, Web Mining Basic Concepts of Association Rules, Apriori Algorithm – Frequent Itemset Generation, Association Rule Generation, Data Formats for Association Rule Mining, Mining with Multiple Minimum Supports – Extended Model, Mining Algorithm, Rule Generation

UNIT-II

Classification based on Associations, Naïve Bayesian Text Classification, Support Vector Machines – Linear SVM Separable and Non Separable cases, Non Linear SVM Kernel functions

UNIT-III

Representation of Clusters, Hierarchical Clustering – Single Link, Complete Link and Average Link Method, Strength and Weaknesses, Distance Functions – Numeric, Binary and Nominal Attributes and Text Documents, Data Standardization, Handling of Mixed Attributes

UNIT-IV

Basic Concepts of Information Retrieval, IR Methods – Boolean Model, Vector Space Model, Statistical Language Model, Relevance Feedback, Evaluation Measures, Text and Web Page Pre-Processing- Stopword Removal, Stemming, Web page preprocessing, Duplicate Detection

UNIT-V

Web Search, Meta-Search: Combining Multiple Rankings – Similarity Score and Rank Positions, Web Spamming – Content and Link Spamming, Hiding Techniques, Combatting Spam

Link Analysis - Social Network Analysis, PageRank Algorithm, HITS Algorithm

Text Books

1. Bing Liu , “Web Data Mining”, Springer India, 2010
2. Soumen Chakrabarti, “Mining the Web”, Morgan-Kaufmann Publishers, Elseiver, 2002
3. Manu Konchady, “Text Mining Application Programming”, Cengage Learning, 2006

Lab:

1. Apply Naive Bayes Classification algorithm for a given textual dataset (1 week)
2. Apply SVM algorithm for a given dataset (2 weeks)
3. Apply Hierarchical Clustering for a given textual dataset. Experiment with different distance metrics (2 weeks)
4. Implement the distance functions for assessing similarity between documents while taking care of standardizing the attributes (1 week)

5. Apply text preprocessing methods to extract relevant text: Stop Word Removal, Stemming, Frequency Analysis for unigrams, bigrams and trigrams (2 weeks)

Note: Lucene/Weka/ MeTA/Python can be used for conducting the lab

COMPUTER VISION AND IMAGE PROCESSING

BTech Minor in AI					Dept. of Artificial Intelligence			
Code	Category	Hours / Week			Credits	Marks		
A522013/14	PEC	L	T	P	C	CIE	SEE	Total
		3	0	3	4.5	0	100	100

Course Objectives

1. Analyze general terminology of digital image processing.
2. Understand the image noise models and enhancement methods.
3. Evaluate the image segmentation methodologies.
4. Understand the image compression and color image processing techniques.
5. Apply image processing algorithms in practical applications.

Course Objectives

At the end of this course, students will be able to:

1. Understand the fundamental concepts of digital image processing systems.
2. Understand the image noise models and enhancement techniques
3. Comprehension of different image segmentation and restoration methodologies
4. Analyze the concepts of image compression and color image processing.
5. Acquire the knowledge of morphological operations and image processing related areas.

UNIT-I

Introduction to Computer Vision and Basic Concepts of Image Formation: Introduction and Goals of Computer Vision and Image Processing, Image Formation Concepts. Fundamental Concepts of Image Formation: Radiometry, Geometric Transformations, Geometric Camera Models. Fundamental steps in image processing, image processing applications

UNIT-II

Digital Image Processing Operations: Basic relationships and distance metrics, Classification of image processing operations- Arithmetic operations, Logical operations.

Image Enhancement: Image quality and need for image enhancement, image enhancement point operations-piecewise linear functions, Histogram based techniques, Spatial filtering concepts.

UNIT-III

Image Restoration: Categories of image degradations- noise modeling, image restoration in the presence of noise only- Mean filters, order statistics filters.

Image Segmentation: Detection of discontinuities, types of edge detectors, First-order edge detection operators, and second-order derivatives filters.

UNIT-IV

Image Compression: Compression model, Lossless and Lossy Compression and Coding techniques for image compression.

Color Image Processing: Introduction, color monitors, color image storage -and processing, color models-RGB Colour Model, HSI Colour Models, HSV Colour Model, HLS Colour Models, TV Color Models.

UNIT-V

Image Morphology: Need for morphological processing, morphological operators, Hit-or-Miss transform, Basic morphological algorithms, and Gray-scale morphology.

Image Descriptors and Features: Texture Descriptors, Colour Features, Object Boundary and Shape Representations

Text Books

1. S. Sridhar, Digital Image Processing, Oxford University Press
2. D. and J. Ponce, Computer Vision: A Modern Approach, Prentice Hall, 2nd ed., 2015.

References

1. Gonzalez R.C., Woods R.E, Digital Image Processing, 3rd Edition, Pearson, Prentice-Hall of India Pvt.Ltd. New Delhi.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing, Analysis and Machine Vision
3. Anil K. Jain, Fundamentals of Digital Image Processing, Prentice- Hall of India Pvt. Ltd, New Delhi.

Lab

1. Installation of SCI lab and basic commands
2. Write the programs for vector and matrix operations
3. a. Write a program for displaying an image, printing of its properties and manipulations, arithmetic operation on images?

   b. Write a program for displaying histogram and histogram equalization?

4. a. Write a program for adding different types of noises with different percentages?
   b. Write a program for application of following mask
   i. Sobel ii. Prewitt iii. Robert iv. Canny v. Laplacian vi. LOG
5. Write a program for color image conversion models?
6. a. Write a program for reading RGB image and segmentation using threshold method?

b. Write a program for color image histogram manipulations?

7. a. Write a Program for following morphology operations
   i. Dilation ii. Erosion iii. Open iv. Close v. Hit-or-Miss transform
   b. Write a program for rotating the image into different angles?