SRM Institute of Science and Technology

Department of Computer Applications

Delhi – Meerut Road, Sikri Kalan, Ghaziabad, Uttar Pradesh – 201204

Circular – 2020-21

MCA GAI 1st semester

Object Oriented Programming using Java (PGI20C01J)

List of Programs

Lab1: Discussing the real-world examples of OOP concepts and applications

Lab 2: Implement a program to demonstrate the use of casting for converting data types

Lab 3: Implement the concept of String Handling functions

Lab 4: Demonstrate Multi Level Inheritance Implement Dynamic Method Dispatch

Lab: 5 Write a Java program that demonstrates the use of try-catch blocks to handle built-in exceptions

Lab 6: Develop a program that converts the character encoding of a text file using Input Stream Reader and Output Stream Writer.

Lab 7: Create an interactive applet that takes user input and performs some action based on it

Lab 8:Develop a real-world AWT applications such as calculators, text editors, and image viewers

Lab 9: Handling Mouse and Key events, Adapter classes (Demonstrate)

Lab 10: Write a Java program to execute a simple SQL query to retrieve data from a table and display the results.

Lab 11: Write a Java program to establish a socket connection between a client and a server on different machines using Socket and Server Socket classes.

Lab 12: Develop a Java RMI application with a clear separation of client and server components.

Lab 13: Write a servlet that demonstrates the usage of these key classes/interfaces for handling HTTP requests and responses.

Lab 14: Develop a servlet that interacts with a database using JDBC to retrieve data from a table and display it in a web page.

Lab 15: Implement a JSP page that displays the current date and time dynamically using JSP script lets.

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MCA GAI 1st semester

Advanced Database Technology (PGI20C02J)

List of Programs

Lab:1: Create a Database Schema for University Database

Lab 2: Create ER Model University Database

Lab 3: Implement Integrity Constraints

Lab 4: Implement DDL, DML commands

Lab 5: Implement DCL, TCL

Lab 6: Implement SQL subqueries, Joins and Clauses

Lab 7: Implementing PL/SQL Conditional Statements, Looping Statements

Lab 8: Write a program to implement PL/SQL functions

Lab 9: Study the structure and properties of B-tree index and its variants

Lab 10: Write functions/procedures to begin, commit, and rollback transactions.

Lab 11: Develop test cases to demonstrate how timestamp-based protocols prevent conflicts and ensure serializability.

Lab 12: Case Study: Analyze different types of failures such as transaction failures, system crashes, and disk failures.

Lab 13: Parallel Database

Lab14: CaseStudy : distributed Database

Lab 15: Creating database employee in MongoDB

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MCA GAI 1st semester

Fundamentals of Generative AI and Working with Open AI (PGI20C03J)

List of Programs

Lab1: Simple programs on Open API

Lab 2 :training a simple autoencoder model on a dataset.

Lab 3 : Implementing a basic GAN architecture for generating synthetic images using a pre trained model. Top of Form

Lab 4: on implementing a basic autoencoder using TensorFlow or PyTorch.

Lab 5: implementing a variational autoencoder using TensorFlow or PyTorch.

Lab 6: VAEs for anomaly detection in datasets

Lab 7: GAN model using TensorFlow or PyTorch.

Lab 8: implementing a DCGAN for image generation

Lab 9: implementing a Progressive Growing GAN

Lab 10: Fine-tuning GPT for Text Generation.

Lab 11 conditioning GPT models for specific text generation tasks

Lab 12: interpreting and analyzing the output of GPT models for text generation tasks.

Lab 13: generating images using DALL E

Lab 14 conditioning DALL-E to generate images

Lab 15: Preprocessing and formatting datasets for training and fine-tuning DALL-E models.

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MCA GAI 1st semester

Foundations of Data Science (PGI20D01J)

List of Programs

Lab 1: Perform Analysis on Simple Dataset I for Data Science and Business Intelligence Applications

Lab 2: Perform Analysis on Simple Dataset II for Data Science and Business Intelligence Applications

Lab 3: Collect and understand a simple data for a Data Science Application

Lab 4: Perform Analysis on Simple Data for Mathematical, Numerical, Data Engineering Processing

Lab 5: Install Python and apply all basic python functions

Lab 6: Install and perform a Numerical Array Processing using NumPy

Lab 7: Apply Scientific functions on a given dataset with SciPy

Lab 8: Install, Import Pandas Learn and Explore a Sample Dataset with it

Lab 9: Install and perform a simple Exploratory Data Analysis using Pandas

Lab 10: Install, Import Scikit Learn and Explore Iris Dataset with Pandas for ML Modelling

Lab 11: Install, Import Tensor flow and Keras. Create a Basic Neural Network with few layers.

Lab 12: Install and perform a simple text processing using NLTK

Lab 13: Install, Import OpenCV and Explore an Simple Image for Image Processing

Lab 14: Install, Import Matplotlib. Explore all the Data Visualization Graphs.

Lab 15: Create all Data Visualization Plots using Matlotlib

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MCA GAI 1st semester

Artificial Intelligence and Machine Learning (PGI20D02J)

List of Programs

Lab 1: Solving Problems using AI

Lab2: Propositional Logic and Reasoning

Lab3: Experts System in Prolog

Lab 4: Working on Uninformed Search

Lab5: Working on Informed Search

Lab 6: Working with Prolog

Lab 7: Supervised Learning

Lab8: Bayesian Learning

Lab9: Linear Models for Clustering

Lab10: Ensemble Learning

Lab11: Reinforcement Learning

Lab 12: Working with Deep Q Network

Lab 13: Working with Dimensionality Reduction Models

Lab 14: Working with Advanced Learning Models

Lab15: Evaluating the performance metrics of the models

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MCA GAI 1st semester

Web Application Development (PGI20D03J)

List of Programs

Lab 1: Create a simple HTML page with a header, footer, navigation bar, and main content section. Include text, images, and links within the content section.

Lab 2: Build a table to display tabular data. Experiment with different attributes like <thread>,<tbody>,<tfoot>, <th> and <td>.Experiment with different types of lists (<ul>, <ol>, <dl>) and link styles (<a>).

Lab 3: Design a form using HTML elements like <form>, <input>, <select>, <text area>, and <button>.

Create a form with input fields that require specific formats or validations (e.g., email address, phone number).

Lab 4: Create a simple HTML page and apply CSS styles to elements like headings, paragraphs, and links. Experiment with properties such as color, font-family, font-size, text align, and text-decoration.

Lab 5: Design a webpage that adapts to different screen sizes using media queries. Create different types of layouts using CSS, such as fixed-width, fluid, and responsive layouts. Use techniques like floats, flexbox, and CSS Grid to arrange elements on the page.

Lab 6: Implementing BEM methodology in a project. Converting CSS code to Sass and utilizing Sass features.

Lab 7: XML Document Creation

Lab 8: create an XML document representing a collection of products with elements like name, price, category, and quantity. Write an XSLT stylesheet to transform an XML document representing a list of students with elements like name, age, and grade, into an HTML table for display on a webpage.

Lab 9: Write a XQuery to transform an XML document representing a list of movies into a new XML document containing only the movie titles and their corresponding release years. Develop an XML document representing a customer profile with elements such as name, email, address, and phone number.

Lab 10: Create a simple PHP page that outputs the current server's PHP configuration using phpinfo() function. Create PHP variables of different data types (string, integer, float, boolean, array).

Lab 11: Implement a PHP script to check if a number is even or odd using if-else statement. Write a PHP program to print the multiplication table of a given number using a for loop.

Lab 12: Implement PHP includes to separate header, footer, and navigation sections in a webpage. Create a PHP form to accept user input for basic information (name, email, age) and display the entered data

Lab 13: Create a form with input fields. Use AJAX to send form data to a server for processing and display the response without refreshing the page.

Lab 14: Build a webpage that retrieves user information from the GitHub API using AJAX. Display user details such as name, profile picture, and repositories. Develop a currency converter application that fetches exchange rates from a currency exchange API using AJAX. Allow users to convert between different currencies dynamically.

Lab 15: Design and implement a simple RESTful API for managing a list of products. Include endpoints for CRUD operations (Create, Read, Update, Delete) using AJAX to interact with the API. Extend the RESTful API to include user authentication using JWT (JSON Web Tokens). Implement AJAX-based login and registration functionality on a web page.

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MCA GAI 1st semester

Intelligent Internet of Things (IIoT) (PGI20D04J)

List of Programs

Lab1: Arduino Installation and Blink LED using Node MCU Esp8266

Lab2: Interfacing Light Sensor with ESP8266 NODE MCU WiFi Board

Lab 3: Interfacing Infrared (IR) Sensor with Node MCU Esp8266

Lab 4: Interfacing Temperature Humidity Sensor with Node MCU Esp8266

Lab 5: Interfacing MQ 4 GAS Sensor with Node MCU Esp8266

Lab 6: Interfacing Relay and Control LIGHT with Node MCU Esp8266

Lab 7: Create a an Access point and a Webserver using Node MCU Esp8266

Lab 8: Interfacing Temperature Humidity Sensor and Visualize data in Cloud Server with Node MCU Esp8266

Lab 9: Create a Smart Switch to Control Light from Internet

Lab 10: Create a Voice Controlled Switch Using Arduino IoT Cloud

Lab 11: ESP8266 NodeMCU Data Logging to Firebase Realtime Database

Lab 12: Install OS and Configure Raspberry pi

Lab 13: Integrating IR sensor with Raspberry pi and control an LED using python

Lab 14: Raspberry Pi: Send an Email using Python

Lab 15: Install Mosquitto MQTT Broker on Raspberry Pi

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MCA GAI 1st semester

Natural Language Processing (PGI20D06J)

List of Programs

Lab 1: NLP Library Exploration - NLTK, SpaCy, CoreNLP and others

Lab2: perform tokenization, stemming, and lemmatization on any text dataset

Lab3: Hands-on experience with POS tagging tasks.

Lab 4: Building a Named Entity Recognition System

Lab 5: To perform stop word removal from text

Lab6: Python script to validate the strength of passwords based on certain criteria using regular expressions and extract username in email address using RE

Lab7: Implement a simple rule based chunker that identifies noun phrases (NP) in a given sentence.

Lab 8: Implement of basic LDA topic model using Python's gensim library and apply it to a small corpus of text documents.

Lab 9: Implement a simple information retrieval system using a vector space model to retrieve relevant documents for user queries.

Lab 10: Implement a basic system to perform sentiment analysis by fusing textual and visual features from social media posts.

Lab 11: Case Study: Analyzing Twitter Data for Sentiment Analysis

Lab 12: Case Study: Designing a Chatbot for Customer Service Queries

Lab 13: Case Study: Building a Question Answering System for Wikipedia Articles

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MCA GAI 1st semester

Prompt Engineering in Generative AI (Lab: Google Generative AI Studio) (PGI20S01J)

List of Programs

LAB 1- Apply 5 Principles of prompting and Generate a Image Prompt

LAB 2- Working with Chat GPT Prompt-I

LAB 3- Working with Chat GPT Prompt-II

LAB 4- Build a simple chunking algorithm in Python

LAB 5- Implement Encoding and Decoding of Text

LAB 6- Build a Classification Model

LAB 7- Creating a generator in LangChain

LAB 8- Working with Prompt Template and Vector Database

LAB 9- Working with FAISS

LAB 10- Implement Simple react

LAB 11- Custom and Build the Agent

LAB 12- Implement Callbacks with Constructors

LAB 13- Generate a AI with various Format Modifiers

LAB 14- Generate a AI with various Prompts

LAB 15- Build AI powered Applications

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MCA GAI 3rd semester

Object Oriented Analysis and Design (PGI20C07J)

List of Programs

Lab 1: Case study – the Next Gen POS system

Lab 2: Identify a software system that needs to be developed.

Lab 3: Document the Software Requirements Specification (SRS) for the identified system.

Lab 4: Identify use cases

Lab 5: Develop the Use Case model

Lab 6: Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.

Lab7: Using the identified scenarios, find the interaction between objects and represent them using UML

Lab 8: Sequence and Collaboration Diagrams.

Lab 9: Draw relevant State Chart and Activity Diagrams for the same system

Lab 10: Implement the system as per the detailed design.

Lab 11: package diagrams - Component and Deployment Diagrams.

Lab 12: Test the software system for all the scenarios identified as per the use case diagram.

Lab 13:Improve the reusability and maintainability of the software system

Lab 14 By applying appropriate design patterns.

Lab 15: Implement the modified system and test it for various scenarios. SUGGESTED DOMAINS FOR MINI-PROJECT: 1.Passport automation system. 2. Book bank 3. Exam registration 4. Stock maintenance system. 5.Online course reservation system

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MCA GAI 3rd semester

Adaptive AI in Data Analytics and Predictive Modeling (PGI20D13J)

List of Programs

Lab 1: Develop a Personalized Content Delivery System

Lab 2: Develop Intelligent Tutoring Systems.

Lab 3: Develop Dynamic Learning Pathways

Lab 4: Implement Fraud Detection IN Banking and finance

Lab 5: Implement adaptive AI algorithms that can analyze student performance data, such as test scores and homework assignments

Lab 6: Implement adaptive AI algorithms that can analyze traffic patterns and adjust traffic lights in real-time to optimize traffic flow.

Lab 7: Understanding Predictive Models Identify and discuss examples of predictive, descriptive, and decision models.

Lab 8: Analytical Techniques Overview Create a comparative analysis chart highlighting different analytical techniques and their applications.

Lab 9: Data Transformation Techniques Implement data transformations for individual and multiple predictors using Python

Lab 10: Dealing with Missing Values Practice techniques for handling missing data such as imputation or removal.

Lab 11: Model Tuning and Data Splitting Split datasets into training and testing sets, perform model tuning, and evaluate performance.

Lab 12: Cluster Model Implementation Utilize clustering algorithms to create cluster models and explore their applications.

Lab 13: Measuring Performance in Regression Models Evaluate performance metrics for various regression models using a dataset.

Lab 14: Implementing Linear Regression Implement linear regression and its variants (e.g., ridge, lasso) using Python

Lab 15: Regression Trees and Rule-Based Models Build regression trees and rule based models for a given dataset and compare their performance.

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MCA GAI 3rd semester

Artificial Intelligence and Machine Learning for Robotics (PGI20D14J)

List of Programs

Lab :1. BFS using Python

Lab 2: DFS using Python

Lab 3: Tower of Hanoi Using Python

Lab 4: program to implement A* Algorithm

Lab 5: Implementation of NLP to develop spellchecker application using python

Lab 6: To Generate random sentence using python

Lab 7: python program to import and export data using Pandas library functions

Lab 8: To develop face emotion recognition using python

Lab 9: Obstacle avoiding robot.

Lab 10: Implement Simple and Multiple Linear Regression Models.

Lab 11: Develop Logistic Regression Model for a given dataset.

Lab 12: Implement Naïve Bayes Classification in Python

Lab 13: Simulation using Adams View

Lab 14: Simulation using Post Processor

Lab 15: To develop pick and place robot using Arduino

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MCA GAI 3rd semester

Full Stack Development (PGI20D15J)

List of Programs

Lab :1 Write a program to create a simple webpage using HTML. Hello World Web Page

Lab 2: Write a program to create a website using HTML CSS and JavaScript

Lab 3: Write a program to build a Chat module using HTML CSS and JavaScript.

Lab 4. Write a simple Node.js script that outputs "Hello, World!" to the console.

Lab 5: To-Do-Liat Application

Lab 6: Write a program to create a voting application using Angular JS

Lab 7: Create different routes for handling HTTP GET requests using Express.

Lab 8: Write middleware functions to log requests, handle errors, and parse request bodies.

Lab 9: Write middleware functions to log requests, handle errors, and parse request bodies.

Lab 10: CRUD Operations

Lab 11 Query Language

Lab 12: Writing a REST API" Exposing the MongoDB database to the application

Lab 13: Create a Simple Login form using R

Lab 14: Making HTTP requests from Angular to an API

Lab 15: More complex views and routing parameters

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MCA GAI 3rd semester

IoT Devices with Computer Vision Technologies (PGI20D16J)

List of Programs

Lab :1 Explain working of Raspberry Pi.

Lab 2: Controlling LED with Raspberry Pi

Lab 3: Interfacing Light Sensor with Raspberry p

Lab 4: Describe gateway as a service deployment in Iot toolkit

Lab 5: Weather Monitoring System

Lab 6: IoT based Soil Moisture Monitoring Device

Lab 7: Install OpenCV Displaying images OpenCV

Lab 8: Reading &Writing images OpenCV

Lab 9: Draw a Rectangle Draw a Circle

Lab 10: Text in Images

Lab 11: Color Space OpenCV Thresholding OpenCV

Lab 12: Finding Contours

Lab 13: Image Edge Detection OpenCV

Lab 14: Image Scaling & Rotation using OpenCV

Lab 15: Image Translation OpenCV Image Filtering OpenCV

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MCA GAI 3rd semester

Computer Vision in Smart Robotics (PGI20D17J)

List of Programs

Lab 1: Install OpenCV Displaying images OpenCV

Lab 2: Reading & Writing Images Open CV

Lab 3: Color Space OpenCV, Thresholding OpenCV

Lab 4: Morphological Operations Opening OpenCV Morphological Operations Closing OpenCV

Lab 5: Image Acquisition and Display: Write a program to capture images from a camera and display them on a screen using OpenCV or a similar library.

Lab 6: Color Detection: Implement a simple color detection algorithm to detect and track objects of a specific color in a video stream.

Lab 7: Object Detection -Use a pre trained object detection model (e.g., YOLO, SSD) to detect objects in a video stream and draw bounding boxes around them.

Lab 8: Object Tracking-Implement a basic object tracking algorithm (e.g., KLT tracker) to track a moving object in a video stream.

Lab 9: Camera Calibration: Calibrate a camera using a chessboard pattern to correct for distortion and obtain the camera's intrinsic parameters.

Lab 10: Motion Estimation Implement a basic optical flow algorithm to estimate the motion of objects in a video stream.

Lab 11: Scene Classification-Given a dataset of images representing different scenes (e.g., indoor, outdoor, kitchen, bedroom), build a classifier to classify the scenes into their respective categories using machine learning techniques.

Lab 12: Semantic Segmentation Implement a semantic segmentation algorithm to label each pixel in an image with the corresponding object class, providing a detailed understanding of the scene's content.

Lab 13: Moving Object Detection and Tracking: Develop a vision-based system to detect and track moving objects in a dynamic environment.

Lab 14: Event Detection in Surveillance Videos: Develop a system to detect events of interest in surveillance videos.

Lab 15: Underwater Object Detection: Develop a vision-based system to detect objects underwater.

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MCA GAI 3rd semester

Building Conversational AI for Human Resources (PGI20D18J)

List of Programs

Lab 1: Implement a tokenization function to split input text into tokens.

Lab 2: Use an NLP library to perform part-of-speech tagging on sample sentences

Lab 3: Designing Conversational Flows: Define common HR scenarios (e.g., employee onboarding, leave request) and outline the conversation flow for each scenario.

Lab 4: Construct dialogue trees representing various conversation paths based on user inputs and system responses.

Lab 5: Implement error handling strategies to handle user misunderstandings or unexpected inputs

Lab 6: Design and train a simple intent recognition model using a rule-based or machine learning approach.

Lab 7: Access HR-related data sources (e.g., employee database, leave management system) using APIs or database queries.

Lab 8: Preprocess retrieved data to extract relevant information and prepare it for use in conversational interactions

Lab 9: Test the integration between the conversational AI system and HR systems to ensure data accuracy and consistency.

Lab 10: Implement strategies to mitigate biases and ensure fairness and inclusivity in conversational AI systems.

Lab 11: Build a Web hook for a Chatbot and connect with HR Systems.

Lab 12 : Conduct user testing sessions with human participants to evaluate the usability and effectiveness of the conversational AI system

Lab 13 : Project integrating concepts learned throughout the course .

Lab 14: Demonstrating the functionality and effectiveness of the conversational AI system.

Lab 15: Deploying a chatbot on Heruku.

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MCA GAI 3rd semester

Blockchain Technology (PGI20G01J)

List of Programs

Lab 1: Demonstrating secret key cryptography techniques

Lab 2: Demonstrating public key cryptography techniques

Lab 3: Demonstrating Hashing Techniques (SHA and MD5.

Lab 4: Implement a digital signature algorithm in c

Lab 5: Demonstrate the working of the Merkle tree using any programming language

Lab 7: Study assignment on blockchain-based applications/projects.

Lab 8: Write a program to study block chain using python

Lab 9: Case Study on Block chain decentralization

Lab 10: Creating bit coins

Lab 11: Case study for bitcoin generation mechanisms.

Lab 12: Building a Bitcoin Wallet Application Using any Programming Languages /Tools

Lab 13: Creating a Crypto currency Wallet using Java

Lab 14: Code to implement peer to-peer using block chain

Lab 15: Case Study on Applications of Bit coins

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MCA GAI 3rd semester

Cyber Security (PGI20G02J)

List of Programs

Lab :1 Install Kali Linux on Virtual box

Lab 2: Explore Kali Linux and bash scripting

Lab 3: Perform opensource intelligence gathering using Net craft, who is Lookups, DNS Reconnaissance, Harvester and Malte go

Lab 4: Understand the n map command d and scan a target using n map

Lab 5: Install metasploitable2 on the virtual box and search for unpatched vulnerabilities

Lab 6: Use Metasploit to exploit an unpatched vulnerability

Lab 7: Write a program to calculate the message digest of a text using the SHA-1 algorithm.

Lab 8: Write a program to calculate the message digest of a text using the MD-5 algorithm

Lab 9: Write a program to implement digital signature standard

Lab 10: Explore and install Snort intrusion detection tool.

Lab 11: Install Linus server on the virtual box and install ssh

Lab 12: Study Email Tracking and Email Tracing and write a report on them

Lab 13: Use Fail2banto scan log files and ban Ips that show the malicious signs

Lab 14: Launch brute-force attacks on the Linux server using Hydra.

Lab 15: Perform real-time network traffic analysis and data pocket logging using Snort

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Mobile Communication Network (PGI20G03J)

List of Programs

Lab :1 Implement a simple mobile communication system simulator that demonstrates the basic concepts of frequency reuse, handover, and mobility management

Lab 2: Analyze the performance differences between 1G, 2G, 3G, 4G, and 5G networks using network simulation tools like NS-3 or MATLAB. Wireless Propagation and Channel Modelling

Lab 3: Simulate the effects of multipath propagation and fading using MATLAB or Python, and analyze the impact on signal quality and coverage

Lab 4: Develop a simulator to compare and evaluate the performance of FDMA, TDMA, CDMA, and OFDMA in terms of spectral efficiency and interference management

Lab 5: Design and simulate a cellular network layout considering cell planning, frequency reuse, and interference management strategies using software like Open Cellular or Atoll

Lab 6: Develop an algorithm to optimize the allocation of resources (frequency channels, time slots) in a cellular network to maximize capacity and coverage while minimizing interference

Lab 7: Implement interference mitigation techniques such as power control, adaptive beam forming, or interference cancellation in a simulated wireless network environment

Lab 8: Implement a simplified version of the OSI protocol stack, including physical, data link, network, and transport layers, and demonstrate data transmission between mobile devices

Lab 9: Develop a GSM protocol stack simulator to handle functions such as call setup, SMS messaging, and handover between base stations. CDMA Protocol Implementation

Lab 10: Implement a CDMA-based communication system simulator and analyze its performance in handling multiple users and mitigating interference

Lab 11: Design and implement a Mobile IP protocol stack to support seamless mobility of devices across different IP networks, and evaluate its effectiveness in real-world scenarios

Lab 12: Develop a security framework for mobile communication networks, including encryption algorithms, authentication protocols, and intrusion detection mechanisms

Lab 13: Design and implement QoS mechanisms to prioritize traffic, ensure bandwidth allocation, and manage latency in a simulated mobile network environment

Lab 14: Develop location-based services (LBS) applications using GPS or cell tower triangulation techniques, and explore their use cases and practical implementations

Lab 15: Experiment with emerging 5G technologies such as massive MIMO, beam forming, and network slicing by prototyping and testing various network configurations in a laboratory setting

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Quantum Machine Learning (PGI20G04J)

List of Programs

Lab :1 The probability that it is Friday and that a student is absent is 3 %. Since there are5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Bayes rule in python to get the result.

Lab 2: Extract the data from database using python

Lab 3: Implement k-nearest neighbours classification using python

Lab 4: Implement linear regression using python

Lab 5: Implement Naïve Bayes theorem to classify the English text

Lab 6: Implement an algorithm to demonstrate the significance of genetic algorithm

Lab 7: Implement the finite words classification system using Back propagation algorithm

Lab 8: Find-S and Candidate Elimination Algorithm

Lab 9: For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

Lab 10: 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

Lab 11: Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

Lab 12: Program to implement the naïve Bayesian classifier for a sample training dataset stored as a .CSV file. Compute the accuracy of the classifier, considering few test datasets.

Lab 13: 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

Lab 14: program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

Lab 15: Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same dataset 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

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Cognitive Analytics Tools and Techniques (PGI20G05J)

List of Programs

Lab1: Customer Segmentation using Machine Learning in Python

Lab 2: Implementation of Simple Machine AI real time problem

Lab3: Build a model for Information Processing using Cognitive science

Lab4: Implementation of Decision tree and K- Mean algorithm-A Low Level cognitive approach

Lab5: Build a Bayesian Model for Anomaly=y Detection

Lab 6: Implement Knowledge representation using predicate logics

Lab 7: Implement model using speech analytics techniques

Lab8: Implement Data Visualization using your own dataset

Lab9: Explore the roles that metadata play in decision making, memory retrievals, and learning

Lab 10Text Detection and Extraction using OpenCV and OCR

Lab 11: Age predictor and Gender classifier project using OpenCV.

Lab 12: Case Study on Ethical, Fairness and Privacy considerations in Cognitive Science

Lab13: Build a cognitive assistant for Visually Impaired

Lab 14: Build and train a self learning Chatbot

Lab15: Time Series Analysis in health care domain

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Building GPT Powered Business Applications (PGI20G06J)

List of Programs

Lab 1: Case Study on NLP Tool

Lab 2: Case Study on GPT

Lab 3: Case Study on Prompt Engineering

Lab 4: Word2Vec Exploration

Lab 5: Applying Tokenization Techniques on text samples

Lab 6: Case Study on ChatGPT API

Lab 7: Experimenting with Prompts

Lab 8: Working Functionality of GPT-3

Lab 9: Experimenting Naïve Bayes

Lab 10: Simple Chatbot

Lab 11: Simple rule-based Chatbot

Lab 12: Working of GPT-4

Lab 13: Build a website using Gen AI Tools

Lab 14: Gen AI with Custom Dataset

Lab 15: Working of Conversational AI

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MCA GAI 3rd semester

Development of Health Care Generative AI (Lab: Google Generative AI Studio) (PGI20G07J)

List of Programs

Lab 1-Test models using prompt samples.

Lab 2- Design and save our own prompts.

Lab 3 - Convert text-to-speech and speech-to-text

Lab 4- Google AI Studio quick start

Lab 5 - Writing scripts with Gemini AI

Lab 6-Creating text prompts with Google AI Studio and Gemini AI

Lab 7- Code completion and generation

Lab 8- Generate and Customize Images

Lab 9- Universal speech model

Lab 10- Build a product copy generator

Lab 11 - Build a custom chat application

Lab 12- Experiment with model parameters

Lab 13- Case Study I

Lab 14- Case Study II

Lab 15- Case Study III

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MCA GAI 2nd semester

Python Programming for Data Science (PGI20C04J)

List of Programs

Lab 1: Simple programs

Lab 2: Programs Using Tuples,List,Dictionary and Sets

Lab 3: Illustration on Lambda and Filters Top of Form

Lab 4: Implementing Inheritance

Lab 5: Implementing Method Overloading

Lab 6: Illustration on how to raise an Exception

Lab 7: Implementing Modules

Lab 8: Implementing Threads

Lab 9: Illustration on Command Line Arguments and Regular Expressions

Lab 10: Descriptive Statistics Using NumPy

Lab 11: Illustrate Indexing Operations in data frame

Lab 12: Illustrate various Plots using Pandas and Matplotlib

Lab 13: Building GUI Application with tKinter

Lab 14: Creating Tables Using SQLite

Lab 15: Illustration on Database Connectivity

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MCA GAI 2nd semester

Deep Neural Networks (PGI20C05J)

List of Programs

Lab 1: Implement the perceptron in a programming language.

Lab 2: Implement the perceptron in a programming language of your choice.

Lab 3: Implement a basic feedforward neural network with one or more hidden layers.

Lab 4: Implement a basic feedforward neural network with one or more hidden layers. Train the network on a simple dataset for binary classification

Lab 5: Implement the softmax classifier using a deep learning library of your choice

Lab6: Implement a basic feedforward neural network with one or more hidden layers. Train the network on a simple dataset for regression tasks.

Lab7: Implement a simple autoencoder neural network for unsupervised learning tasks such as dimensionality reduction or image denoising.

Lab 8: Implement a simple autoencoder neural network for unsupervised learning tasks such as dimensionality reduction or image denoising. Train the autoencoder on datasets like the MNIST handwritten digit dataset.

Lab 9: Implementation of a feedforward neural network trained using backpropagation for binary classification task

Lab10: Implement gradient descent for a simple linear regression problem in Python

Lab 11: Implement the basic architecture of an RBF network, consisting of an input layer, a hidden layer with radial basis functions, and an output layer.

Lab12: Implement the training algorithm for the RBF network, such as the k-means clustering algorithm for determining the centers of the radial basis functions, and the least squares method for computing the weights.

Lab13:Implement an RNN for sequential data tasks such as time series prediction or text generation. Train the RNN on datasets like the IMDB movie review dataset or stock price data.

Lab14: Implement a CNN for image classification tasks using libraries like TensorFlow or PyTorch. Train the CNN on datasets MNIST

Lab15: Implement a basic GAN for generating synthetic data samples. Train the GAN on datasets like the MNIST dataset for generating handwritten digits.

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MCA GAI 2nd semester

Data Engineering and Knowledge Representation (PGI20D07J)

List of Programs

Lab 1: Setting Up a Data Engineering Environment Data Ingestion Using Apache Kafka Data Processing with Apache Spark Data Storage with Hadoop Distributed File System (HDFS)

Lab 2: Building ETL Pipelines

Lab 3: Real-time Data Processing with Apache Flink Top of Form

Lab 4 Creating Entity Relationship Diagrams Designing Relational Database Schemas Normalization and Denormalization

Lab 5: Indexing and Query Optimization Database Implementation with SQL

Lab 6: Data Migration and Conversion

Lab 7: NoSQL Database Implementation

Lab 8: OLAP Cube Design and Implementation

Lab 9: Data Lake Implementation

Lab 10: Semantic Web Technologies (RDF, OWL)

Lab 11 Knowledge Representation Languages Knowledge Extraction and Acquisition

Lab 12: Knowledge Representation in Machine Learning

Lab 13: Data Integration and ETL (Extract, Transform, Load) Processes

Lab 14 Anomaly Detection with Machine Learning

Lab 15: Graph Databases and Knowledge Graph Technologies

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MCA GAI 2nd semester

Introduction to Robotics Automation (PGI20D08J)

List of Programs

Lab 1: Introduction to Raspberry Pi -Setting up and configuring Raspberry Pi Introduction to Raspberry Pi operating system GPIO (General Purpose Input/Output) programming with Raspberry Pi-Interfacing sensors and actuators with Raspberry Pi

Lab 2: Python Programming for Robotics Applications Controlling simple robots (e.g., line following robots) using Python and Raspberry Pi. Data acquisition and processing from sensors using Python

Lab 3: Implementing basic control algorithms (e.g., PID control) in Python. Develop Python programs for robot communication, sensor data acquisition, and control using Raspberry Pi.

Lab 4: Kinematics and Dynamics Simulation -Using simulation software (e.g., V REP, Gazebo) to model and simulate robot kinematics and dynamics Implement Python scripts to interact with simulation software and analyze robot behaviour.

Lab 5: Robot Vision with Raspberry Pi Camera -Image acquisition and processing using Raspberry Pi camera. Object detection and recognition using Python libraries (OpenCV).

Lab:6 Develop Python programs for camera interfacing, image capture. Basic object recognition using Raspberry Pi.

Lab:7 Advanced Control System Implementation -Design and implement advanced control systems (MPC) for robot control tasks using Python. Experiment with different control strategies and evaluate their performance.

Lab:8 Robot Navigation Simulation -Utilize simulation software (ROS with Gazebo) to develop and test robot navigation algorithms using Python. Design and simulate various navigation scenarios with obstacles and dynamic environments.

Lab:9 Autonomous Navigation Integrate mapping, localization, path planning, and obstacle avoidance. Design and simulate various navigation scenarios with obstacles and dynamic environments.

Lab:10 Machine Learning for Robot Control: Train and implement machine learning models using Python for specific robot control tasks (e.g., object recognition, path planning). Evaluate the performance of machine learning models and refine them for improved results.

Lab:13 Robotics Project Students will select a project topic related to robotics or automation, applying the knowledge and skills acquired throughout the program

Lab: 14 The project will involve: Defining the project scope and objectives. Researching the chosen topic and identifying relevant ethical considerations.

Lab: 15 Designing and implementing the project using Python, Raspberry Pi, or other suitable tools and technologies. Testing and evaluating the project's performance and addressing any ethical concerns, Documenting the project and presenting the findings.

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MCA GAI 2nd semester

Android Applications Development (PGI20D09J)

List of Programs

Lab1: Login page creation with Toast message

Lab 2: Student registration form with Toast message

Lab3: Implement Explicit Intent

Lab 4: implement implicit Intent

Lab 5: Implement Time Picker

Lab 6: Implement Date Picker

Lab 7: Student Registration form using Basic and List view

Lab 8: Implement Context menu

Lab 9: Implement Option Menu

Lab 10: Shared preferences

Lab 11: Storing data to file in Internal storage

Lab 12: SQLite database

Lab 13: Simulate paintbrush applications

Lab 14: Draw an object

Lab 15: Implement WebView

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MCA GAI 2nd semester

IOT Cloud Infrastructure and IOT Protocols (PGI20D10J)

List of Programs

Lab1: MQTT Publisher: Develop a program to publish sensor data (e.g., temperature, humidity) from Node MCU to an MQTT broker hosted on a cloud platform

Lab2: MQTT Subscriber: Create a program to subscribe to MQTT topics on Node MCU

Lab 3: HTTP Client: Implement an HTTP client on Node MCU to send sensor data to a cloud-based server

Lab 4: OTA Updates: Set up Over The-Air (OTA) firmware updates for Node MCU to enable remote updating of firmware from a cloud server without physical access.

Lab 5: Security Measures: Secure communication between Node MCU and cloud services using TLS/SSL encryption and implement authentication mechanisms

Lab 6: Cloud-triggered Actions: Create a program on Node MCU to perform specific actions (e.g., turn on/off an LED) based on commands received from a cloud-based IoT platform.

Lab 7: Real-time Data Streaming: Develop a program to stream real time sensor data from Node MCU to a cloud-based database (e.g., Firebase Real time Database, AWS Dynamo DB).

Lab 8: Data Visualization: Interface Node MCU with a cloud-based data visualization platform (e.g., Thing Speak, Grafana) to visualize sensor data in real-time.

Lab 9: Device Shadowing: Implement device shadowing functionality on Node MCU to synchronize device states and configurations with a cloud-based IoT platform.

Lab 10: Integration with IoT Platforms: Integrate Node MCU with popular cloud-based IoT platforms (e.g., AWS IoT, Google Cloud IoT Core) to leverage their services for IoT applications.

Lab 11: MQTT Publisher: Develop a Python script on Raspberry Pi to publish data from sensors connected to GPIO pins to an MQTT broker hosted on a cloud platform

Lab 12: MQTT Subscriber: Create a Python script to subscribe to MQTT topics on Raspberry Pi and take actions based on messages received from a cloud-based MQTT broker.

Lab 13: HTTP Server: Implement an HTTP server on Raspberry Pi to receive sensor data from Node MCU or other IoT devices and store it in a cloud-based database

Lab 14: Data Logging to Cloud Storage: Write a Python script to log sensor data (e.g., temperature, humidity) from Raspberry Pi to a cloud-based storage service (e.g., Google Cloud Storage, AWS S3).

Lab 15: Real-time Data Analytics: Develop a Python script to perform real-time analytics on sensor data received from Node MCU or other devices and send alerts or notifications based on predefined thresholds.

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MCA GAI 2nd semester

Augmented Reality and Virtual Reality for Game Development (PGI20D11J)

List of Programs

Lab 1: Set up a VR development environment using Unity: Install VR development tools, import VR SDKs, Set up a new VR project

Lab 2: Create a simple VR scene.

Lab3: Experiment with different audio and visual effects for immersive experience

Lab 4: Set up AR Foundation & ARKit Package

Lab 5: Creating and Scripting a Placement Indicator in Unity

Lab 6: Create an AR game by importing 3D objects

Lab 7: Create a simple scene with a controllable character (e.g., a cube) that can move forward, backward, left, and right using keyboard input.

Lab 8: Implement a script that allows the player to interact with objects in the scene (e.g., picking up and dropping objects, triggering events).

Lab 9: Design a simple user interface (UI) with buttons, sliders, and text elements to display information or control aspects of the game (e.g., health bar, score display).

Lab 10: Develop a script that rotates an object (e.g., a sphere) around its axis when the player presses certain keys (e.g., Q and E).

Lab 11: Implement a timer script that counts down from a specified time (e.g., 60 seconds) and displays the remaining time on the screen.

Lab 12: Create a script that controls the playback of animations on a character or object (e.g., idle, walk, jump).

Lab 13: Create your first unreal engine project

Lab 14: create a simple environment, author basic materials, explore the lighting system, and add basic Landscape and Foliage to bring the scene to life.

Lab 15: Create classes with Blueprints in Unreal Engine.

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MCA GAI 2nd semester

Working with Generative AI and Large Language Models (PGI20D12J)

List of Programs

Lab 1: Write a python program to implement statistical language model.

Lab 2: Write a python program to implement Finite State Machine for a traffic light

Lab 3: Write a python program using the Recursive Descent Parser for analyzing the sentence with NLTK tool

Lab 4: Write a python program to implement pushdown automata.

Lab 5: Sentiment analysis using Recurrent Neural Network

Lab 6: How to implement self attention mechanism in python using Numpy.

Lab 7: Develop an LLM Application using OpenAI and Streamlit

Lab 8: Generate text using Open Ai's GPT-3 with python.

Lab 9: How to generate text using Lang Chain and OpenAI

Lab 10: Text Summarization using LLM

Lab 11: Sentimental analysis using LLM

Lab 12: Using Pre-trained BERT model for Summarization

Lab 13: Chatbot and Virtual Assistance

Lab 14: -Movie Prediction

Lab 15: Write a python program for text generation using BART model.

Lab 16: Write a python program for auto texting using BART

Lab 17: Write a python program for text summarization using BART model

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MCA GAI 2nd semester

Advanced Techniques in Generative AI with Open AI Models (Lab: Google Generative AI Studio) (PGI20S02J)

List of Programs

1. Fine-tuning GPT for Text Generation.
2. Implementing self-supervised with ChatGPT
3. Implement image classification and retrieval using contrastive objectives with ChatGPT
4. Application of multi-modal GANs
5. Applications using Autoencoding variantional Bayes
6. Generate an application using conditional generative models
7. Implement conditional generation
8. Develop fine grained control in 3D Printing
9. Generate an application using Meta learning
10. Adapt a generative model from MNIST to SVHN using meta learning
11. Develop applications using RL algorithm
12. Fine-tune a pre-trained transformer model on a few-shot text classification problem using a meta learning approach.
13. Implement RL algorithm
14. Implement Adversarial training methods
15. Develop RL based generative models using benchmark dataset