Syllabus

6th semester

Annexure 4

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.)

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CLOUD COMPUTING AND VIRTUALIZATION
DC- 150615

Course Objectives:

1. To Provide the basics of cloud computing concepts along with virtualization techniques.

2. To provide overview of the field of Cloud Computing, and an in-depth study into its enabling technologies and main building blocks.

3. To develop the skills needed to become a practitioner or carry out research projects in this domain.

Unit I - Introduction:

Definition and evolution of cloud computing, Cloud components, Essential characteristics, advantages and limitations of cloud computing, Issues in cloud computing, Virtualization: Need of virtualization, Features of Virtualization, limitations, Classification of virtualization: Hardware virtualization, Desktop virtualization.

Unit II – Virtualization Concepts:

Server Virtualization: Introduction, types of server virtualization, Virtual machine basics, types of virtual machines, hypervisor concepts and types, Utility Computing, Elastic Computing, Virtualization applications in enterprises, Pitfalls of virtualization, Multitenant software, Virtualization security management, Datacenter Virtualization, Client Virtualization, Cloud Virtualization.

Unit III – Cloud Architecture:

Cloud architecture, Layers in cloud architecture, Service Models: Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), Application as a Service, Functions as a Service, features and benefits of each. Deployment Models: Public clouds, Private clouds, Community clouds, Hybrid clouds.

Unit IV – Cloud Storage & Security:

Introduction to Storage Systems, Data in the cloud: Relational databases, Cloud Storage Concepts, Cloud file systems: GFS and HDFS. Cloud Databases (HBase, MongoDB, Cassandra, DynamoDB), Cloud Object Storage, Features and functions of cloud computing platforms, Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud: Cloud computing security architecture.

Unit V – Tools and Techniques:

Distributed Programming for the Cloud, Map-Reduce and extensions: Parallel computing, The Map-Reduce model, Example/Application of MapReduce, Introduction to Simulators, CloudSim simulator, GreenCloud simulator, VMWare Simulator, Oracle Virtual Box. Case Study: AWS.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE OUTCOMES:

After successful completion of the course, the learners would be able to:

1. **Describe** the fundamental ideas behind Cloud Computing.
2. **Use** ideas and principles of Virtualization and its applications.
3. **Illustrate** fundamental concepts of cloud infrastructures and Service Oriented Architecture.
4. **Analyze** the fundamental concepts of cloud storage and cloud security.
5. **Apply** various tools and technologies for implementing applications of Cloud.

Reference Books:-

- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008
- Kai Hawang, Geoferrey C Fox, "Distributed and Cloud Computing", Elseveir publication, 2012
- David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center, Auerbach

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CLOUD COMPUTING AND VIRTUALIZATION
DC- 150615
List of Experiments

1. Study of Cloud Service Models
2. Working with Goggle Drive to make spreadsheet and notes
3. Installation and configuration of Hadoop
4. Installation and configuration of Justcloud
5. Working and installation of CloudSim
6. Working and installation of GreenCloud
7. Working and installation of VMWare
8. Working and installation of Oracle Virtual Box
9. Working and installation of Google App Engine
10. Working and installation of Microsoft Azure
11. Study of Amazon Web Services

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CLOUD COMPUTING AND VIRTUALIZATION
DC- 150615
List of Skill Based Mini Projects

1. Cloud-Enabled Attendance System
2. Cloud-Enabled Bookstore System
3. Online Blood Bank System
4. Cloud-Based Bus Pass System
5. Online Education System
6. Cloud-Enabled Data Leak Detection System Using SQL Injection
7. Online Chatbot System
8. Cloud-Based File Storage System using Hybrid Cryptography
9. Cloud-Based Rural Banking
10. Cloud-Based Smart Traffic Management System

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DIGITAL IMAGE PROCESSING
DC-150616

COURSE OBJECTIVES:
1. To understand the fundamentals of image acquisition, image processing in spatial and frequency domain.
2. To understand image transforms used in digital image processing.
3. To know about the image restoration techniques and methods used in image processing.

Unit – I:
Introduction and Fundamental: Introduction to Image Processing Systems, Digital Image fundamentals: Components of Digital Image Processing Systems, Image Model, Image Geometry, Sampling and Quantization of Images, Classification of Digital Images, Zooming and Shrinking, Relationship between pixels.

Unit – II:
Image Enhancement in spatial Domain: Introduction, Basic Gray Level Function, Piecewise Linear Transformation, Contrast Stretching, Histogram Specification, Histogram Equalization, Local Enhancement using arithmetic and logical operation- Image Subtraction, Image averaging, Image Smoothing: Smoothing Spatial Filters, Smoothing Linear Filters, Image Sharpening.

Unit – III:
Image Enhancement in Frequency Domain: Introduction to Fourier Transform, Filters: Low Pass and High Pass, Gaussian Filters, Homomorphic Filtering, **Image Restoration:** Model of Image Degradation/Restoration process, Noise Models, Noise Reduction in Spatial and Frequency Domain, Inverse Filtering, Mean Filters, Least Mean Square (Wiener) Filtering, FIR Wiener Filter.

Unit – IV:
Morphological Image Processing: Logic operation involving binary images, Dilation and Erosion, Opening and Closing, Morphological Algorithms: Boundary Extraction, Region filling, Extraction of connected components, Convex Hull, Thinning and Thickening.

Unit –V:
Image Registration: Introduction, Geometric Transformation, Plane to plane Transformation, Mapping, **Image Segmentation:** Introduction, Region Extraction, Pixel based approach, Multilevel Thresholding, Local Thresholding, Region based approach, Region growing, Splitting and Merging, Edge and line detection, Corner Detection, Detection of Discontinuities, Edge and boundary detection.

RECOMMENDED BOOKS:

1. Digital Image processing, Rafael C Gonzalez, Richard E Woods, Pearson Education.
2. Fundamental of Digital Image processing, K. Jain, Pearson education.
3. Digital Image Processing, S. Esakkirajan, S. Jayaraman, T. Veerakumar, Tata McGraw- Hill Education.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE OUTCOMES: After completing the course, the student will be able to:

1. **Explain** the fundamental concepts of Image Models and Image Geometry.
2. **Apply** Spatial Domain Techniques for Image Enhancement.
3. **Apply** Frequency Domain Techniques for Image Enhancement and Restoration.
4. **Categories** Morphological Image Processing operations.
5. **Apply** Geometric Transformations and Segmentation Techniques for Images.

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DIGITAL IMAGE PROCESSING
DC-150616

LIST OF EXPERIMENT

1. Program to read an image and display it on the screen.

2. Program to determine image negative.

3. Read an image and perform different filtering operations (Average, Median etc.)

4. Program to create motion blur.

5. Program performs gray level slicing without background.

6. Program to perform brightness enhancement and brightness suppression of an image.

7. To create a vision program to find histogram value and display histograph of a grayscale and color image.

8. Read an RGB image and segment it using threshold method.

9. Read a colour image and separate the colour image into red green and blue planes.

10. Perform gamma correction for the given colour image

11. Program to perform different image conversion techniques

12. To create a color image and perform read and write operation

13. Code to implement watermarking in spatial domain.

14. Code to generate different levels of Gaussian Pyramid.

DIGITAL IMAGE PROCESSING
DC-150616

<u>Skill Based Mini Project</u>

1. Read multiple images from a folder and show them using sub plotting operation.

2. Read an image given by the user and perform different filtering operations (Average, Median etc.)

3. Implement Smart selfie using image processing techniques.

4. Object detection (eg. Face mask, Number plate etc.)

5. Bookshop management system using Image processing techniques

6. Real time sentiment analysis.

7. Apply image segmentation techniques on original image given by the user.

8. Implement a GUI to enhance the image using Histogram equalization techniques.

9. Implement a GUI for Edge detection (Sobel, Prewitt, Canny etc.)

10. Execute the GUI for various segmentation methods using user given images.
11. Implement a GUI for similar images detection.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

MACHINE LEARNING

DC-150617

COURSE OBJECTIVES:

1.   To understand types of issues and challenges that could be solved by machine learning.
2.   To be able to understand wide variety of learning models and use them.
3.   To be able to evaluate and optimize these models

Unit – I:

Introduction to Machine Learning: Learning, Traditional Vs Machine Learning, Types Of ML, Classification and Regression model, Challenges faced by ML, Steps of developing an ML model, Bias and Variance, Underfitting and Overfitting, Regularization, Data visualization, Outlier, Testing and validating, K cross validation, Hyperparameter tuning, Model Selection.

Unit – II:

Model optimization and Evaluation: Parametric and non- Parametric model, Learner performance evaluation, confusion matrix, Recall, accuracy, precision, Model optimization, Cost/Loss Function, Derivative of cost function and non-derivative cost function, Gradient descent, Mini-batch Gradient Descent (sckit-learn), Stochastic Gradient descent(sckit-learn), Momentum(sckit-learn).

Unit – III:

Supervised Machine Learning Algorithim with python: Model Complexity vs Dataset Size, Supervised Machine Learning Algorithms, k-Nearest Neighbors, Linear Regression, RMSE, Logistic Regression, Log Loss, Support Vector Machine, Hinge Loss, Kernel Trick, polynomial Kernal, Decision Trees, Gini impurity.

Unit – IV:

Ensemble Learner with python: Ensemble learner, Bagging, Pasting , Voting Classifiers, Out-of-Bag, Evaluation, Random Patches and Random Subspaces , Random Forests , Extra-Trees, Boosting , AdaBoost, Gradient Boosting, Stacking.

Unit –V:

Unsupervised Machine Learning with python: The Curse of Dimensionality, Projection, Manifold Learning Principal component analysis, Clustering , K-Means, Limits of K-Means, Clustering for Image Segmentation, Clustering for Preprocessing, Clustering for Semi-Supervised Learning, DBSCAN.

RECOMMENDED BOOKS:

1. Hands-On Machine Learning with Scikit-Learn, Keras and TensorFlow by Aurélien Géron
2. Introduction to Machine Learning with Python by Andreas C. Müller & Sarah Guido, O'reilly
3. Machine Learning For Absolute Beginners: A Plain English Introduction (Second Edition)" by Oliver Theobald
4. Machine Learning For Dummies" by John Paul Mueller and Luca Massaron
5. Machine Learning in Action" by Peter Harrington

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COURSE OUTCOMES: After completing the course, the student will be able to:

1. **Explain** basic concepts of Machine Learning.
2. **Discuss** model optimization using sckit-learn technique in python.
3. **Apply** various techniques for learner evaluation.
4. **Illustrate** various types of supervised machine learning algorithm using python.
5. **Formulate** ML ensemble model to solve real world problem using python.
6. **Evaluate** unsupervised ML techniques to solve real world problems using python.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

MACHINE LEARNING
DC-150617
LIST OF EXPERIMENT

1. Perform exploratory data analysis and visualization after importing a .CSV file.

   - Handle missing data by detecting and dropping/ filling missing values.
   - Transform data using different methods.
   - Detect and filter outliers.
   - Perform Vectorized String operations on Pandas Series.
   - Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.

2. Recognize data Skew-ness, outliers both using statistical function and Graphical representation.

3. Write a Python program to implement Simple Linear Regression to predict if male or female based on Height.

4. Implement Various Regression algorithm for House Price Prediction (USA housing Dataset) and compare there accuracy using scikitlearn

   - Linear Regression
   - Polynomial Regression
   - Support Vector machine

5. Implement Logistic regressor using softmax on iris dataset using sckitlearn.

6. Implement Regularized Regression for house price prediction and evaluate there accuracy using sckitlearn.

   - Ridge Regression
   - Lasso Regression

7. Implement Various Classification algorithm for iris data set and evaluate there performance.

   - Navie Bayes Classifier
   - Logistic Regression
   - Support vector Machine
   - Decision tree

8. Implement Various ensemble on housing and iris dataset and evaluate there performance

   - Voting classifier
   - Random Forest (Bagging and pasting)

9. Implement principle component analysis on any choosen dataset/

10. Implement various clustering algorithm on choosen dataset

    1. K-Mean
    2. DBSCAN

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MACHINE LEARNING
DC-150617

Skill Based Mini Project

1. Implement a regressor for any Medical disease diagnosis.

2. Implement a Cervical Cancer Risk Classifier

3. Regression model for Video Game Sales Prediction
4. Regression model for predicting if song will be popular

5. Regression model for Customer Behavior Analysis

6. Regression model to predict health insurance cost

7. Titanic Survival Prediction

8. Spam and not Spam Classifier

9. Spotify Music Recommendation System

10. Target Customer segmentation.