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ANNEXURE-III

Syllabi

of

Departmental Core Courses (DC)

of

B. Tech VI Semester

[Information Technology (Artificial Intelligence and Robotics)/ Artificial Intelligence (AI) and Data Science/ Artificial Intelligence (AI) and Machine Learning]

for batch admitted in 2021-22

(under the flexible curriculum)

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AI FOR ROBOTICS (240601)

COURSE OBJECTIVES

- To study the concepts of Artificial Intelligence in Robotics.
- To learn the methods of solving problems in Robotics using Artificial Intelligence.
- To learn about planning, strategies and algorithms.

Unit I

Introduction to Robotics Engineering and AI Integration: Overview of Robotics Engineering, Laws of Robotics, Types of Robot, Components Needed for Robot, Robot Standards and Safety Regulations, Robot System Analysis, Trends in Robotics System, Requirements of AI for Robot Automation, AI agents, Algorithms used in Robotics, Case Studies: Sofia, ASIMO, IBM Watson.

Unit II

Path Planning and Control in Robotics: Overview of Path Planning and Control, Path Planning Categories: Environment-based, Algorithm-based, Completeness-based, Kinematics and Dynamics for Path Planning, Robot Control Architectures for Path Following, Robot Path Planning Problem, and Complexity.

Unit III

Artificial Intelligence for Global Path Planning: Classical Approaches to Path Planning, Graph Search Approaches: A* and AO* Algorithm, Heuristic Approaches: Tabu Search, Genetic Algorithm, Ant Colony Optimization, Hybrid Approaches in Path Planning, Case studies of AI-powered Path Planning in Robotics.

Unit IV

Simultaneous Localization and Mapping (SLAM): Introduction to SLAM, EKF-SLAM, Graph-based SLAM (G-SLAM), Feature-based Mapping: Feature extraction and matching, FastSLAM algorithm, Comparison of feature-based mapping techniques.

Unit V

Advancements in AI for Robotics: Swarm Robotics and Multi-Robot Systems, Bio-inspired Robotics, Integration of AI and Robotics in Industry 4.0.

RECOMMENDED BOOKS

- Poole, Harry H. "Fundamentals of robotics engineering. Springer Science & Business Media", 2012.
- Steven M. LaValle, "Planning Algorithms", 2006.
- Anis Koubaa, Hachemi Bennaceur, Imen Chaari, Sahar Trigui, Adel Ammar, Mohamed-Foued Sriti, Maram Alajlan, Omar Cheikhrouhou, Yasir Javed, "Path Planning and Cooperation: Foundations, Algorithms and Experimentations", 2018.
- Robin R. Murphy, "Introduction to AI Robotics", second edition, 2019.
- Dubey, Ashutosh Kumar, Abhishek Kumar, S. Rakesh Kumar, N. Gayathri, and Prasenjit Das, eds. AI and IoT-based Intelligent Automation in Robotics. John Wiley & Sons, 2021.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. describe fundamental concepts in robotics engineering and AI integration in robotics.

CO2. explain the basics of robotics path planning and control.

CO3. utilize various artificial intelligence techniques for effective global path planning solutions in diverse robotic scenarios.

CO4. discover appropriate Simultaneous Localization and Mapping (SLAM) techniques for robots.

CO5. evaluate the strengths, weaknesses, and trade-offs among various Simultaneous Localization and Mapping (SLAM) methods.

CO6. design and propose advanced solutions for addressing complex challenges in the field of AI for robotics.

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IMAGE PROCESSING (240602/ 270602/ 280602)

COURSE OBJECTIVES

- To impart knowledge about the fundamental steps of image processing.
- To study different causes for image degradation and image restoration techniques
- To study the various image enhancement and segmentation techniques in spatial and frequency
- domain
- To able the students to understand the image compression, image segmentation and Color image
- processing.

Unit I

Introduction: Digital image representation, Fundamental steps in image processing, Components of Digital Image processing systems, Elements of visual perception, Image Formation model, Image Sampling and quantization, Relationship between pixels – neighbourhood, adjacency connectivity, regions, boundaries and distance measures.

Unit II

Image Enhancement: Enhancement by point processing, Sample intensity transformation, Histogram processing, Image subtraction, Image averaging, Spatial filtering- Smoothing Spatial filters, Sharpening Spatial filters, Frequency domain- Fourier Transform, Low-Pass, High Pass, Homomorphic filtering.

Unit III

Image Segmentation: Detection of discontinuities - point, line and edge detection, Edge linking and boundary detection, Thresholding, Region based segmentation - region growing, region splitting and merging, Use of motion in segmentation- Spatial techniques and Frequency domain techniques.

Unit IV

Image Restoration and Compression: A model of the image degradation/restoration process, noise models, restoration in the presence of noise–only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function. Image Data Compression: Fundamentals, Compression models, Error free compression, Lossy Compression, Image compression standards.

Unit V

Color Image Processing: Color Models, Pseudo color Image Processing, Color Transformations, Smoothing and sharpening, Image Segmentation based on color. Applications of Image Processing: Medical imaging, Robot vision, Character recognition, Remote Sensing.

RECOMMENDED BOOKS

- R. C. Gonzalez and R. E. Woods, Digital Image Processing, Addison-Wesley Publishing Company, 2007
- Gonzalez R. C, Woods R. E and Eddins S. L;Digital Image Processing using MATLAB, McGraw Hill Education, 2nd edition, 2017.
- Sonka M. Hlavac V., Boyle R., Image Processing, Analysis and Machine Vision, Cengage Learning, 3rd edition, 2007.
- A. K. Jain, Fundamentals of Digital Images Processing, Pearson Education India, 2015

COURSE OUTCOMES

After completion of the course students will be able to:

CO1: describe the fundamentals of image processing.

CO2: classify image enhancement techniques in both spatial and frequency domains for noise removal and better appearance.

CO3: apply image segmentation for object and boundary detection.

CO4: analyze the causes for image degradation and image restoration.

CO5: evaluate image compression techniques.

CO6: implement novel image filtering techniques.

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ARTIFICIAL INTELLIGENCE & MACHINE LEARNING (240603)

COURSE OBJECTIVES

- To provide the fundamental knowledge of Artificial Intelligence and Machine Learning.
- To present the basic representation and reasoning paradigms used in AI & ML.
- To understand the working of techniques used in AI & ML.

Unit I

Introducing Artificial Intelligence: Definition, Goals of AI, Task of AI, Computation, Psychology and Cognitive Science, Perception, Understanding and Action. Artificial Intelligence vs Machine Learning vs Deep Learning and other related fields. Applications of Artificial intelligence and Machine Learning in the real world.

Unit II

Problem, Problem Space and Search: Production System, Blind Search: BFS & DFS, Heuristic Search, Hill Climbing, Best First Search.

Introduction to Neural Networks: History, Biological Neuron, Artificial Neural Network, Neural Network Architectures, Classification, & Clustering.

Unit III

Introduction to Machine Learning: Traditional Programming vs Machine Learning. Key Elements of Machine Learning: Representation, Process (Data Collection, Data Preparation, Model Selection, Model Training, Model Evaluation and Prediction), Evaluation and Optimization. Types of Learning: Supervised, Unsupervised and Reinforcement Learning. Regression vs Classification Problems.

Unit IV

Supervised Machine Learning: Linear Regression: Implementation, Applications & Performance Parameters, Decision Tree Classifier, Terminology, Classification vs Regression Trees, Tree Creation with Gini Index and Information Gain, IDE3 Algorithms, Applications and Performance Parameters. Random Forest Classifier, Case Study on Regression and Classification for solving real world problems.

Unit V

Unsupervised Machine Learning: Introduction, Types: Partitioning, Density Based, DBSCAN, Distribution Model-Based, Hierarchical, Agglomerative and Divisive, Common Distance Measures, K-Means Clustering Algorithms, Case Study on Clustering for solving real world problems.

Centre for Artificial Intelligence

RECOMMENDED BOOKS:

- Artificial Intelligence: A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.
- Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
- Introduction to AI & Expert System: Dan W. Patterson, PHI.
- Pattern Recognition and Machine Learning, Christopher M. Bishop
- Introduction to Machine Learning using Python: Sarah Guido
- Machine Learning in Action: Peter Harrington

COURSE OUTCOMES

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

CO1. describe the fundamentals of Artificial Intelligence & Machine Learning.

CO2: design heuristics driven search solutions for real-world problems.

CO3. identify types of machine learning problems.

CO4. analyze Artificial Intelligence (AI) and machine learning (ML) algorithms.

CO5. design AI enabled intelligent systems for solving real world problems.

CO6. evaluate the performance of AI and ML techniques.

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DATA MINING & WAREHOUSING (270601/ 280601)

COURSE OBJECTIVES

- To understand the significance of data mining in a real-world perspective. and gain the understanding of data mining techniques, algorithms and commonly used tools.
- To develop the ability for applying data mining techniques and tools for solving real-world problems.

Unit I

Introduction: Motivation, importance, Data types for Data Mining: Relational Databases, Data Ware-Houses. Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities, Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis, Classification of Data Mining Systems, Major Issues in Data Mining.

Unit II

Data Pre-processing: Data Cleaning, Data Integration and Transformation and Data Reduction. Discretization and Concept Hierarchy Generation. Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical, Characterization. Data Warehouse and OLTP Technology for Data Mining: Differences between Operational Database Systems & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology

Unit III

Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, other Algorithms & their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining.

Unit IV

Classification & Prediction and Cluster Analysis: Issues Regarding Classification & Prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, Currently Available Tools.

Unit V

Introduction to data warehousing, need and significance, challenges & issues in warehousing, difference between data mining & warehousing, case studies- stock market, super market etc. , implementation of current applications involving data mining.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.
- Data Warehousing in the Real World, Sam Anahory, Pearson Publication.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1: explain basics of data mining and data warehousing.

CO2: classify database systems and data models / schemas of data warehouses.

CO3: compare methods for storing & retrieving data from different data sources/repositories.

CO4: apply data mining techniques for knowledge extraction from large amount of data.

CO5: predict trends to make informed decisions.

CO6: develop real world applications using data mining techniques.

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DEEP LEARNING (270603/ 280603)

COURSE OBJECTIVES

- To understand the theoretical foundations, algorithms and methodologies of Neural Network
- To design and develop an application using specific deep learning models
- To provide practical knowledge in handling and analyzing real world applications.

Unit I

Machine Learning Basics: Learning algorithms, Maximum likelihood estimation, Building machine learning algorithm, Neural Networks Multilayer Perceptron, Back-propagation algorithm and its variants Stochastic gradient descent, Curse of Dimensionality

Unit II

Deep Learning Architectures: Machine Learning and Deep Learning, Representation Learning, Width and Depth of Neural Networks, Activation Functions: RELU, LRELU, ERELU, Unsupervised Training of Neural Networks, Restricted Boltzmann Machines, Auto Encoders, Deep Learning Applications

Unit III

Convolutional Neural Networks: Architectural Overview, Motivation, Layers, Filters, Parameter sharing, Regularization, Popular CNN Architectures: ResNet, AlexNet – Applications; Transfer learning Techniques, Variants of CNN: DenseNet, PixelNet.

Unit IV

Sequence Modeling – Recurrent and Recursive NETS: Recurrent Neural Networks, Bidirectional RNNs, Encoder-decoder sequence to sequence architectures - BPTT for training RNN, Long Short Term Memory Networks.

Unit V

Auto Encoders: Under complete Auto encoder, Regularized Autoencoder, stochastic Encoders and Decoders, Contractive Encoders; DEEP GENERATIVE MODELS: Deep Belief networks, Boltzmann Machines, Deep Boltzmann Machine, Generative Adversarial Networks.

RECOMMENDED BOOKS

- Ian Goodfellow, YoshuaBengio and Aaron Courville, " Deep Learning", MIT Press, 2017
- Josh Patterson, Adam Gibson, Deep Learning: A Practitioner's Approach, O'Reilly Media, 2017
- Umberto Michelucci "Applied Deep Learning. A Case-based Approach to Understanding Deep
- Neural Networks" A press, 2018.
- Giancarlo Zaccone, Md. Rezaul Karim, Ahmed Menshawy, Deep Learning with TensorFlow:
- Explore neural networks with Python, Packt Publisher, 2017
- Antonio Gulli, Sujit Pal Deep Learning with Keras Packt Publishers, 2017.
- Francois Chollet, Deep Learning with Python, Manning Publications, 2017.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1: recall the concepts of neural networks, activation functions and optimization algorithms.

CO2: explain the principles of backpropagation and gradient descent.

CO3: select an appropriate deep learning model for problem solving.

CO4: evaluate the performance of deep learning models.

CO5: compare the applicability of deep learning architectures across the problem domain.

CO6: develop novel deep learning architectures for specific applications.

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ANNEXURE-IV

Syllabi

of

Open Category Courses (OC)

B. Tech VI Semester

[for the students of other department]

for batch admitted in 2021-22

(under the flexible curriculum)

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INFORMATION SECURITY

COURSE OBJECTIVES

- To provide conceptual understanding of Information security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.

Unit-I

Security: Principles and Attacks, Basic Number Theory, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Steam Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: RC4, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit-III

Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). Authentication: Requirements, Functions, Kerberos, Message Authentication Codes, Digital Signatures, Digital Certificates.

Unit -IV

IP Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). IDS (Intrusion detection system), Firewalls: Types, Functionality and Polices.

Unit -V

Phishing: Attacks and its Types, Buffer Overflow Attack, Session Hijacking, Hacker: Hacking and Types of Hackers, FootPrinting, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing Detection Prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prosise, Tata McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1: determine symmetric and public key cryptography, classical algorithms, and basic number theory.

CO2: explain the working of various cryptographic algorithms.

CO3. apply firewall, IDS, and security protocols like SSL, TLS, and SET.

CO4: build secure systems using digital signatures, message authentication, and certificates.

CO5: examine the strengths and weaknesses of IP and web security.

CO6: select strategies for detecting and preventing attacks like sniffing, spoofing, and hacking.

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DATA MINING & WAREHOUSING

COURSE OBJECTIVES

- To understand the significance of data mining in a real-world perspective. and gain the understanding of data mining techniques, algorithms and commonly used tools.
- To develop the ability for applying data mining techniques and tools for solving real-world problems.

Unit I

Introduction: Motivation, importance, Data types for Data Mining: Relational Databases, Data Ware-Houses. Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities, Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis, Classification of Data Mining Systems, Major Issues in Data Mining.

Unit II

Data Pre-processing: Data Cleaning, Data Integration and Transformation and Data Reduction. Discretization and Concept Hierarchy Generation. Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical, Characterization. Data Warehouse and OLTP Technology for Data Mining: Differences between Operational Database Systems & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology

Unit III

Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, other Algorithms & their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining.

Unit IV

Classification & Prediction and Cluster Analysis: Issues Regarding Classification & Prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, Currently Available Tools.

Unit V

Introduction to data warehousing, need and significance, challenges & issues in warehousing, difference between data mining & warehousing, case studies- stock market, super market etc. , implementation of current applications involving data mining.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.
- Data Warehousing in the Real World, Sam Anahory, Pearson Publication.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1: explain basics of data mining and data warehousing.

CO2: classify database systems and data models / schemas of data warehouses.

CO3: compare methods for storing & retrieving data from different data sources/repositories.

CO4: apply data mining techniques for knowledge extraction from large amount of data.

CO5: predict trends to make informed decisions.

CO6: develop real world applications using data mining techniques.

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ANNEXURE-V

Experiment list/ Lab manual/ Skill Based Mini-Project List

of

Laboratory Courses offered

for

B. Tech VI Semester

[Information Technology (Artificial Intelligence and Robotics)/ Artificial Intelligence (AI) and Data Science/ Artificial Intelligence (AI) and Machine Learning]

for batch admitted in 2021-22

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IMAGE PROCESSING (240602/ 270602/ 280602)

LIST OF PROGRAMS

1. Study of Image Processing:
    a. Image Acquisition
    b. Image Enhancement
    c. Color image Processing
    d. Image resizing
2. Write a program for Image resampling.
3. Write a program for color detection.
4. Write a program for image Segmentation.
5. Write a program for object Detection.
6. Write a program for hand Gesture Recognition.
7. Write a program for object Tracking.
8. Image enhancement and spatial operation- Convolution, correlation, linear filtering,edge detection.
9. Implement i) Edge Detection, ii) Line Detection.
10. Implement Smoothing and Sharpening of an eight bit color image.

COURSE OUTCOMES

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

CO1: develop the ability to write programs for color detection.

CO2: analyze color information in digital images.

CO3: apply image segmentation techniques to partition images into meaningful regions.

CO4: demonstrate competence in writing a program for object detection.

CO5: integrate image processing techniques to interpret and respond to hand gestures.

CO6: track movement of objects in a sequence of images.

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SKILL BASED MICRO PROJECTS

1. Write a program to implement linear point operation and clipping,
2. Write a program to implement thresholding and negation
3. Write a program to implement non-linear mapping and intensity slicing,
4. Write a program to implement image histogram and histogram equalization
5. Write a program to implement data compression

SKILL BASED MACRO PROJECTS

1. Write a program to Implement Smoothing and Sharpening of an eight bit color image
2. Write a program to Implement Low Pass Filter
3. Write a program to Implement High Pass Filter
4. Write a program to Implement Arithmetic Mean Filter
5. Write a program to Implement Geometric Mean Filter

SKILL BASED MINI PROJECTS

1. Color image processing - color models, color enhancement, color thresholding.
2. Frequency domain operations- fourier transform, freq domain filtering
3. Implement the spatial image enhancement functions on a bitmap image –Mirrorin (Inversion)
4. Implement the spatial image enhancement functions on a bitmap image –Rotation (Clockwise)
5. Implement the spatial image enhancement functions on a bitmap image –Enlargement (Double Size)

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ARTIFICIAL INTELLIGENCE & MACHINE LEARNING (240603)

LIST OF PROGRAMS

1. Study of PROLOG programming language and its functions.
2. Write simple fact for the statements using PROLOG
3. WAP to implement factorial, Fibonacci of a given number using PROLOG.
4. Write a program to solve the 4-Queen problem using PROLOG and Python both.
5. Explore numpy, Pandas, SciPy, Matplotlib and Scikit Learn libraries in Python
6. Study and implement various Dimensionality reduction, Feature selection and Normalization techniques in Python
7. Implement Linear Regression model in Python.
8. Implement Logistic Regression model in Python.
9. Implement decision tree Classification Model using C4.5 and CSRT algorithms in Python.
10. Implement K-means clustering technique.
11. Implement Fuzzy C-means clustering technique.
12. Study various performance parameters used for evaluating the performance of various regression, classification and clustering models.

COURSE OUTCOMES

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

CO1: apply concepts of PROLOG programming.

CO2: implement ML models in Python using machine learning libraries such as Scikit-Learn.

CO3: build k-means and hierarchical clustering model.

CO4: use the functions of NLTK and spaCy Python libraries for text classification and sentiment analysis.

CO5: perform feature engineering and optimize machine learning models.

CO6: apply AI and ML techniques to solve real world problems.

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ARTIFICIAL INTELLIGENCE & MACHINE LEARNING (240603)

SKILL BASED MINI PROJECTS

1. Design and implement Handwritten Digits Recognition system.
2. Design and implement a Spam classification system using Machine Learning algorithm.
3. Design and implement a Music Recommendation App.
4. Design and implement heart disease prediction using different classification algorithms and analyze the best over the dataset.
5. Design and implementation of Animal Kingdom Classification using CNN with the help of available libraries in python.
6. Apply the classification algorithms over the time series dataset by transforming the dataset into static values.
7. With the help of random forest classifier, classify any suitable dataset available over the trusted repository.
8. Design a program for Number Guessing using a random number generator library. Make a play game with the defined library.

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DATA MINING & WAREHOUSING (270601/ 280601)

List of Programs

1. To perform basic operations for mining data (Preprocessing, Regression, Classification, Association, Clustering and Visualization) using WEKA simulator/Python.
2. Setting up a flow to load an ARFF file (batch mode) and perform a cross validation using J48 (WEKA's C4.5 implementation).
3. Draw multiple ROC curves in the same plot window for J48 and RandomForest as classifiers using Knowledge flow in weka.
4. Training and Testing of naive Bayes classifiers incrementally using Knowledge flow in weka.
5. Write a program to count the occurrence frequency of items in the given data set.
6. Write a program to generate frequent itemset from a given data set.
7. Write a program to generate Association rules from the generated frequent itemsets.
8. Write a program to implement various Association Rule Mining algorithms such as Apriori, Eclat, FP growth and FP Tree.
9. Write a program to implement different type of classification algorithms such as SVM,
10. Write a program to implement different types of clustering algorithms such as Kmean, Hierarchical, DBScan and EM Clustering.

Course Outcomes of Lab:

After completion of the course students will be able to:

CO1: perform the basic data mining operations.

CO2: demonstrate the working mechanisms of data mining platforms.

CO3: execute multiple classification algorithms effectively.

CO4: compare association rules and their effects on corresponding datasets.

CO5: evaluate the working of existing machine learning algorithms using different datasets.

CO6: solve real world problems using data mining techniques.

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DATA MINING & WAREHOUSING (270601/ 280601)

List of Skill based Mini Projects

List of Micro Projects:

1. Design a system that predicts which patterns of products are likely to be purchased more in a subset of products.
2. Design a spam filtering system for emails.
3. Develop an E-commerce website of your choice.
4. Develop a system to determine users' sentiments from their tweets.
5. Develop a house price prediction system.

List of Macro Projects:

1. Design a system that extracts users' feeds from facebook and determines their moods based on it.
2. Design a system to preprocess the upcoming data from user feeds and classify them as per need.
3. Design a system to perform sales analysis of the data collected from Gwalior Trade Fair.
4. Design a system to identify patterns in supermarket dataset in terms of nature of sale.
5. Develop a system to perform categorization of sales dataset as least and most purchased sets.

List of Mini Projects:

1. Design an application for real estate industries to predict the house prices.
2. Design an application for detecting Phishing websites using data mining techniques.
3. Develop an Intelligent Transport System using data mining techniques.
4. Design a Credit Card Fraud Detection System.
5. Opinion Mining for Social Networking Site.
6. Design a Weather forecasting system using Data mining technique.
7. Develop a Stock Market Analysis and Prediction system.
8. Design an online book recommendation system using Collaborative filtering.
9. Develop a customer behavior prediction system using web usage mining.
10. Design a secure E Learning system using Data Mining Techniques.

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DEEP LEARNING (270603/ 280603)

List of Programs

1. Train a Deep learning model to classify a given image using pre trained model
2. Object detection using Convolution Neural Network
3. Recommendation system from sales data using Deep Learning
4. Improve the Deep learning model by tuning hyper parameters
5. Perform Sentiment Analysis in network graph using RNN
6. Image generation using GAN
7. Develop a model by using AUTO ENCODERS.
8. Implement an LSTM based Autoencoder in TensorFlow/Keras.
9. Perform Sentiment Analysis using RNN
10. Using a pre-trained model on Keras for Transfer Learning.

Course Outcomes of Lab:

After completion of the course students will be able to:

CO1: recognize the characteristics of deep learning models that are useful to solve real-world problems

CO2: design Convolution Neural Network for solving various problems pertaining to image processing.

CO3: apply multiple deep learning model variants for suitable applications.

CO4: examine the working mechanism of different deep learning algorithms.

CO5: assess the key computational techniques underlying deep learning models.

CO6: develop autoencoders and generative models for suitable applications.

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DEEP LEARNING (270603/ 280603)

List of Skill based Mini Projects

List of Micro Projects:

1. Implement a regression model in Keras.
2. Explain existing and emerging deep learning architectures for text and speech processing.
3. Hyper-Parameter Tuning in Multilayer Perceptron
4. Deep learning Packages Basics: Tensorflow, Keras, Theano and PyTorch
5. Classification of MNIST Dataset using CNN
6. Parameter Tuning in CNN
7. Implement a perceptron in TensorFlow/Keras Environment.

List of Macro Projects:

1. Implement simple vector addition in TensorFlow.
2. Implement an Image Classifier using CNN in TensorFlow/Keras.
3. Face recognition using CNN
4. Object detection using Transfer Learning of CNN architectures
5. Recommendation system using Deep Learning
6. Dimensionality Reduction using Deep learning
7. Language Modeling using RNN

List of Mini Projects:

1. Classification with Multilayer Perceptron using Scikit-learn (MNIST Dataset)
2. Time Series Prediction using RNN
3. Sentiment Analysis using LSTM
4. Image generation using GAN
5. Deep Learning using H2O
6. Deep Learning using DL4J
7. Use deep learning to solve real-life problem
8. Predictive analysis using H2O tool
9. Using a pre trained model on Keras for Transfer Learning
10. Recommendation system from sales data using Deep Learning.