

LABORATORY MANUAL

**for**

### AD8711 : DEEP LEARNING LABORATORY

**of**

**B.Tech Artificial Intelligence And Data Science**

**(Anna University Regulation 2017)**

For the Batch (2020 to 2024)

**Semester:VII Academic Year:2023-2024**

**DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE**

**KCG COLLEGE OF TECHNOLOGY,**

**CHENNAI – 600 097**



**KARAPAKKAM, CHENNAI 600 097**

**REG. No. …………………………….**

# LABORATORY RECORD

Course Code: ………………….

Name of the Course:…………………………………………………………..

It is to certify that this is a bonafide record of the work carried out by

…………………………………………………………………………………………………………………………of………………….semester………………………………………department, during the odd semester of the academic year 2023-2024.

Faculty In-charge: ……………………………………

HOD…………………………………………….

Int. Examiner: ……………………………Ext. Examiner ………………………………..

Date of the Examination: ……………………

**VISION OF THE COLLEGE**

KCG College of Technology aspires to become a globally recognized centre of excellence for science, technology & engineering education, committed to quality teaching, learning, and research while ensuring for every student a unique educational experience which will promote leadership, job creation, social commitment and service to nation building

**MISSION OF THE COLLEGE**

* Disseminate knowledge in a rigorous and intellectually stimulating environment
* Facilitate socially responsive research, innovation and entrepreneurship
* Foster holistic development and professional competency
* Nurture the virtue of service and an ethical value system in the young minds

**VISION OF THE DEPARTMENT**

The Department of Artificial Intelligence and Data Science desires to become a: prominent Centre of Excellence for producing competent Data Architect for providing quality education by using the latest tools.

**MISSION OF THE DEPARTMENT**

* Provide quality education in the field of Artificial Intelligence and Data Science related domains.
* Facilitate Skill based value added education.
* Inculcate professional performance, an essence of entrepreneurship and promise to the growth of the country.
* Providing varying software development tools and required implementation facilities.

### PROGRAMME EDUCATIONAL OBJECTIVES

The graduates of B.TECH/ AI&DS will

|  |  |
| --- | --- |
| **PEO 1** | To provide graduates with the proficiency to utilize the fundamental knowledge of basic sciences, mathematics, Artificial Intelligence, data science and statistics to build systems that require management and analysis of large volume of data. |
| **PEO 2** | To enrich graduates with necessary technical skills to pursue pioneering research in the field of AI and Data Science and create disruptive and sustainable solutions for the welfare of ecosystems.. |
| **PEO 3** | To enable graduates to think logically, pursue lifelong learning and collaborate with an ethical attitude in a multidisciplinary team. |

|  |  |
| --- | --- |
| **PSO No.** | **Description of PSO** |
| PSO 1 | Graduates should be able to evolve AI based efficient domain specific processes for effective decision making in several domains such as business and governance domains.  . |
| PSO 2 | Graduates should be able to arrive at actionable Fore sight, Insight , hind sight from data for solving business and engineering problems |
| PSO 3 | Graduates should be able to create, select and apply the theoretical knowledge of AI and Data Analytics along with practical industrial tools and techniques to manage and solve wicked societal problems |

### PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

After successful completion of B.TECH (Artificial Intelligence and Data Science) Programme, the students will be able to:

|  |  |
| --- | --- |
| **PO No.** | **Description of the PO** |
| **PO 1** | **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| **PO 2** | **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| **PO 3** | **Design / Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| **PO 4** | **Conduct Investigations of Complex Problems:** Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| **PO 5** | **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| **PO 6** | **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |
| **PO 7** | **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| **PO 8** | **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| **PO 9** | **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| **PO 10** | **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| **PO 11** | **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| **PO 12** | **Lifelong Learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change. |

**COURSE OUTCOMES**

**Upon completion of this course, the student will be able to:**

|  |  |  |
| --- | --- | --- |
| **CO No** | **Description of the Course Outcome** | **Blooms level** |
| **CO 1** | Apply deep neural network for simple problems | K3 |
| **CO 2** | Apply Convolution Neural Network for image processing | K3 |
| **CO 3** | Apply Recurrent Neural Network and its variants for text analysis | K3 |
| **CO 4** | Apply generative models for data augmentation | K3 |
| **CO 5** | Develop a real world application using suitable deep neural networks | K3 |
| **CO 6** | Apply Natural Language Processing for speech recognition | K3 |

**AD8711 : DEEP LEARNING LABORATORY**

**INDEX**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Expt.  No. | Name of the Experiment | Page  No | Date | Signature |
| 1 | Solving XOR problem using Multilayer perceptron |  |  |  |
| 2 | Implement character and Digit Recognition using ANN |  |  |  |
| 3 | Implement the analysis of X-ray image using autoencoders |  |  |  |
| 4 | Implement Speech Recognition using NLP |  |  |  |
| 5 | Develop a code to design object detection and classification for traffic analysis using CNN |  |  |  |
| 6 | Implement online fraud detection of share market data using any one of the data analytics tools. |  |  |  |
| 7 | Implement image augmentation using deep RBM |  |  |  |
| 8 | Implement Sentiment Analysis using LSTM |  |  |  |
| 9 | Mini Project: Number plate recognition of traffic video analysis. |  |  |  |

**EX NO 1**

**DATE:**

**SOLVING XOR PROBLEM USING MULTILAYER PERCEPTRON**

**AIM**

To implement and Solve XOR problem using Multilayer perceptron.

**ALGORITHM:**

1. If the node has unvisited child nodes, get the unvisited child node, mark it
2. as traversed and push it on stack
3. If the node has unvisited child nodes, get the unvisited child node, mark it
4. as traversed and push it on stack
5. Define the input data.
6. Define output coding for XOR problem.
7. Prepare inputs & outputs for network training.
8. Create and train a multilayer perceptron.
9. Plot targets and network response to see how good the network learns the data.

**PROGRAM**

**OUTPUT:**

**RESULT**

**REVIEW QUESTIONS**

**1.What is XOR problem?**

**2. What is the Difference between supervised and unsupervised learning?**

**3. Name any two applications in ANN.**

4. **What are the layers in ANN?**

**EX NO 2**

**DATE:**

**IMPLEMENT CHARACTER AND DIGIT RECOGNITION USING ANN**

**AIM:**

To write and implement character and Digit Recognition using ANN

**ALGORITHM:**

* + 1. Define the network with layers.
    2. Load the input data and extract features and label.
    3. Split the data into training and testing examples
    4. Perform operations with feedforward and backpropagation

**PROGRAM:**

**OUTPUT**

**RESULT:**

**REVIEW QUESTIONS**

**1. What is feedforward network?**

**2. What are the advantages of ANN?**

**3. What are the limitations in feedforward and backpropagation?**

4. **What is backpropagation?**

**EX NO 3**

**DATE:**

**IMPLEMENT THE ANALYSIS OF X-RAY IMAGE USING AUTOENCODERS**

**AIM:**

To write a python program to implement decision problems for various real-world applications.

**ALGORITHM:**

1. Load and preprocess the images.

2. Defining Function to plot the images

3. Display Normal Images in Train Set

4. Display Noisy Images

5. Display a singel image after denoising using autoencoder

**PROGRAM:**

**OUTPUT**

**RESULT:**

**REVIEW QUESTIONS**

1. **Define autoencoders.**
2. **What is sampling in an image?**

**3. Write the steps involved in image segmentation.**

**4. Give any four real time applications with ANN.**

**EX NO 4**

**DATE: IMPLEMENT SPEECH RECOGNITION USING NLP**

**AIM:**

To write a program and Implement Speech Recognition using NLP

* 1. **ALGORITHM:**

1. Install a Speech Recognition Package
2. Speech recognition from the microphone.
3. create a program that takes in the audio as input and converts it to text.
4. create a function that takes in the audio as input and converts it to text.
5. Convert audio input to text

**PROGRAM:**

**OUTPUT**

**RESULT**

**REVIEW QUESTIONS**

**1.What is NLP?**

**2.What are the methods available to implement NLP?**

**3. Define autoencoders.**

**4. How does speech recognition work?**

**EX NO 5**

**DATE:**

**DEVELOP A CODE TO DESIGN OBJECT DETECTION AND CLASSIFICATION FOR TRAFFIC ANALYSIS USING CNN**

**AIM :**

To develop a code to design object detection and classification for traffic analysis using CNN

**ALGORITHM :**

1. Load and Extract the Dataset

2. Import the Libraries

3. Visualize images from dataset

4. Prepare data for training

5. Perform model evaluation.

**PROGRAM**

**OUTPUT**

**RESULT**

**REVIEW QUESTIONS**

1. **What is CNN?**
2. **Give applications of CNN.**
3. **What is tensorflow?**
4. **What are the metrics for evaluating model?**

**EX NO 6**

**DATE:**

**IMPLEMENT ONLINE FRAUD DETECTION OF SHARE MARKET DATA USING ANY ONE OF THE DATA ANALYTICS TOOLS.**

**AIM :**

To implement online fraud detection of share market data using any one of the data analytics tools.

**ALGORITHM :**

1. Identify fraud risk factors.
2. Identify areas susceptible to fraud schemes.
3. Understand relevant data sources.
4. Mix, match, and analyze the data.
5. Share insights and schedule alerts

**PROGRAM**

**OUTPUT**

**RESULT**

**REVIEW QUESTIONS**

1. **Define data analytics.**
2. **Write the applications involve with data analytics tools.**
3. **What are the steps in data analytics?**
4. **What are the different tools in data analytics?**

**EX NO 7**

**DATE: IMPLEMENT IMAGE AUGMENTATION USING DEEP RBM**

**AIM:**

To Implement image augmentation using deep RBM

* 1. **ALGORITHM:**

1. Prepare dataset of images for training.

2. The deep RBM is trained using a learning algorithm.

3. Once the deep RBM is trained, generate new images by sampling.

4. To augment images, sample from the deep RBM and apply transformations like rotation, translation, scaling, flipping, etc.,

5. Generate images to create variations of the original images.

**PROGRAM**

**OUTPUT**

**RESULT**

**REVIEW QUESTIONS**

1. **What is RBM?**
2. **What is Image augmentation?**
3. **What are the layers in CNN?**

**4. What are the different types of image transformations ?**

**EX NO 8**

**DATE: IMPLEMENT SENTIMENT ANALYSIS USING LSTM**

**AIM:**

To write a program to implement Sentiment Analysis using LSTM.

**ALGORITHM:**

1. Load in and visualize the data

2. Perform data processing

3. Perform tokenize and Analyze Reviews Length

4. Remove Outliers for Getting rid of extremely long or short reviews

5. Do Training, Validation, Test Dataset Split

6. Train the network and perform test on data.

**PROGRAM**

**OUTPUT**

**RESULT**

**REVIEW QUESTIONS**

**1. What is sentiment analysis?**

**2. Define LSTM.**

**3. Write the different types of learning in ML.**

**4. Differentiate between training and testing data.**

**EX NO 9**

**DATE:**

**MINI PROJECT: NUMBER PLATE RECOGNITION OF TRAFFIC VIDEO ANALYSIS**

**AIM:**

To write a program to implement Number plate recognition of traffic video analysis.

**ALGORITHM:**

**PROGRAM:**

**OUTPUT**

**RESULT**