

AIL 411	DEEP LEARNING LAB	CATEGORY	L	T	P	CREDIT
		PCC	0	0	3	2

Preamble: This course aims to offer students hands-on experience on deep learning algorithms. Students will be able to familiarize basic python packages for deep learning, computer vision concepts for deep learning, sequence modelling and recurrent neural network. This course helps the learners to enhance the capability to design and implement a deep learning architecture for a real time application.

Prerequisite: A sound knowledge in python programming, machine learning concepts, deep learning algorithms.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Implement advanced machine learning concepts using python. (Cognitive Knowledge Level: Apply)
CO 2	Apply basic data pre-processing and tuning techniques. (Cognitive Knowledge Level: Apply)
CO 3	Experiment behaviour of neural networks and CNN on datasets. (Cognitive Knowledge Level: Analyse)
CO 4	Design and Implement sequence modelling schemes.(Cognitive Knowledge Level: Apply)
CO 5	Implement auto encoders on standard datasets and analyse the performance. (Cognitive Knowledge Level: Apply)

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1												
CO 2												
CO 3												
CO 4												
CO 5												

Assessment Pattern

Bloom's Category	Continuous Assessment Test %	End Semester Examination %
Remember		
Understand	20	20
Apply	80	80

Analyze		
Evaluate		
Create		

Mark distribution

Total Marks	CIE	ESE	ESE Duration
150	75	75	3 hours

Continuous Internal Evaluation Pattern:

Attendance : 15 marks
 Continuous Evaluation in Lab : 30 marks
 Continuous Assessment Test : 15 marks
 Viva-voce : 15 marks

Internal Examination Pattern: The marks will be distributed as Algorithm 30 marks, Program 20 marks, Output 20 marks and Viva 30 marks. Total 100 marks which will be converted out of 15 while calculating Internal Evaluation marks.

End Semester Examination Pattern: The marks will be distributed as Algorithm 30 marks, Program 20 marks, Output 20 marks and Viva 30 marks. Total 100 marks will be converted out of 75 for End Semester Examination.

Operating System to Use in Lab :Linux/Windows

Programming Language/Software to Use in Lab :matlab or python

Fair Lab Record:

All Students attending the Deep Learning Lab should have a Fair Record. The fair record should be produced in the University Lab Examination. Every experiment conducted in the lab should be noted in the fair record. For every experiment in the fair record the right hand page should contain Experiment Heading, Experiment Number, Date of Experiment, Aim of Experiment, Details of Experiment including algorithm and Result of Experiment. The left hand page should contain a print out of the code used for the experiment and sample output obtained for a set of input.

SYLLABUS

Familiarize python frameworks for deep learning, Data Preprocessing, Supervised Unsupervised Learning, Design and Implementation of Simple Neural Networks, Back Propagation, Regularization, Dropout, Build and analyze deep learning architectures like CNN, RNN, LSTM, GRU, Autoencoders.

LIST OF PRACTICE QUESTIONS

****mandatory**

1. Familiarize basic python packages for deep learning such as Keras, Tensorflow etc.
2. Data pre-processing operations such as outliers and/or inconsistent data value management. **
3. Implement Feed forward neural network with three hidden layers for classification on CIFAR-10 dataset.**
4. Analyse the impact of optimization and weight initialization techniques such as Xavier initialization, Kaiming Initialization, dropout and regularization techniques and visualize the change in performance. **
5. Digit classification using CNN architecture for MNIST dataset. **
6. Digit classification using pre-trained networks like VGGnet-19 for MNIST dataset and analyse and visualize performance improvement.**
7. Implement a simple RNN for review classification using IMDB dataset.**
8. Analyse and visualize the performance change while using LSTM and GRU instead of simple RNN.**
9. Implement time series forecasting prediction for NIFTY-50 dataset. **
10. Implement a shallow auto encoder and decoder network for machine translation (by using Kaggle English to Hindi neural translation dataset). **

Note: Any suitable dataset and deep learning specific packages can be used. Number of epochs can be reduced to complete the training in the prescribed 3 hour lab sessions.

Reference Books

1. Deep Learning with Python, by François Chollet, Manning, 2021
2. Goodfellow, I., Bengio, Y., and Courville, A., Deep Learning, MIT Press, 2016.
3. Neural Networks and Deep Learning, Aggarwal, Charu C., c Springer International Publishing AG, part of Springer Nature 2018