DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE
(AUTONOMOUS)
Approved by AICTE & Affiliated to Anna University, Chennai
Re-Accredited with 'A' Grade by NAAC, Accredited by TCS
Accredited by NBA(AERO, CSE, IT & MECH)
Re-Accredited by NBA(BME, ECE & EEE)
PERAMBALUR – 621 212, Tamil Nadu

LABORATORY COURSE PLAN

COURSE – INFORMATION:

LAB COURSE TITLE	**DEEP LEARNING LABORATORY**			
LAB COURSE CODE	**P23CSP22**			
LAB COURSE STRUCTURE	**LECTURE**	**TUTORIAL**	**PRACTICAL**	**CREDIT**
	0	0	4	2
REGULATION	**BRANCH**	**YEAR**	**SEMESTER**	**ACADEMIC YEAR**
2023	CSE	I	I	2023-2024
COURSE INCHARGE				

SYLLABUS

COURSE OBJECTIVE:

The student should be made to:

1. Implement the various deep learning algorithms in Python
2. Learn to work with different deep learning frameworks like Keras, Tensor flow, PyTorch, Caffe etc

LIST OF EXPERIMENTS

1. Basic image processing operations: Histogram equalization, thresholding, edge detection, data augmentation, morphological operations

2. Implement SVM/Softmax classifier for CIFAR-10 dataset: (i) using KNN, (ii) using

3-layer neural network 3. Study the effect of batch normalization and dropout in neural network classifier

4. Familiarization of image labelling tools for object detection, segmentation

5. Image segmentation using Mask RCNN, UNet, SegNet

6. Object detection with single-stage and two-stage detectors (Yolo, SSD, FRCNN, etc.)

7. Image Captioning with Vanilla RNNs

8. Image Captioning with LSTMs

9. Network Visualization: Saliency maps, Class Visualization

10. Generative Adversarial Networks

11. Chabot using bi-directional LSTMs

12. Familiarization of cloud based computing like Google colab

TOTAL: 60 PERIODS

TEXT/REFERENCE BOOKS:

1. **Ian Goodfellow, Yoshua Bengio, Aaron Courville** – Deep Learning – **2016**
2. **Rafael C. Gonzalez, Richard E. Woods** – Digital Image Processing – **2018 (4th Edition)**
3. **Richard Szeliski** – Computer Vision: Algorithms and Applications – **2022 (2nd Edition)**
4. **Adrian Rosebrock** – Deep Learning for Computer Vision with Python – **2017**

HARDWARE& SOFTWARE:

- Standalone desktops
- Windows 10/11, Ubuntu (preferred for deep learning), macOS
- Python 3.8 – 3.11

VIRTUAL LAB LINK:

https://www.vlab.co.in/
https://onlinecourses.nptel.ac.in/noc24_cs89/preview
https://vlab.dev.nptel.ac.in
https://www.vlab.co.in/ba-nptel-labs-computer-science-and-engineering
https://github.com/DL4CV-NPTEL/Deep-Learning-For-Computer-Vision https://colab.research.google.com/

EXP. NO.	NAME OF THE EXPERIMENTS	NO. OF PERIODS	CUMULATIVE PERIODS
	CYCLE I		
1	Basic image processing operations : Histogram equalization, thresholding, edge detection, data augmentation,	8	8
2	Implement SVM/Softmax classifier for CIFAR-10 dataset: (i) using KNN, (ii) using 3 layer neural network ,	4	12
3	Study the effect of batch normalization and dropout in neural network classifier	8	20

4	Familiarization of image labelling tools for object detection, segmentation	4	24
5	Image segmentation using Mask RCNN, UNet, SegNet	4	28
6	Object detection with single-stage and two-stage detectors (Yolo, SSD, FRCNN, etc.)	8	36
7	Image Captioning with Vanilla RNNs	4	40
8	Image Captioning with LSTMs	8	48
9	Network Visualization: Saliency maps, Class Visualization	4	52
10	Generative Adversarial Networks and LSTM	8	60

COURSE OUTCOMES:

On the completion of the course, the students will be able to

CO1: Effectively use the various machine learning tools.

CO2: Can develop knowledge in solving real world problems using state-of-art deep learning techniques

CO3: Apply various pre-processing techniques on different datasets

CO4: Develop Deep learning programs for Supervised & Unsupervised learning models.

CO5: Analyze the graphical outcomes of learning algorithms with specific datasets

CO6: Design a chatbot using learning algorithms.

CO PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	3	2	2	1	-	-	-	1	2	1	1	2	3
CO 2	2	3	2	2	2	-	-	-	2	2	3	2	3	3
CO 3	2	3	3	2	2	-	-	-	1	2	2	1	3	2
CO 4	2	2	2	3	1	-	-	-	1	1	3	1	3	3
CO 5	2	2	3	2	2	-	-	1	3	2	2	2	3	3
CO 6	2	2	2	3	1	-	-	-	1	1	3	1	3	3
AVG:	**3.00**	**3.00**	**2.33**	**2.16**	**1.66**	**1.50**	**1.66**	**2.00**	**2.50**	**1.66**	**3.00**	**2.50**	**2.83**	**2.83**

ADDITIONAL EXPERIMENTS		
EXP. NO.	**NAME OF THE EXPERIMENTS**	**Identified Resource link**
1	Implement Image Segmentation using UNet	https://pytorch.org/hub/mateuszbuda_
2	Implement GAN for image generation	https://scikit-learn.org/stable/modules/ensemble.html
3	Implement RNN for text generation (SVM) for classification and compare kernels	https://pytorch.org/tutorials/intermediate/char_rnn_classification_tutorial.html

4	Implement LSTM for image captioning	https://github.com/yunjey/pytorch-tutorial/tree/master/tutorials/03-advanced/image_captioning
5	Implement Bi-LSTM chatbot using NLP dataset	https://www.tensorflow.org/text/tutorials/chatbot

MODEL LAB DETAILS

BATCH	REGISTER NO.	MODE OF LAB CONDUCT	DATE	TIMING
1		Offline Mode		

LIST OF QUESTIONS

1. What is digital image processing?
2. What is histogram equalization?
3. Why is histogram equalization used?
4. What is thresholding in image processing?
5. Difference between global and adaptive thresholding?
6. What is edge detection?
7. Name some edge detection operators.
8. What is the difference between Sobel and Canny edge detector?
9. What are morphological operations?
10. What is dilation and erosion?
11. What is opening and closing?
12. What is data augmentation?
13. Why is data augmentation used in deep learning?
14. What is CIFAR-10 dataset?
15. How many classes are present in CIFAR-10?
16. What is KNN classifier?
17. How does KNN work?
18. What is SVM?
19. What is Softmax classifier?
20. Difference between SVM and Softmax?
21. What is loss function?
22. What is cross-entropy loss?
23. What is overfitting?
24. What is a 3-layer neural network?
25. What is activation function?
26. Why ReLU is used?
27. What is batch normalization?
28. Why batch normalization is used?
29. What is internal covariate shift?
30. What is dropout?
31. Why dropout is used?
32. Difference between batch normalization and dropout?
33. What is regularization?
34. What is overfitting in neural networks?

35. How dropout prevents overfitting?
36. What is image segmentation?
37. Types of image segmentation?
38. What is semantic segmentation?
39. What is instance segmentation?
40. What is UNet?
41. What is SegNet?
42. What is Mask RCNN?
43. Difference between Mask RCNN and Faster RCNN?
44. Applications of image segmentation?
45. What is object detection?
46. Difference between classification and detection?
47. What is YOLO?
48. Why YOLO is called single-stage detector?
49. What is SSD?
50. What is Faster RCNN?
51. Difference between single-stage and two-stage detectors?
52. What is bounding box regression?
53. What is mAP?
54. What is anchor box?
55. What is LSTM?
56. Difference between RNN and LSTM?
57. What are LSTM gates?
58. What is forget gate?
59. What is input gate?
60. What is output gate?

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