

SRM VALLIAMMAI ENGINEERING COLLEGE

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK



VI SEMESTER

PAD 105–INTRODUCTION TO DEEP LEARNING

Regulation–2019

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QUESTION BANK

SUBJECT: PAD 105 INTRODUCTION TO DEEP LEARNING

YEAR / SEM : III/VI

UNIT I - DEEP NETWORKS BASICS			
Overview of Deep Learning - Neural Networks Fundamentals - Learning XOR - Gradient Descent Learning - Hidden units - Activation Functions - Training Neural Networks - Backpropagation Algorithm - Differentiation Algorithms - Frameworks for Deep Learning.			
PART A			
Q. No	Questions	BT Level	Competence
1.	Define Deep Learning.	BTL1	Remember
2.	Tabulate the wireless networking standards used in Mobile Computing.	BTL1	Remember
3.	Differentiate Machine Learning and Deep Learning.	BTL2	Understand
4.	List the advantages and disadvantages of Deep Learning.	BTL1	Remember
5.	Point out the different types of neural networks.	BTL4	Analyze
6.	Give the advantages of using neural networks.	BTL2	Understand
7.	What are the limitations of Deep Learning?	BTL1	Remember
8.	List the differences between Deep Learning and Artificial Neural Networks.	BTL1	Remember
9.	Point out the applications of deep learning .	BTL4	Analyze
10.	Define supervised learning algorithms.	BTL1	Remember
11.	Illustrate the Support Vector Machines.	BTL3	Apply
12.	Classify the main variants of gradient Descent.	BTL4	Analyze
13.	Distinguish between perceptron and multilayered perceptron.	BTL2	Understand
14.	Give the characteristics of Neural Networks.	BTL2	Understand
15.	Show the important libraries for Deep Learning.	BTL3	Apply
16.	Classify Artificial Neural Networks and Convolutional Neural Networks.	BTL3	Apply
17.	Compose a role played by activation functions in neural networks.	BTL6	Create
18.	Assess the role of back propagation in convolution neural Networks.	BTL5	Evaluate
19.	Develop five applications of Deep learning .	BTL6	Create
20.	Formulate key steps to develop a neural Network.	BTL5	Evaluate
21.	Give the various features of Neural Networks.	BTL2	Understand

22.	Show the role of Tensor Flow in Deep Learning.	BTL3	Apply
23.	Classify Regularization and Optimization.	BTL4	Analyze
24.	Assess the applications of Tensor Flow.	BTL5	Evaluate
PART – B			
1.	(i) Analyze Supervised and Unsupervised Learning. (8) (ii) Explain in detail about Stochastic Gradient Descent. (7)	BTL4	Analyze
2.	Describe how deep learning is more efficient than machine learning in case of feature extraction. (15)	BTL2	Understand
3.	Analyze Learning XOR and its role in deep learning. (15)	BTL4	Analyze
4.	Describe the architecture of a typical feedforward neural network. What are the roles of input, hidden, and output layers? (15)	BTL3	Apply
5.	Describe the architecture of a typical feedforward neural network. What are the roles of input, hidden, and output layers? (15)	BTL1	Remember
6.	What is the purpose of activation functions in artificial neural networks? Provide examples of commonly used activation functions and explain their characteristics. (15)	BTL1	Remember
7.	Explain the concept of backpropagation and its role in training neural networks. How does it enable adjusting the weights to minimize error? (15)	BTL2	Understand
8.	Discuss the difference between supervised and unsupervised learning in the context of neural networks. Provide examples of tasks suited for each approach. (15)	BTL3	Apply
9.	What is gradient descent, and how is it used in training neural networks? Describe the steps involved in gradient descent optimization. (15)	BTL6	Create
10.	(i) Examine perceptron and its learning algorithm. (8) (ii) Describe the operations of Deep Feed Forward Network with a diagram. (7)	BTL1	Remember
11.	Explain the implementation of Back Propagation algorithm with MLP in detail. (15)	BTL4	Analyze
12.	Discuss: (i) Regularization Techniques. (8) (ii) Autoencoders. (7)	BLT2	Understand
13.	(i) Describe in detail about hidden units. (8) (ii)Identify the role of neural networks in real time. (7)	BTL1	Remember
14.	Summarize the differentiation algorithms. (15)	BTL5	Evaluate
15.	Discuss on frameworks for deep learning. (15)	BTL2	Understand
16.	Examine the difference between backpropagation and differentiation algorithms. (15)	BTL3	Apply
17.	Summarize on the importance of Deep Learning in real time.(15)	BTL5	Evaluate

UNIT II - CONVOLUTIONAL NEURAL NETWORKS

Introduction to Convolutional Neural Networks- Motivation - Convolution operation - Pooling - Variants of the Basic Convolution Function - Structured Outputs - Data types - Convolution algorithms - Common CNN Architectures (LeNet, AlexNet, VGG, ResNet)-

Applications of CNNs in Computer Vision.			
PART – A			
1.	Define Covolutional Neural Networks.	BTL1	Remember
2.	What is meant by Pooling and how it works?	BTL1	Remember
3.	Express transposed and dilated convolution.	BTL2	Understand
4.	What do you know about ‘agent solicitation’?	BTL1	Remember
5.	Predict the merits of Gradient computation.	BTL2	Understand
6.	Differentiate between parameter sharing and padding.	BTL2	Understand
7.	Formulate applications of convolution operation.	BTL6	Create
8.	Show the relevance of RELU layer in activation function in CNN.	BTL3	Apply
9.	“An essential feature of any convolutional network implementation is the ability to implicitly zero-pad the input V”. Define this statement.	BTL1	Remember
10.	Illustrate the various formats of data that can be used with convolution networks.	BTL3	Apply
11.	Give the any example for convolution.	BTL2	Understand
12.	Infer the use of key applications in CNN.	BTL4	Analyze
13.	Compare and contrast complex layer terminology and simple layer terminology in convolutional network.	BTL4	Analyze
14.	Mention the techniques used in a structured output.	BTL6	Create
15.	Assess the concept of parameter sharing.	BTL5	Evaluate
16.	Point out the features of CNNs.	BTL4	Analyze
17.	Assess the advantages of structure output in deep learning.	BTL5	Evaluate
18.	List the sparse interaction and parameter sharing.	BTL1	Remember
19.	Demonstrate the primary motivaton for CNN.	BTL3	Apply
20.	Define congestion avoidance.	BTL1	Remember
21.	Predict the role of Natural Language Processing in deep learning.	BTL2	Understand
22.	Define Computer Vision.	BTL3	Apply
23.	Infer three stages on convolution neural networks.	BTL4	Analyze
24.	Discriminate between Traditional networks and CNN.	BTL5	Evaluate
PART-B			
1.	Examine with a diagram the basic structure and working mechanism of convolutional Neural Networks. (15)	BTL3	Remember
2.	Give the classification of convolution networks. (15)	BTL5	Evaluate
3.	Describe the Convolution operation in Deep learning. (15)	BTL1	Remember
4.	With a neat diagram explain entire mechanism of pooling and how it is relevant in CNN. (15)	BTL1	Remember
5.	Demonstrate the applications of CNN in Computer Vision. (15)	BTL3	Apply
6.	Summarize the variants of Basic Convolution Function. (15)	BTL2	Understand
7.	Explain the concept of NLP with a diagram. (15)	BTL4	Analyze
8.	Examine the motivations for CNN. (15)	BTL3	Apply

9.	Explain briefly about convolution operation in neural Networks. (15)	BTL4	Analyze
10.	Summarize the Structured outputs in CNN. (15)	BTL2	Understand
11.	Create and explain the common architectures of CNN. (15)	BTL6	Create
12.	Write a short notes about overview of convolution networks. (15)	BTL1	Remember
13.	Write a short note about efficient convolution algorithms. (15)	BTL2	Understand
14.	Analyze the concept of NLP with a diagram. (15)	BTL4	Analyze
15.	Discuss about data types used in CNN. (15)	BTL2	Understand
16.	Examine the architecture of convolution and Recurrent networks. (15)	BTL3	Apply
17.	Evaluate the concept of Visual Fixation in CNN with an appropriate diagram. (15)	BTL5	Evaluate

UNIT III - RECURRENT NEURAL NETWORKS

Recurrent Neural Networks - Bidirectional RNN - Encoder-Decoder Sequence to Sequence architecture - Deep Recurrent Networks - Recursive Neural Networks - LSTM - Practical Use- cases (Multi-digit Number Recognition).

PART – A

1.	Define Recurrent Neural Networks.	BTL1	Remember
2.	State the purpose of Backpropagation through Time.	BTL1	Remember
3.	Show the drawbacks of RNN.	BTL3	Apply
4.	Evaluate the purpose of Bidirectional Recurrent Neural Networks.	BTL5	Evaluate
5.	Define core architecture of the Deep Recurrent Attentive Writer (DRAW) for image generation.	BTL1	Remember
6.	Classify RNN with CNN.	BTL3	Apply
7.	Differentiate between RNN and LSTM.	BTL2	Understand
8.	Give the key advantages of Long Short Term Memory (LSTM) networks in comparison to standard RNNs?.	BTL2	Understand
9.	List the differences between Gated Recurrent Unit (GRU) and Long Short Term Memory (LSTM) network.	BTL1	Remember
10.	Discuss purpose of Backpropagation Through Time (BPTT) in training Recurrent Neural Networks (RNNs).	BTL2	Understand
11.	Give the significance of the vocabulary in Natural Language Processing (NLP) tasks.	BTL2	Understand
12.	Analyze the Language models in RNN.	BTL4	Analyze
13.	List the advantages of unfolding process.	BTL1	Remember
14.	Classify four components to an LSTM Network.	BTL4	Analyze
15.	Create different ways to overcome challenges of vanishing and exploding gradient.	BTL6	Create
16.	Discriminate between RNN and CNN.	BTL5	Evaluate
17.	Show the types of sequence to sequence learning.	BTL3	Apply
18.	Point out the reason why RNN is called “recurrent”.	BTL4	Analyze
19.	Generalize echo state Networks of RNN.	BTL6	Create

20.	Define Encoders and Decoders.		BTL1	Remember
21.	Discuss on language models in RNN.		BTL2	Understand
22.	Show the steps in Unified end to end models.		BTL3	Apply
23.	Point out the steps in pipeline approach.		BTL4	Analyze
24.	Assess the Multidigit Number Recognition.		BTL5	Evaluate
PART – B				
1.	Explain in detail about RNN Architecture with diagram. (15)		BTL5	Evaluate
2.	Describe with a diagram how LSTM cell address the vanishing gradient problem.. (15)		BTL1	Remember
3.	Illustrate about encoders and decoders in RNN. (15)		BTL3	Apply
4.	Demonstrate the concept of gated RNN's and why it is used? (15)		BTL3	Apply
5.	Explain in detail about LSTM. (15)		BTL6	Create
6.	Describe the principle of Bi-Directional and explain the principle behind it. (15)		BTL1	Remember
7.	Classify briefly about the RNN with CNN. Analyze how it is important in real life. (15)		BTL4	Analyze
8.	Discuss briefly about sequential modelling. (15)		BTL2	Understand
9.	Describe the language models in RNN. (15)		BTL1	Remember
10.	Summarize briefly about Multidigit Number Recognition. (15)		BTL2	Understand
11.	Explain in detail about Sequence to Sequence Modelling architecture. (15)		BTL1	Remember
12.	Summarize role of BPTT with an example in RNN. (15)		BTL2	Understand



13.	Analyze the concept of unfolding graphs in RNN. Explain how unfolding transforms RNNs into feedforward networks. (15)		BTL4	Analyze
14.	Explain how gradients are computed in RNN using BPTT. Highlight the challenges of vanishing and exploding gradients and their impact on training. (15)		BTL4	Analyze
15.	Summarize on Long term Dependencies in Sequence modelling. (15)		BTL2	Understand
16.	Demonstrate leaky units in RNN. How skip connections and dropouts are incorporated to address issues like vanishing gradients. (15)		BTL3	Apply
17.	Evaluate the different design patterns of RNN: Acceptor, encoder, transducer. (15)		BTL5	Evaluate

UNIT-IV: MODEL EVALUATION

Performance Metrics - Default Baseline methods - Selecting hyper parameters - Debugging strategies - Applications - Large-scale deep learning, Computer vision, Speech recognition, NLP, other applications.

PART – A

1.	Define performance metrics for model evaluation.	BTL1	Remember
2.	Show the reasons for training data can be evaluated.	BTL3	Apply
3.	Summarize the measures of performance needed to satisfy the criteria.	BTL5	Evaluate
4.	Examine the Hyperparameter tuning methods.	BTL3	Apply
5.	What is Classification metrics?	BTL1	Remember
6.	Classify the important debugging tests.	BTL4	Analyze
7.	Develop how each task in machine learning is divided.	BTL6	Create
8.	How will you evaluate Confusion Matrix?	BTL5	Evaluate
9.	Analyze about the term ‘accuracy’ in model evaluation and when to use it.	BTL4	Analyze
10.	Express Recall/Sensitivity.	BTL2	Understand
11.	Distinguish Mean absolute error and Mean Squared error.	BTL2	Understand
12.	List the types of baseline models.	BTL1	Remember
13.	How will you analyze debugging? What are its strategies?	BTL4	Analyze
14.	List the applications in large scale deep learning.	BTL1	Remember
15.	Design a schematic model of computer vision.	BTL6	Create
16.	Interpret about NLP.	BTL2	Understand
17.	Tabulate and tell about the classification, Regression and application specific metrics	BTL1	Remember
18.	Identify the issues encountered while developing speech recognition models.	BTL1	Remember
19.	Interpret the core tasks in NLP.	BTL2	Understand
20.	Show the four key debugging strategies in Debugging.	BTL3	Apply
21.	Interpret the term Tokenization in NLP.	BTL2	Understand
22.	Show the example for key learning areas in Deep learning.	BTL3	Apply
23.	Classify the advantages of using NLP.	BTL4	Analyze
24.	Give the Comparison of NLP and Deep Learning.	BTL5	Evaluate

PART – B

1.	Summarize various performance metrics used for evaluating deep learning models. (15)	BTL2	Understand
2.	Illustrate the importance of baseline models and how they serve as a benchmark in a machine learning application. (15)	BTL3	Apply

3.	Explain the concepts of overfitting and underfitting with examples, and discuss regularization techniques used to mitigate them. (15)	BTL3	Apply
4.	How will you create the different approaches to hyperparameter tuning? (15)	BTL6	Create
5.	Evaluate on various debugging strategies for deep learning models, such as monitoring histograms of activations and gradients, and visualizing the model's performance. (15)	BTL5	Evaluate
6.	Discuss the Bias-Variance trade-off in the context of model evaluation. (15)		
7.	Explain in detail the Grid search with an example. (15)	BTL1	Remember
8.	Describe two basic approaches to choosing hyperparameters in machine learning, and how do they differ? (15)	BTL1	Remember
9.	Explain in detail the Random search. (15)	BTL4	Analyze
10.	Write short notes different Debugging strategies. (15)	BTL1	Remember
11.	Explain the how the Baseline models serve as a benchmark in an ML application. (15)	BTL1	Remember
12.	Express briefly about Baseline models and its performance. (15)	BTL2	Understand
13.	Analyze in detail about speech recognition in model evaluation. (15)	BTL4	Analyze
14.	Point out the factors that make the mobile adhoc networks more vulnerable to security attacks compared to the traditional networks. (15)	BTL4	Analyze
15.	Express routing scenario with example. (15)	BTL2	Understand
16.	Demonstrate how NLP is used in real time scenario. (15)	BTL3	Apply
17.	Evaluate in detail the performance of debugging strategies. (15)	BTL5	Evaluate

UNIT V AUTOENCODERS AND GENERATIVE MODELS

Autoencoders: Undercomplete autoencoders -- Regularized autoencoders -- Stochastic encoders and decoders -- Learning with autoencoders; Deep Generative Models: Variational autoencoders – Generative adversarial networks.

1.	What is Probabilistic PCA and Factor Analysis?	BTL1	Remember
2.	Give the definition of Linear Factor Model.	BTL2	Understand

3.	Differentiate one Shot Learning and Zero Shot Learning.		BTL2	Understand
4.	Show the advantages of Autoencoders.		BTL3	Apply
5.	Define Independent Component Analysis.		BTL1	Remember
6.	Assess the tasks that can be done by probabilistic models.		BTL5	Evaluate
7.	What is Denoising Autoencoders?		BTL1	Remember
8.	Assess the pros and cons of Autoencoders and generative models.		BTL5	Evaluate
9.	Express different Graphical models..		BTL2	Understand
10.	Define distribution equation for energy based model.		BTL1	Remember
11.	Show the role of undirected models.		BTL3	Apply
12.	List the Distributed representations.		BTL1	Remember
13.	Point out why greedy layer wise-training called greedy.		BTL4	Analyze
14.	Analyze the directed and undirected models		BTL4	Analyze
15.	Describe Slowness principle.		BTL3	Apply
16.	Develop how task must be performed in transfer learning.		BTL6	Create
17.	Describe the features of Deep generative models.		BTL2	Understand
18.	Analyze variational encoders.		BTL4	Analyze
19.	Compose a stochastic encoders and decoders.		BTL6	Create
20.	Differentiate distributed representation and symbolic one.		BTL1	Remember
21.	Express the reasons why rich distribution is not feasible in unstructured modelling.		BTL2	Understand
22.	Describe Undirected models.		BTL3	Apply
23.	Analyze the example for distribution equation that represent a Boltzman distribution.		BTL4	Analyze
24.	Asses the tradeoff faced in representing learning problems.		BTL5	Evaluate
PART – B				
1.	Explain the basic concepts of autoencoders.	(15)	BTL5	Evaluate
2.	(i) Discuss about types of autoencoders . (ii) Give the applications of autoencoders.	(8) (7)	BTL2	Understand
3.	Compare and contrast GANs and VAEs.(13)		BTL4	Analyze
4.	Summarize the approaches in Deep Generative Models.	(15)	BTL2	Understand
5	(i) List and explain Denoising autoencoder.(8) (ii) Write short notes on Sparse autoencoder.(5)		BTL1	Remember
6.	Illustrate regularization techniques.	(15)	BTL3	Apply
7.	Examine about stochastic encoder and decoder.	(15)	BTL3	Apply
8.	Write detailed notes on learning with autoencoders.	(15)	BTL1	Remember
9.	Describe in detail about Undercomplete Autoencoders..	(15)	BTL1	Remember
10.	Generalize the learning with autoencoders.	(15)	BTL6	Create
11.	Describe Independent Component Analysis.	(15)	BTL1	Remember
12.	Explain the direct sampling methods and how it help in approximate inference?	(15)	BTL2	Understand

13.	Analyze and Design a Bayesian belief network for the diagnosis of car's electrical system. (15)	BTL4	Analyze
14.	Explain Bayesian networks. (15)	BTL4	Analyze
15.	Explain in detail about deep generative models. (15)	BTL2	Understand
16.	Illustrate the process of compiling a neural network in keras. Signify its role in loss function, optimizer, evaluation metrics. (15)	BTL3	Apply
17.	Evaluate the concept and working of deep belief network. (15)	BTL5	Evaluate