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|  | **Questions and Short notes**  Explain a way to prevent overfitting and control model complexity in CNN. |  |
|  | List down four transfer learning scenarios, explain any one in detail. |  |
|  | Write a note on : Pixel Net |  |
|  | Draw and explain basic CNN architecture. |  |
|  | What is transfer learning? Why it is essential in machine learning? |  |
|  | What are the limitations of BPTT (backpropagation through time)? Mention the solutions to overcome these limitations. |  |
|  | With all its components explain basic structure of an image in detail. |  |
|  | List down two basic blocks of Seq2Seq model, explain both in detail. |  |
|  | Write a note on: Dense Net |  |
|  | How transfer learning process takes place? Explain first two steps in detail. |  |
|  | What are the application areas of bidirectional neural network explain in detail. |  |
|  | Write a note on: LSTM |  |

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|  | In which real-world applications and domains have multilayer perceptron’s demonstrated their effectiveness, and what are some challenges or limitations often encountered when using MLPs in practice |  |
|  | List the fundamental principle behind Maximum Likelihood Estimation and how does it relate to the concept of likelihood in statistics. |  |
|  | Explain learning algorithm & its types and explain how they impact the training process. |  |
|  | What is the primary objective of unsupervised training in machine learning, and how does it differ from supervised learning? |  |
|  | Differentiate between machine learning and deep learning with suitable example |  |
|  | Explain the choice of activation function relate to the architecture and training of specific types of neural networks with suitable example. |  |
|  | List the primary architectural components of a Convolutional Neural Network |  |
|  | Discriminate between Representation Learning, Width Vs. Depth of Neural Networks. |  |
|  | Explain the principle of parameter sharing in Convolutional Neural Networks (CNNs), and how does it relate to the efficiency of the model. |  |
|  | Describe the concept of fully connected layers in a CNN and their role in making predictions |  |
|  | Distinguishes ResNet architecture from traditional Convolutional Neural Networks and write the fundamental idea behind it |  |
|  | Explain the benefits of using transfer learning techniques, particularly in terms of reducing training time and data requirements with proper example. |  |
|  | Explain BPTT for training RNN with suitable example |  |
|  | Enlist the practical applications of recursive neural networks, and how do they handle  hierarchical or tree-structured data |  |
|  | List the common variants of Convolutional Neural Networks designed to handle sequential data, and how do they differ from traditional CNNs. |  |
|  | Describe the Long Short Term Memory Networks. |  |
|  | Explain the fundamental purpose of encoder-decoder sequence-to-sequence architectures in natural language processing and machine translation tasks |  |
|  | Write the fundamental difference between recurrent and recursive neural networks in sequence modeling, and how do they handle sequential data differently |  |
|  | Explain the fundamental concept behind Boltzmann Machines. |  |
|  | Discuss the fundamental purpose of autoencoders in the neural networks. |  |
|  | Write key distinction between deterministic and stochastic encoders and decoders and how does stochasticity affect the learning process |  |
|  | Explain the concept of the encoder and decoder components in an autoencoder, and how they work together to reconstruct input data. |  |
|  | List the fundamental purpose of filters in Convolutional Neural Networks (CNNs), and how do they contribute to feature extraction |  |
|  | Distinguishes deep generative models from traditional generative models, and how do they leverage deep learning techniques for data generation |  |
|  | Describe the "curse of dimensionality," and how does it impact the effectiveness of various machine learning and data analysis techniques |  |
|  | Write the core principle of the back-propagation algorithm in training neural networks, and how does it optimize model parameters through gradient descent |  |
|  | Explain the foundational principle behind Restricted Boltzmann Machines and how do they differ from standard Boltzmann Machines |  |
|  | Write the primary motivation behind using regularized autoencoders in deep learning, and how do they address issues related to overfitting |  |
|  | Explain how the convolutional layer in a CNN extract feature from input data, and what are the key components of this layer. |  |
|  | Explain Deep Boltzmann Machine |  |
|  | Write the core idea behind Generative Adversarial Networks (GANs), and how does this architecture differ from traditional generative models |  |
|  | Write a note on : Regularized autoencoders in detail |  |
|  | What is a deep belief network? Explain its working in detail |  |
|  | Write a note on: Architecture of deep belief network |  |
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**MCQs**

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| 1. | Which layers of a pre-trained model that are kept unchanged during the fine-tuning process?  (a)modified layers (b) frozen layers (c) convolution layer (d) pooling layer |
| 2. | Identify correct number of layers for AlexNet architecture, the order is convolutional layers, max pooling layers, normalization layers, fully connected layers, SoftMax layer.  (a)5,5,2,3,1 (b)5,3,3,2,1 (c)5,3,2,2,1 (d) 5,2,2,3,1 |
| 3. | Which layer type is typically used to capture sequential dependencies in an RNN?  (a) Input layer (b) Hidden layer (c) Output layer (d) Activation layer |
| 4. | Which of the following best describes the working of a Bidirectional Recurrent Neural Network (Bi-RNN)?  (a) It processes input data in a single forward direction only. (b) It processes input data in both forward and backward directions, allowing the model to capture information from both past and future contexts. (c) It processes input data only in a backward direction, ignoring the forward direction. (d)It uses two hidden layers, one for the forward pass and another for backward propagation of the error. |
| 5. | What is the primary purpose of padding in Convolutional Neural Networks (CNNs)?  (a) To reduce the size of the input data after each convolution operation. (b) To increase the computational cost of the network. (c) To maintain the spatial dimensions of the input data after convolution and prevent information loss near the borders. (d) To apply pooling more efficiently across the entire input. |
| 6. | Which type of RNN is used for music generation and image captioning?  (a) one to one (b) many to many (c) many to one (d) one to many |

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