



Group 1: Activation Functions

Question: Describe the sigmoid and ReLU activation functions. Explain when you might choose one over the other in a neural network.

Group 1: Building a Simple Neural Network

Question: Create a simple feedforward neural network in Keras with one input layer, one hidden layer (with 32 neurons and ReLU activation), and one output layer (with a sigmoid activation function). Write down the model architecture.



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Group 2: Backpropagation

Question: Explain the backpropagation algorithm in the context of training a neural network. What is the role of the chain rule in backpropagation?

Group 2: Compiling a Model

Question: Define the compilation steps for a neural network in Keras. Include the optimizer, loss function, and evaluation metric. Explain the role of each component.



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Group 3: Overfitting

Question: Define overfitting in the context of deep learning. Describe two techniques to mitigate overfitting.

Group 3: Model Training

Question: Describe the steps involved in training a neural network in Keras. Include concepts like epochs, batch size, and validation data.



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Group 4: Convolutional Neural Networks (CNNs)

Question: Explain the concept of convolution in Convolutional Neural Networks (CNNs). Why are CNNs particularly well-suited for image recognition tasks?

Group 4: Data Preprocessing

Question: Explain the importance of data preprocessing in deep learning. Provide examples of common preprocessing techniques used in Keras.



Group 5: Recurrent Neural Networks (RNNs)

Question: Describe the architecture and purpose of Recurrent Neural Networks (RNNs). Provide an example of a real-world application where RNNs are beneficial.

Group 5: Regularization

Question: Describe the concept of regularization in deep learning. Explain how dropout and L2 regularization can be implemented in Keras.



Group 6: Gradient Descent

Question: Explain the gradient descent optimization algorithm. What is the learning rate, and how does it affect the convergence of gradient descent?

Group 6: Early Stopping

Question: What is early stopping, and why is it used in deep learning? Describe how you can implement early stopping in Keras.



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Group 7: Batch Normalization

Question: Explain the concept of batch normalization in neural networks. What are the benefits of using batch normalization?

Group 7: Model Evaluation

Question: Explain how to evaluate a trained neural network model in Keras using test data. Mention the evaluation metric commonly used for classification tasks and another metric for regression tasks.



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Group 8: Vanishing Gradient Problem

Question: What is the vanishing gradient problem in deep learning? How does it affect training in deep neural networks, and what activation functions can help mitigate it?

Group 8: Model Saving and Loading

Question: Describe how to save a trained neural network model in Keras to a file. Also, explain how to load a saved model for future use.



Group 9: Transfer Learning

Question: Define transfer learning in deep learning. Describe a scenario where transfer learning can be effectively applied, and explain the benefits.

Group 9: Hyperparameter Tuning

Question: What are hyperparameters in deep learning, and why is tuning them important? Explain how hyperparameter tuning can be performed in Keras.

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Group 10: Dropout

Question: Explain the dropout regularization technique in deep learning. How does dropout work, and why is it used?

Group 10: Transfer Learning

Question: Define transfer learning and explain how it can be applied using pre-trained models in Keras. Provide an example of a pre-trained model in Keras.