**📘 Additional Technical Interview Questions & Answers**

1. **What is list comprehension in Python? How is it useful?**  
   → List comprehension is a concise way to create lists in Python using a single line of code. Example: [x\*\*2 for x in range(5)] gives [0, 1, 4, 9, 16].
2. **Explain the difference between deepcopy() and copy() in Python.**  
   → copy() creates a shallow copy (nested objects are shared), while deepcopy() makes a full independent clone of objects.
3. **What are lambda functions? Give an example.**  
   → Lambda functions are anonymous functions. Example: lambda x: x + 5.
4. **How does exception handling work in Python? What are try-except blocks?**  
   → try-except blocks handle runtime errors. Example:

try:

a = 1/0

except ZeroDivisionError:

print("Cannot divide by zero")

1. **What are Python decorators? Where would you use them?**  
   → Decorators modify behavior of functions, often used for logging, authentication, etc., e.g., @staticmethod.
2. **What are the different types of data (categorical, numerical, etc.) and how would you handle them?**  
   → Types include numerical (continuous/discrete), categorical (nominal/ordinal), date/time. Use encoding, scaling, or parsing.
3. **What is the curse of dimensionality?**  
   → When feature count is high, data becomes sparse, hurting performance of models like KNN.
4. **How do you select important features in a dataset?**  
   → Use correlation matrix, feature importance from models, RFE, or L1 regularization.
5. **What are outliers and how do you handle them?**  
   → Outliers are extreme values. Handle using Z-score, IQR, transformations, or removal.
6. **What is the difference between mean, median, and mode?**  
   → Mean = average, median = middle, mode = most frequent. Median is robust to skew.
7. **What is the difference between Bagging and Boosting?**  
   → Bagging trains models in parallel to reduce variance; Boosting trains sequentially to reduce bias.
8. **What is a ROC curve and what does AUC represent?**  
   → ROC plots TPR vs FPR. AUC is the area under this curve—higher means better model.
9. **What is gradient descent and how does it work?**  
   → Optimization algorithm that updates weights iteratively to minimize loss function using gradients.
10. **What are the assumptions of a linear regression model?**  
    → Linearity, independence, homoscedasticity, no multicollinearity, and normal distribution of errors.
11. **What is the difference between KNN and K-means?**  
    → KNN is supervised (classification/regression), K-means is unsupervised (clustering).
12. **What is backpropagation in neural networks?**  
    → An algorithm for computing gradients to update weights using chain rule.
13. **What is the vanishing gradient problem?**  
    → When gradients become too small during training, preventing weight updates. Solved using ReLU or batch norm.
14. **What are CNNs and where are they used?**  
    → Convolutional Neural Networks are used in image recognition, leveraging convolution layers.
15. **What is the purpose of using ReLU in neural networks?**  
    → ReLU adds non-linearity and avoids vanishing gradients by returning max(0, x).
16. **How is batch size different from epoch in training neural networks?**  
    → Batch size = samples before weight update; Epoch = 1 full pass through the dataset.