Department of Computer Science
Gujarat University
MCA – III
Sessional – I
Deep Learning
Time: 1.5 hrs

Date: 9th September 2024

Max. Marks:30

Q1. Answer the following questions (any 4) [20]

a) Define bias and variance in the context of machine learning models. Discuss the bias-variance tradeoff and its implications for model performance. How does this tradeoff manifest in deep networks, and what techniques can be employed to manage it?

b) Given that the Universal Approximation Theorem states that a neural network can approximate any continuous function, why do some networks still perform poorly on certain tasks? What other factors must be considered beyond the theorem?

c) Explore the applications of convolutional networks in computer vision tasks. Choose two specific application tasks and explain how CNNs are designed and optimized to perform these tasks effectively.

d) If a CNN's performance on a test dataset is significantly lower than on the training dataset, what logical steps would you take to diagnose and address the issue? Consider factors such as overfitting, data distribution, and model architecture in your response.

e) Consider a CNN with multiple layers of convolutions and pooling. If the input image size is 224x224, and the first convolutional layer uses a 7x7 kernel with a stride of 2 and padding of 3, followed by max pooling with a 2x2 kernel and stride of 2, calculate the size of the feature map after these two layers.

f) Elaborate on the concept of the curse of dimensionality. How does it affect machine learning models, particularly deep networks? Discuss strategies that can be employed to mitigate the challenges posed by high-dimensional data.

Q2. Answer the following [05]

1. Which method is used to address the problem of vanishing gradients in backpropagation?
   A) Dropout B) Batch normalization C) Using ReLU activation functions D) Weight initialization

2. Which of the following helps improve feature representation in deep networks?
   A) Regularization B) Feature scaling C) Using multiple hidden layers D) Gradient clipping

3. Which of the following is NOT a typical function of pooling layers in a Convolutional Neural Network (CNN)?
   A) Reducing the spatial dimensions of feature maps B) Preventing overfitting by reducing parameters
   C) Learning additional features by convolution D) Preserving spatial structure during reduction

4. What is the primary reason for using strides in convolutional networks?
   A) To reduce the number of parameters B) To increase the number of trainable layers
   C) To downsample the input D) To increase the computational complexity

5. Which of the following statements correctly describes the Universal Approximation Theorem?
   A) Any neural network can approximate any function given enough neurons in a single hidden layer
   B) Any neural network can approximate any function given multiple hidden layers
   C) Deep networks require specific architectures to approximate arbitrary functions
   D) Shallow networks cannot approximate non-linear functions

Q3. State whether the following are true or false [05]

1. In machine learning, the curse of dimensionality occurs because data points become denser as dimensions increase.
2. The Universal Approximation Theorem applies only to deep networks with multiple hidden layers.
3. Pooling is a linear operation similar to convolution.
4. CNNs are particularly suited for sequential data processing tasks like natural language processing.
5. High bias in a model usually results in overfitting to the training data.

Department of Computer Science
Gujarat University
~~M.Sc.(CS&IT)~~ MCA) theory examination
Semester II

Subject: Computer Vision
Total Marks: 30

Time: 1.5 hours

Q1. Define the following: [05]

i. Image
ii. Spatial resolution
iii. frequency
iv. wavelength
v. convolution

Q2. Explain point processing operations with mathematical equation, graph, effect and application areas [09]

Q3. Define convolution. How Image denoising is done using average filter [05]

Q3. Explain components of computer vision system. List down applications of computer vision system in different bands of em spectrum [05]

Q4. Explain bitplane slicing,histogram equalisation and intensity slicing [06]

Department of Computer Science
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MCA – III
Sessional Examination – I, September 2024

Subject: Mobile Application Development

Time: 1 hr 30 min

Date: 11/09/2024

Max. Marks: 20

Que:1 Fill-in-the-blank (Any 5) (5)

1. The underlying kernel in the Android operating system is based on the _____ kernel.
2. _____ is a mechanism in Android that allows communication between different components, such as activities, services, and broadcast receivers.
3. A(n) _____ is a unique identifier assigned to each view in the user interface, allowing developers to reference and manipulate it programmatically.
4. The file that contains the user interface layout for an Android app is usually located in the _____ directory.
5. In Android development, the _____ file contains information about the app's components and permissions.
6. To add a fragment to an activity, you typically use a _____ to perform the transaction.

Que: 2 Explain in detail (Any 5) (15)

1. Explain the role of the findViewById method in Android development. Difference between findViewById and view.findViewById.
2. Name and explain android components.
3. What is the use of Intent and Bundle?
4. Difference between Activity and Fragment.
5. Draw the Activity lifecycle and explain each stage.
6. Draw the Android Architecture and explain each layer.

DEPARTMENT OF COMPUTER SCIENCE
GUJARAT UNIVERSITY

SUBJECT: CLOUD COMPUTING
MCA SEMESTER - 3

Time: 1.5 Hours | Date: 13th September, 2024 | Max. Marks: 40

Q1 Briefly explain any 5 services of AWS / GCP **[10 marks]**

OR

Write the steps to create a Linux instance and Connect to the instance your PuTTY client

Q2 **Answer any 4 in detail:** **[20 marks]**

1. What is Cloud Reference Model? Discuss each aspect briefly.
2. Differentiate between Cluster & Grid Computing
3. What is Virtualization? Discuss types of Virtualizations in brief.
4. Explain BASE theorem in detail.
5. Discuss the model of CDN
6. What is NoSQL database? Discuss the types of NoSQL databases in brief.

Q3 **Answer any 5 in short:** **[10 marks]**

1. Why ACID properties are not good fit for NoSQL Db?
2. What do you understand by 'On Demand Self Service'?
3. Cloud computing requires less investment, discuss in brief.
4. Give an example project that can be deployed on cloud and not on any traditional
5. "Cloud Systems are highly resilient" – Justify the statement
6. Differentiate between Type-1 and Type-2 Hypervisors.

Department of Computer Science
Gujarat University
MCA – III
Sessional – I

Subject: Object Oriented Software Engineering
Time: 1 hr & 30 mins

Date: 09/ 14 / 2024
Max. Marks: 40

Q-1	Answer the following questions	**20**
a)	Explain the importance of software engineering in the development of large-scale software systems. Provide a real-life example of a system that required robust software engineering principles.	
b)	Define the four core Object-Oriented (OO) concepts. Provide an example of each in the context of a software application.	
c)	Explain the importance of an SRS document in the software development lifecycle.	
d)	Discuss Risk Management with Example.	
Q-2	Answer the following questions (Any two)	**10**
a)	Explain software development life cycle models.	
b)	Define functional and non-functional requirements. Provide two real-life examples of each.	
c)	Describe four requirement elicitation techniques and provide a real-life example where each technique would be most effective.	
Q-3	Answer the following questions	**10**
a)	Discuss the role of Unified Modeling Language (UML) in software development.	
b)	Explain the Need for Cost and Schedule Estimation.	