

CBCS SCHEME

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18AI81

Eighth Semester B.E. Degree Examination, June/July 2024 Neural Networks and Deep Learning

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With respect to reverse mode autodiff in tensor flow, explain the main benefits and drawbacks of creating a computation graph rather than directly executing the applications. (06 Marks)
- b. Explain the steps required to feed the data to the training algorithm in tensor flow. (04 Marks)
- c. With code snippet, explain the following :
 - i) Modularity and sharing variables in Tensor flow
 - ii) Save and restore the models in tensor flow. (10 Marks)

OR

- 2 a. With code snippet explain two different phases while training a DNN using tensor flow. (10 Marks)
- b. With a neat diagram explain the architecture of a multilayer perceptron. (10 Marks)

Module-2

- 3 a. With the code snippet and equations discuss Xavier and the initialization pertaining to vanishing/exploding gradients problem. (10 Marks)
- b. With the code snippet, explain Leaky Relu, a non saturating activation function related to vanishing gradient problem. (10 Marks)

OR

- 4 a. Write a note on Batch Normalization and Gradient clipping which supports exploding gradients problem. (10 Marks)
- b. With an example, discuss how tweaking, dropping or replacing the upper layers helps in improving the performance of DNN model. (10 Marks)

Module-3

- 5 a. Illustrate asynchronous communication using Tensor flow Queues with code snippet and diagram. (10 Marks)
- b. Briefly explain with a diagram, parallelizing neural networks on a Tensor flow cluster on condition of one neural network per device. (10 Marks)

OR

- 6 a. Discuss convolutional layer features with a diagram and explain the methods for stacking multiple features maps. (10 Marks)
- b. What are pooling layers, explain Tensor flow implementations of pooling layers with a diagram and code. (10 Marks)

Module-4

- 7 a. Explain Recurrent Neural Networks and describe output of a recurrent layer for a single instance as well as all instances in a mini batch. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

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b. With respect to Basic RNNs in tensor flow, write a note on:

- i) Static unrolling through time.
- ii) Dynamic unrolling through time.

(10 Marks)

OR

- 8 a. With diagram and code snippet explain the steps required for training to predict time series in RNN. (10 Marks)
- b. With LSTM cell diagram, explain LSTM computations features. (10 Marks)

Module-5

- 9 a. Discuss performing Principle Component Analysis (PCA) with an under complete linear autoencoder code. (10 Marks)
- b. Briefly explain Sparse Autoencoders and denoising autoencoders with a neat diagram. (10 Marks)

OR

- 10 a. With a neat diagram and code snippet, describe the features of Neural Network policies. (10 Marks)
- b. Summarize the application features of Markov Decision Processes with respect to Bellman optimality equation and values iteration algorithm. (10 Marks)

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18AI821

Eighth Semester B.E. Degree Examination, June/July 2024

System Modeling and Simulation

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is simulation and explain the different steps in simulation study with neat flow chart. (10 Marks)
- b. A small grocery store has only one check out counter customer arrive at counter at random from 1 to 8 min apart. Each possible value of service time has same probability of occurrence. Service time varies from 1 to 6 mins apart. Each possible values of service time has same probability of occurrence. Develop simulation distribution table and calculate
- Average waiting time
 - Probability waiting time.
 - Probability of idle server.

Given :

Random digit for arrival time :

913 727 015 948 309 922 753 235 302

Service time : (Random digit)

84 10 74 53 17 79 91 67 89 38

(10 Marks)

OR

- 2 a. List and explain circumstances when simulation is not an appropriate tool. (10 Marks)
- b. Consider a store with one checkout counter. Prepare simulation table and find out average waiting time of customer in waiting queue, probability of idle server, average service time, given
- Inter arrival time : 3, 2, 6, 4, 4, 5, 8, 7
Service time : 4, 5, 5, 8, 4, 6, 2, 3, 4
Assume 1st customer arrives at $t = 0$.

(10 Marks)

Module-2

- 3 a. Explain discrete random variable and continuous random variable. (10 Marks)
- b. Explain :
- Binomial distribution
 - Uniform distribution.

(10 Marks)

OR

- 4 a. List queuing notations for parallel server systems. (10 Marks)
- b. Explain steady state parameters of M/G/1 queue. (10 Marks)

Module-3

- 5 a. Sequence of numbers has been generated 0.44, 0.81, 0.14, 0.05, 0.93. Use Kolmogorov Smirnov test with $\alpha = 0.05$, test whether the hypothesis that numbers are uniformly distributed, can be accepted or rejected. Consider $P_\alpha = 0.565$. (10 Marks)
- b. What are pseudorandom numbers? Explain consideration for selection of routines to generate random numbers. (10 Marks)

OR

- 6 a. Discuss the concept of inverse transform technique to generate random numbers, using exponential distribution. (10 Marks)
- b. Generate three Poisson variants with mean $\alpha = 0.2$ for given random number, 0.4357, 0.4146, 0.8353, 0.9952, 0.8004. (10 Marks)

Module-4

- 7 a. Explain data collection in input modeling and the suggestions for enhancing data collection technique. (10 Marks)
- b. Using goodness of fit test, test whether random numbers are uniformly distributed based on Poisson assumption with $\alpha = 0.05$ and $\hat{\alpha} = 3.64$. Data is as :

Interval:	0	1	2	3	4	5	6	7	8	9	10	11
Observed frequency :	12	10	19	17	10	8	7	5	5	3	3	1

(10 Marks)

OR

- 8 a. Explain measures of performance. (10 Marks)
- b. Explain multivariate and time series input models. (10 Marks)

Module-5

- 9 a. Explain model building, verification and validation. (10 Marks)
- b. Explain iterative process of calibration model. (10 Marks)

OR

- 10 a. Write a note on validation of model assumption. (10 Marks)
- b. Explain optimization via simulation. (10 Marks)

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