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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

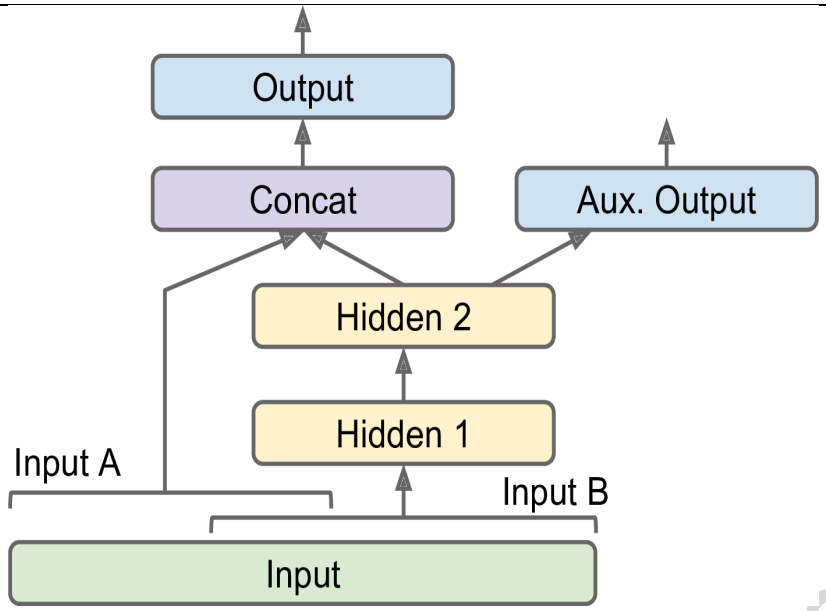
July 2023 Semester End Main Examinations

Programme: B.E. **Semester: VI**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 20IS6PEDLG **Max Marks: 100**
Course: Deep Learning **Date: 19.07.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. **Choice questions are from Unit 1 and Unit 3**.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Explain the concept of a Perceptron with a neat diagram. Using suitable equations describe the following: i. Computing the outputs of a fully connected layer. ii. Perceptron learning rule (weight update).	*CO1*		**10**
	b)	Explain three popular activation functions with suitable diagrams.	*CO1*		**05**
	c)	Suppose you have an Multi Layer Perceptron (MLP) composed of one input layer with 10 passthrough neurons, followed by one hidden layer with 50 neurons, and finally one output layer with 3 neurons. All neurons use the ReLU activation functions. 1. What is the shape of the input matrix X? 2. What about the shape of the hidden layer's weight vector W_h, and the shape of its bias vector b_h? 3. What is the shape of the output layer's weight vector Wo, and its bias vector b_o? 4. What is the shape of the network's output matrix Y? 5. Write the equation that computes the network's output matrix Y as a function of X, W_h, b_h, W_o and b_o.	*CO2*	*PO1*	**05**
		OR			
2	a)	Build a complex model by considering below diagram to handle multiple outputs for Fake News Detection Dataset for the given model parameters: i. suppose we want to send 5 features through the deep path (features 0 to 4), and 6 features through the wide path (features 2 to 7). ii. Activation a function: Relu iii. Dense layer output units: 30 iv. loss=mse v. optimizer="sgd" vi. epochs: 20 vii. loss_weights= [0.9, 0.1]	*CO3*	*PO2*	**10**

						
		b)	Explain the concept of Fine-Tuning Neural Network Hyperparameters for the following: i. Number of Hidden Layers ii. Number of Neurons per Hidden Layer	*CO2*	*PO1*	**10**
			UNIT - II			
	3	a)	Brief out the concept of vanishing gradient problem. Explain the No saturating Activation Functions method of handling the same.	*CO1*		**10**
		b)	Explain the concept of Reusing Pretrained Layers and describe how reusing of pretrained layers is performed in the following: i. Unsupervised pretraining ii. Pretraining on an Auxiliary Task	*CO1*		**10**
			UNIT - III			
	4	a)	Define tensor. Explain general architecture of a TensorFlow and describe the following tensor flow operations with suitable examples. i. tf.constant() ii. tf.square() iii. tf.transpose iv. tf.variable() v. tf.RaggedTensor()	*CO3*	*PO2*	**10**
		b)	Demonstrate computing gradients using autodiff using suitable examples.	*CO2*	*PO1*	**10**
			OR			
	5	a)	a) Write a python code to explain categorical and cross categorical features. b) Explain the ways of encoding categorical features using one hot encoders and word embeddings with suitable python code	*CO2*	*PO1*	**10**
		b)	What is TFrecord Format? Explain how to perform following operations:	*CO3*	*PO2*	**05**

			i. create a TFRecord file ii. Read one or more TFRecord files iii. create a compressed TFRecord iv. reading a compressed TFRecord file			
		c)	Define protocol buffers. Illustrate with an example. Give a brief introduction about tensorflow protobufs.	*CO2*	*PO1*	**05**
			UNIT - IV			
	6	a)	What are the advantages of a CNN over a fully connected DNN for image classification?	*CO3*	*PO2*	**05**
		b)	Elucidate CNN architecture. Build your own CNN from scratch and try to achieve the highest possible accuracy on fashion MNIST dataset.	*CO3*	*PO2*	**10**
		c)	Consider a CNN composed of three convolutional layer, each with 3 × 3 kernels, a stride of 2, and SAME padding. The lowest layer output 100 features maps, the middle one outputs 200, and the top one outputs 400. The input images are RGB images of 200 × 200 pixels. Calculate the total numbers of parameters in the CNN.	*CO3*	*PO2*	**05**
			UNIT - V			
	7	a)	Explain RNN architecture with suitable diagrams related to input and output sequence. List out the advantages of RNN over feed forward neural networks.	*CO3*	*PO2*	**10**
		b)	Differentiate RNN and LSTM. Discuss the logic behind LSTM with the help of a neat diagram and list out the applications of LSTM.	*CO3*	*PO2*	**10**

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