

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Supplementary Odd Semester Examination, December 2023

Programme Name: B.Tech (Mechatronics)

Semester : III

Course Name : Applied Machine Learning

Time : 03 hrs

Course Code : MECH 2040

Max. Marks: 100

Nos. of page(s) : 2

Instructions:

SECTION A
ALL QUESTIONS ARE COMPULSORY.

S. No.		Marks	CO
Q 1	Explain Logistic Regression with its mathematical form.	4	2
Q 2	Explain null and alternative hypothesis.	4	1
Q 3	Explain about R-squared (multiple and adjusted), confusion matrix and precision.	4	2
Q 4	Define CNN with the importance of convolution layer in it.	4	1
Q 5	Explain the conditions to reject null hypothesis as well as to accept alternative hypothesis through <i>p-value</i> and slope.	4	2

SECTION B

ALL QUESTIONS ARE COMPULSORY. ATTEMPT ANY ONE FROM Q6

Q 6	Explain the usefulness of following python libraries with their python syntax: a. keras b. tensor c. scipy d. OpenCV e. matplotlib OR Explain block diagram of nervous system and its components.	10	2
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Q 7	Explain five benefits of neural network.	10	2
Q 8	Explain about lossless and lossy Compression.	10	3
Q 9	Explain neural model and their equations, and components with model diagram.	10	3

SECTION-C

ALL QUESTIONS ARE COMPULSORY. ATTEMPT ANY ONE FROM Q10

Q 10	<p>Build two separate models in python – (i) single and (ii) multiple linear regression model which is responsible for generating summary given in Fig.1.</p> <p align="center">OR</p> <p>Answer following questions based on model output shown in Fig. 1:</p> <ol style="list-style-type: none"> Name the list of predictors, response and number of observations used for running linear regression model. (2) Explain the accuracy of fitted model. What will be the reliable parameter(s) to analyze the model’s performance and why? (6) Explain strong and weak relationship between all predictors and response. Justify your conclusion. (6) <p>Which predictors will reject null hypothesis. Discuss your views upon null hypothesis rejection.</p> <pre> ===== OLS Regression Results ===== Dep. Variable: logpgp95 R-squared: 0.689 Model: OLS Adj. R-squared: 0.679 Method: Least Squares F-statistic: 74.05 Date: Thu, 08 Jul 2021 Prob (F-statistic): 1.07e-17 Time: 16:24:41 Log-Likelihood: -62.031 No. Observations: 70 AIC: 130.1 Df Residuals: 67 BIC: 136.8 Df Model: 2 Covariance Type: nonrobust ===== </pre> <table border="1"> <thead> <tr> <th></th> <th>coef</th> <th>std err</th> <th>t</th> <th>P> t </th> <th>[0.025</th> <th>0.975]</th> </tr> </thead> <tbody> <tr> <td>const</td> <td>2.4782</td> <td>0.547</td> <td>4.530</td> <td>0.000</td> <td>1.386</td> <td>3.570</td> </tr> <tr> <td>avexpr</td> <td>0.8564</td> <td>0.082</td> <td>10.406</td> <td>0.000</td> <td>0.692</td> <td>1.021</td> </tr> <tr> <td>resid</td> <td>-0.4951</td> <td>0.099</td> <td>-5.017</td> <td>0.000</td> <td>-0.692</td> <td>-0.298</td> </tr> </tbody> </table> <pre> ===== Omnibus: 17.597 Durbin-Watson: 2.086 Prob(Omnibus): 0.000 Jarque-Bera (JB): 23.194 Skew: -1.054 Prob(JB): 9.19e-06 Kurtosis: 4.873 Cond. No. 53.8 ===== Warnings: [1] Standard Errors assume that the covariance matrix of the errors is correctly specified. </pre> <p align="center">Fig. 1.</p>		coef	std err	t	P> t	[0.025	0.975]	const	2.4782	0.547	4.530	0.000	1.386	3.570	avexpr	0.8564	0.082	10.406	0.000	0.692	1.021	resid	-0.4951	0.099	-5.017	0.000	-0.692	-0.298	20	3
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Q 11

- I. Answer following questions based on model summary analysis shown in Fig. 1:
- a. Name the list of predictors, response and number of observations used for generating model' summary in Fig. 2 (2)
 - b. Is the given formula belong to simple or multiple linear regression? Explain your observations? (4)
 - c. Is there any relationship between predictor and responses? Why or why not? (2)
 - d. Determine the strength of relationship between the predictor and the response and how? (6)
 - e. Which type of relationship (either positive or negative) you observed between the predictor and the response? (6)

20

2,3

OLS Regression Results						
Dep. Variable:	Sales	R-squared:	0.897			
Model:	OLS	Adj. R-squared:	0.896			
Method:	Least Squares	F-statistic:	570.3			
Date:	Wed, 14 Sep 2022	Prob (F-statistic):	1.58e-96			
Time:	11:57:02	Log-Likelihood:	-386.18			
No. Observations:	200	AIC:	780.4			
Df Residuals:	196	BIC:	793.6			
Df Model:	3					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
Intercept	2.9389	0.312	9.422	0.000	2.324	3.554
TV	0.0458	0.001	32.809	0.000	0.043	0.049
Radio	0.1885	0.009	21.893	0.000	0.172	0.206
Newspaper	-0.0010	0.006	-0.177	0.860	-0.013	0.011

Fig. 2