CSPB 4622 - Truong - Machine Learning

Dashboard / My courses / 2247:CSPB 4622 / 26 August - 1 September / Quiz 1-1. Linear Regression

Started on	Tuesday, 3 September 2024, 2:49 PM
State	Finished
Completed on	Tuesday, 3 September 2024, 3:09 PM
Time taken	19 mins 13 secs
Grade	**9.00** out of 10.00 (**90**%)

Question **1**

Correct

Mark 1.00 out of 1.00

The regression technique described in class is called **least-squares** regression because:

- (selected) a. The estimated model parameters are learned by minimizing the sum of the squares of the residuals. ✔
- b. It always produces predictions that are perfect squares.
- c. The solution technique involves a square design matrix.

Question **2**

Correct

Mark 1.00 out of 1.00

Given the following three regression models for **SepalLength,** indicate which model has the **worst** fit.

A.

OLS Regression Results

Dep. Variable:	SepalLength	**R-squared:**	0.760
Model:	OLS	**Adj. R-squared:**	0.758
Method:	Least Squares	**F-statistic:**	468.6
Date:	Thu, 19 Apr 2018	**Prob (F-statistic):**	1.04e-47
Time:	15:18:01	**Log-Likelihood:**	-77.020
No. Observations:	150	**AIC:**	158.0
Df Residuals:	148	**BIC:**	164.1
Df Model:	1		
Covariance Type:	nonrobust		

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	4.3056	0.078	54.895	0.000	4.151	4.461
PetalLength	0.4091	0.019	21.646	0.000	0.372	0.446

Omnibus:	0.212	**Durbin-Watson:**	1.868
Prob(Omnibus):	0.899	**Jarque-Bera (JB):**	0.350
Skew:	0.070	**Prob(JB):**	0.839
Kurtosis:	2.809	**Cond. No.**	10.3

B.

OLS Regression Results

Dep. Variable:	SepalLength	**R-squared:**	0.012
Model:	OLS	**Adj. R-squared:**	0.005
Method:	Least Squares	**F-statistic:**	1.792
Date:	Thu, 19 Apr 2018	**Prob (F-statistic):**	0.183
Time:	15:23:41	**Log-Likelihood:**	-183.14
No. Observations:	150	**AIC:**	370.3
Df Residuals:	148	**BIC:**	376.3
Df Model:	1		
Covariance Type:	nonrobust		

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	6.4812	0.481	13.466	0.000	5.530	7.432
SepalWidth	-0.2089	0.156	-1.339	0.183	-0.517	0.099

Omnibus:	4.455	**Durbin-Watson:**	0.941
Prob(Omnibus):	0.108	**Jarque-Bera (JB):**	4.252
Skew:	0.356	**Prob(JB):**	0.119
Kurtosis:	2.585	**Cond. No.**	24.3

C.

OLS Regression Results

Dep. Variable:	SepalLength	**R-squared:**	0.840
Model:	OLS	**Adj. R-squared:**	0.838
Method:	Least Squares	**F-statistic:**	386.8
Date:	Thu, 19 Apr 2018	**Prob (F-statistic):**	2.74e-59
Time:	15:18:22	**Log-Likelihood:**	-46.442
No. Observations:	150	**AIC:**	98.88
Df Residuals:	147	**BIC:**	107.9
Df Model:	2		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	2.2513	0.247	9.104	0.000	1.763	2.740
PetalLength	0.4708	0.017	27.616	0.000	0.437	0.504
SepalWidth	0.5968	0.069	8.602	0.000	0.460	0.734

Omnibus:	0.169	**Durbin-Watson:**	2.015
Prob(Omnibus):	0.919	**Jarque-Bera (JB):**	0.319
Skew:	-0.051	**Prob(JB):**	0.853
Kurtosis:	2.798	**Cond. No.**	48.2

- a. A.
- b. B. ✔
- c. C.

Question **3**

Correct

Mark 1.00 out of 1.00

Given the following regression model information for the model **SepalLength~PetalLength** answer the question below.

OLS Regression Results

A.

Dep. Variable:	SepalLength	**R-squared:**	0.760
Model:	OLS	**Adj. R-squared:**	0.758
Method:	Least Squares	**F-statistic:**	468.6
Date:	Thu, 19 Apr 2018	**Prob (F-statistic):**	1.04e-47
Time:	15:18:01	**Log-Likelihood:**	-77.020
No. Observations:	150	**AIC:**	158.0
Df Residuals:	148	**BIC:**	164.1
Df Model:	1		
Covariance Type:	nonrobust		

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	4.3056	0.078	54.895	0.000	4.151	4.461
PetalLength	0.4091	0.019	21.646	0.000	0.372	0.446

Omnibus:	0.212	**Durbin-Watson:**	1.868
Prob(Omnibus):	0.899	**Jarque-Bera (JB):**	0.350
Skew:	0.070	**Prob(JB):**	0.839
Kurtosis:	2.809	**Cond. No.**	10.3

When the PetalLength increases by 1, how much does the SepalLength increase by?

Answer: 0.4091

Question **4**

Correct

Mark 1.00 out of 1.00

Assume you are modeling $Y \sim X$ where X is a continuous variable and Y is a discrete variable. Is this a regression or classification problem?

- (selected) a. Classification ✔
- b. Either technique could be used.
- c. Regression

Question **5**

Correct

Mark 1.00 out of 1.00

It makes sense to use a **correlation matrix** to select multiple features by choosing features in order of correlation.

- a. True
- (selected) b. False ✔

Question **6**

Correct

Mark 1.00 out of 1.00

We have a linear regression model with an intercept in the form y = ax + b. We create a new model with no intercept in the form y = ax. The r-squared value for the model with no intercept is higher than the r-squared value model with an intercept. We can feel confident that the model with no intercept is better than the model with an intercept.

- a. True
- (selected) b. False ✔

Question **7**

Incorrect

Mark 0.00 out of 1.00

Suppose you fit a multiple linear regression model to a dataset with $p = 7$ features and $n = 1000$ data points. Answer the following question: Hint: (Design matrix) X (coefficients vector) = (Y vector) The design matrix $\mathbf{X}$ has 1000 ✖ columns

Question **8**

Correct

Mark 1.00 out of 1.00

Assume you've run a regression model $Y \sim \beta_0 + \beta_1 X$ for a single factor 'X'. The value of $R^2 = 0.932$ and the model is $\hat{y} = 5.5000 - 9.1667x$. The t- value for β_0 is 0.625 with a corresponding p -value of 0.555. The t -value for β_1 is 5.257 with a corresponding *p-value* of 0.002. The confidence interval for β_0 is [-16.048, 27.048] and the confidence interval for β_1 is [4.900, 13.434]. Is the model a poor, good or perfect fit to the available data?

- a. Poor
- b. Good ✔
- c. Perfect

Question **9**

Correct

Mark 1.00 out of 1.00

Assume you've run a regression model $Y \sim \beta_0 + \beta_1 X$ for a single factor 'X'. The value of $R^2 = 0.932$ and the model is $\hat{y} = 5.5000 - 9.1667x$. The t- value for β_0 is 0.625 with a corresponding p -value of 0.555. The t -value for β_1 is 5.257 with a corresponding *p-value* of 0.002. The confidence interval for β_0 is [-16.048, 27.048] and the confidence interval for β_1 is [4.900, 13.434]. Is the intercept (β_0) statistically significant?

- a. Yes
- b. No ✔

Question **10**

Correct

Mark 1.00 out of 1.00

Assume you've run a regression model $Y \sim \beta_0 + \beta_1 X$ for a single factor 'X'. The value of $R^2 = 0.932$ and the model is $\hat{y} = 5.5000 - 9.1667x$. The t- value for β_0 is 0.625 with a corresponding p -value of 0.555. The t -value for β_1 is 5.257 with a corresponding *p-value* of 0.002. The confidence interval for β_0 is [-16.048, 27.048] and the confidence interval for β_1 is [4.900, 13.434]. Is the slope (β_1) statistically significant?

- a. Yes ✔
- b. No