Homework 2:
A Study: Rural Areas' Access to Electricity and Scientific Articles on GDP per capita

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Introduction

GDP per capita (GPDpc) is a measure of a country's development level. It is a snapshot of a country's economic health and it is affected by various factors. In this report, World Bank's publicly available data is used to extract and analyze three variables: GDP, rural access to electricity and Scientific and technical journal articles. The report uses rural access to electricity and Scientific and technical journal articles as explanatory variables and GDP as the response variable.

Null Hypothesis

There exists no relationship between a country's GDPpc and its corresponding rural access to electricity and scientific articles.

Methodology

Python is used to scrape data from the World Bank's website. A multiple linear regression model is used to estimate the beta values, and standard errors and 95% confidence interval.

First, Beta values were found by using the formula

$\beta i = (X'X)^{-1} * X'Y$

By knowing the Beta values, we get regression equation in the form of

$y = \beta_0 + \beta_1 * x_1 + \beta_2 * x_2$

From the formula, we obtain predicted y values, get the error values and standard error.

Using scipy library, Beta values and standard error, we calculate the 95% confidence interval using t values and degrees of freedom. The following equation was used:

$\sigma^2 = (e'e) / (n - k - 1)$

Summary Table

	Estimates	Standard Errors	Lower CI	Upper CI
Bo	9957.818006	608.000759	8751.561817	11164.074196
B1	−0.001701	0.014131	−0.029737	0.026334
B2	−0.079060	0.085871	−0.249426	0.091305

Conclusion

According to the summary table, the estimates for β_1, β_2 *and* β_3 are 9957.818006, -0.001701, -0.079060, where their standard error values are 608.000759 , 0.014131 and 0.085871.
Since both CI's of predictors include 0 inside the intervals, we fail to reject the hypothesis, meaning that the predictors, country's access to electricity in rural areas, scientific articles, have no relationship with the response variable, GDPpc, or they are insignificant in terms of its influence on GDPpc.

References

 [1] "The World Bank Indicators API". [Online]. Available:
https://datahelpdesk.worldbank.org/knowledgebase/articles/889392-about-the-indicators-api-documentati on [Accessed: 7- Mar- 2020].