

A GUIDE ON BAYESIAN CORRELATION ANALYSIS OF FILIPINO STUDENT'S GRADE AND HOURS IN CLASS DURING THE QUARANTINE PERIOD

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Abstract

This article seeks to perform a Bayesian Correlation between Student Final Grades and Hours in class during the pandemic, this article can also be used as a step-by-step guide in teaching Bayesian Analysis. Data was taken from a one-month modular online class, with the online platform in use tracked student hours in the online module and online classes. JASP was the statistical software used for the Bayesian correlation for its open-source nature, allowing students and teacher easy access to a free statistical software. The result showed correlation between variables and possible implication for use of JASP was also provided. The computation herein can be reproduced.

Keywords: Bayesian Correlation, JASP, Quarantine, Student Score, Filipino

INTRODUCTION

“There are more ways than one to skin a cat” is a quote from the short story Money Diggers, this idea is believed to be found in the field of statistics. Matthews et al. (2017) believed that p-values are often misinterpreted in the field of social science and medical science, they provided specific example where the p-value of less than .05 for rejection of null hypothesis but it one must bear in mind the different confidence level for social science and medical fields (90% for the later and 95%). Matthews and company proved that Bayesian statistics can be resorted to as an alternative in providing correlation. Currently, Philippine tertiary education system has adopted synchronous and asynchronous modality of teaching. These methods are believed accessible for students but such methodology carries specific caveats like the need for stable internet connection and a degree of technology savviness. This article offers a simple guide on evaluation of student performance by looking into the correlation of class hours and the final score given.

A brief background on Bayesian data analysis. Van de Schoot (2020) explained that “In Bayesian statistics, the prior distributions are combined with the likelihood of data to update the prior distributions to the posterior distributions. The updated posterior distributions about

parameters of interest are used for statistical inference. This logic of Bayesian statistics implies that how the prior distributions are specified plays a crucial role in doing Bayesian statistics.”

Environment and Class hours under the modular education. Under the modular education delivery students are expected to complete 12 hours of online lessons (3hours per week) with weekly assessment for a specific subject. Cramming a three-month lesson into a one-month delivery is a challenge. Fabito et al. (2020) stated “that faculty members may have failed to adapt to the needs of the students in an online learning environment. Hence, there is a need for faculty members to undergo training that would allow them to design a pedagogy suited for online learning” (p. 454)

Hypothesis

H₀: There is no significant correlation between the student score and hours in class
H₁: There is a significant correlation between student score and hours in class

METHODS

Instrument used. Jeffrey’s Amazing Statistics Program, open- source statistical program written via C++, R and Java script (JASP Team, 2022). To load Data on JASP, tabulate the data in MS-Excel and save it either as .CSV or .SAV file.

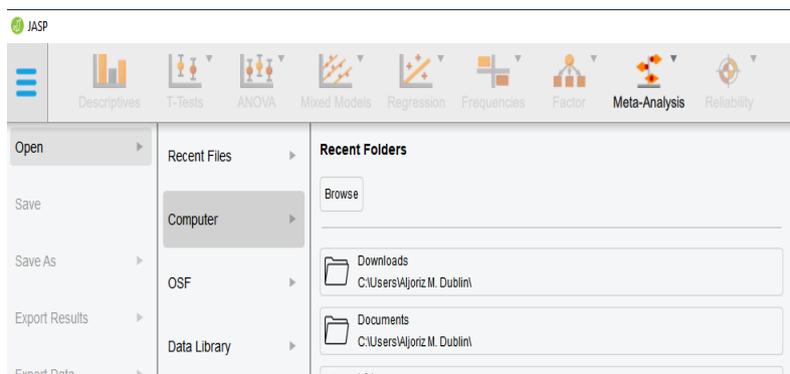
Data Source. The Data collected was taken from a one-month class with twenty-four students with names coded as “Student X” where X is the number entry.

Procedure.

Step 1. Data source can be collected from

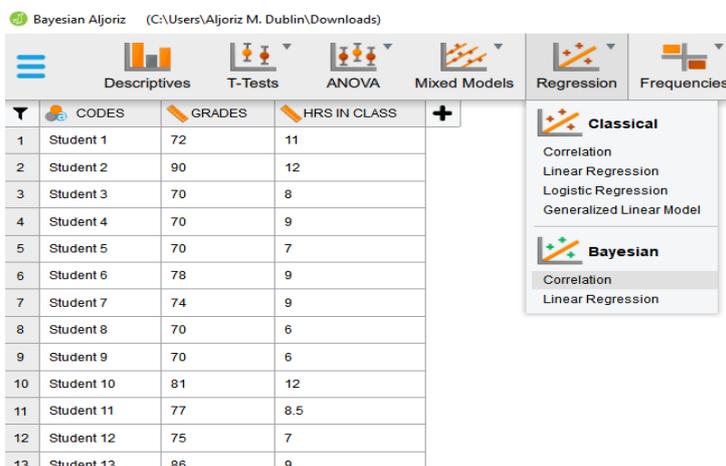
<https://aljoriz.wordpress.com/2022/07/22/teaching-in-the-time-of-quarantine/> enter the data in MS-Excel and save as .CSV. Click the three lined tab on the upper left then OPEN > Computer > locate the file. (See Image 1.0)

Image 1.0 – Loading the Data



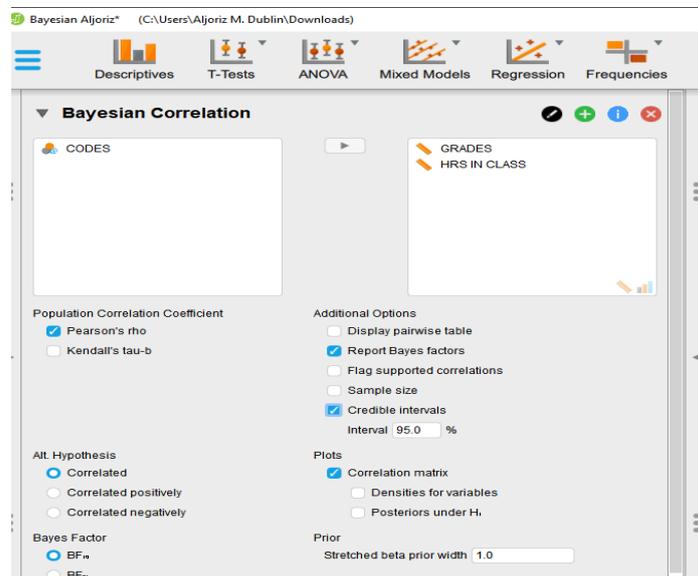
Step 2. Press Regression>Bayesian>Correlations (See Image 2.0)

Image 2.0- Selecting Bayesian



Step 3. Check the following items: Pearson’s Rho, additional options Report Bayes Factor and Credible Intervals at 95%, Alt. Hypothesis Correlated, Bayes Factor 10, and Correlational Matrix Plot.

Image 3.0 – Verifying Bayes Conditions



RESULT AND DISCUSSION

The resulting output for our correlation is present in Image 4.0, where the Pearson’s R for the Grade and Hours is computed 0.70 with Bayes Factor 10 of 235. This means that the support in the observed data is 235.115 larger in favor of the alternative hypothesis than the null

hypothesis. The upper and lower limit of 95% credible interval is 0.848 and 0.378 considering zero is not within the upper and lower limit, he surmises correlation coefficient between the “grades” and “hrs. In class” can be found within the said interval. (See Image 4.0). The Bayesian correlation plot shows positive correlation between the Grades and Hrs. in class. The Bayesian correlation matrix plot allows for graphical understanding of the correlation between our stated variables, the correlation graph validates the computed correlation where the alternative hypothesis is accepted due to high correlation probability.

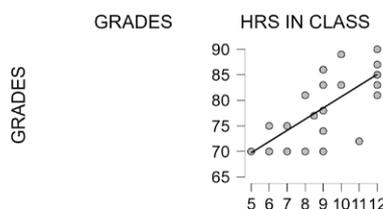
Implication. This article shows a step-by-step process in performing Bayesian correlation using JASP, it is hoped that students/teacher can make use of Bayesian analysis as an alternative to correlational analysis considering Bayesian is new and the software is open-source. These authors are hoping that students and teachers can expand usage of JASP within the Philippine Higher education setting.

Image 4.0 – Bayesian Output of JASP

Bayesian Correlation

Bayesian Pearson Correlations			
Variable		GRADES	HRS IN CLASS
1. GRADES	Pearson's r	—	—
	BF ₁₀	—	—
	Upper 95% CI	—	—
	Lower 95% CI	—	—
2. HRS IN CLASS	Pearson's r	0.700	—
	BF ₁₀	235.115	—
	Upper 95% CI	0.848	—
	Lower 95% CI	0.378	—

Bayesian Correlation Matrix Plot



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APPENDIX – PLAGIARISM RESULT

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