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“Optimizing Innovation in Knowledge, Education and Design”

EXTENDED ABSTRACT



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Assalamualaikum warahmatullahi wabarakatuh,



First and foremost, I would like to express my gratitude to the organizing committee of i-Spike 2023 for their tremendous efforts in bringing this online competition a reality. I must extend my congratulations to the committee for successfully delivering on their promise to make i-Spike 2023 a meaningful event for academics worldwide.

The theme for this event, 'Optimizing Innovation in Knowledge, Education, and Design,' is both timely and highly relevant in today's world, especially at the tertiary level. Innovation plays a central role in our daily lives, offering new solutions for products, processes, and services. By adopting a strategic approach to 'Optimizing Innovation in Knowledge, Education, and Design,' we have the potential to enhance support for learners and educators, while also expanding opportunities for learner engagement, interactivity, and access to education.

I am awed by the magnitude and multitude of participants in this competition. I am also confident that all the innovations presented have provided valuable insights into the significance of innovative and advanced teaching materials in promoting sustainable development for the betterment of teaching and learning. Hopefully, this will mark the beginning of a long series of i-Spike events in the future.

It is also my hope that you find i-Spike 2023 to be an excellent platform for learning, sharing, and collaboration. Once again, I want to thank all the committee members of i-Spike 2023 for their hard work in making this event a reality. I would also like to extend my congratulations to all the winners, and I hope that each of you will successfully achieve your intended goals through your participation in this competition.

Professor Dr. Roshima Haji Said
RECTOR
UiTM KEDAH BRANCH



WELCOME MESSAGE (i-SPIKE 2023 CHAIR)



We are looking forward to welcoming you to the 3rd International Exhibition & Symposium on Productivity, Innovation, Knowledge, and Education 2023 (i-SPIKE 2023). Your presence here is a clear, crystal-clear testimony to the importance you place on the research and innovation arena. The theme of this year's Innovation is "*Optimizing Innovation in Knowledge, Education, & Design*". We believe that the presentations by the distinguished innovators will contribute immensely to a deeper understanding of the current issues in relation to the theme.

i-SPIKE 2023 offers a platform for nurturing the next generation of innovators and fostering cutting-edge innovations at the crossroads of collaboration, creativity, and enthusiasm. We enthusiastically welcome junior and young inventors from schools and universities, as well as local and foreign academicians and industry professionals, to showcase their innovative products and engage in knowledge sharing. All submissions have been rigorously evaluated by expert juries comprising professionals from both industry and academia.

On behalf of the conference organisers, I would like to extend our sincere thanks for your participation, and we hope you enjoy the event. A special note of appreciation goes out to all the committee members of i-SPIKE 2023; your dedication and hard work are greatly appreciated.

Dr. Junaida Ismail

Chair

3rd International Exhibition & Symposium Productivity, Innovation, Knowledge, and Education 2023 (i-SPIKE 2023)

THE CC GUY: ENHANCING COMPREHENSION OF CONTINUITY CORRECTION

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ABSTRACT

In statistics, continuity correction is a crucial modification applied when approximating a discrete distribution (a Binomial or Poisson distribution) by a continuous distribution (a normal distribution). To adjust the discrete value(s), students commonly add or subtract 0.5 as the first step in solving problems related to this topic. However, a preliminary study found that many students need help with the adjustment. The CC Guy was created as a creative solution to this problem to increase students' understanding of continuity correction and facilitate precise adjustments. The CC Guy easily presents the concept of continuity correction by incorporating visualization techniques, allowing students to grasp and apply it more effectively in solving questions. A preliminary survey involving 72 students was conducted to evaluate the effectiveness of The CC Guy. Impressively, 93.1% of the participants agreed that The CC Guy improved their ability to solve questions related to continuity correction. Additionally, an overwhelming majority of 98.6% expressed a strong willingness to recommend this approach to their fellow friends studying these topics. This method empowers students to negotiate the difficulties of continuity correction with greater ease and confidence, especially for visual learners, by providing a user-friendly and visually appealing platform. In conclusion, The CC Guy is an effective attempt to close the continuity correction comprehension gap. It makes a significant contribution to the field of statistical education. It can potentially improve learning outcomes in this area by enabling students to overcome the uncertainties and challenges related to this fundamental statistical concept.

Keywords: correction continuity, visualization, continuous distribution, probability

INTRODUCTION

Correction continuity, commonly referred to as the continuity correction or Yates' correction, is a crucial statistical technique employed to account for the discreteness of values in calculations involving categorical data, binomial, or Poisson distributions. This technique is particularly beneficial when using a normal distribution to approximate a binomial or Poisson distribution. Mastering this topic is critical for students studying statistics and working with discrete and continuous distribution functions.

In applying this technique, students commonly add or subtract 0.5 as the first step to adjust the discrete value(s) when solving problems related to this topic. By employing continuity correction, students can ensure more accurate results and better understand the transition from discrete to continuous distributions in various statistical analyses.

However, a preliminary study has highlighted that many students encounter challenges when making this adjustment. This observation is consistent with the findings of Tuh et al. (2017), who likened mastering the concept of when to add or subtract the 0.5 factor to climbing a very steep ladder. Students experience significant difficulties with these adjustments, underscoring the need for additional support and clarification in this study area.

A method incorporating visualizations is introduced to reduce uncertainty and difficulties and effectively support students in mastering correction continuity adjustments. According to Kolari et al. (2004), visualization aids students in forming mental images, interpreting concepts, and elucidating abstractions. Thus, correction continuity is integrated into The CC Guy to enhance students' motivation and eagerness to learn.

Parallel to the findings of A. Bakri et al. (2021), this incorporation of visual representations facilitates cognitive engagement, particularly when dealing with abstract concepts like graphical representations. By employing visual aids, students can better grasp the intricacies of correction continuity and improve their ability to apply the 0.5 factor appropriately, leading to a deeper understanding of statistical analyses involving categorical data and discrete distributions.

MATERIAL AND METHODOLOGY

Table 1 illustrates the continuity correction adjustments that should be made when approximating a discrete distribution with a continuous distribution using a random variable X with integers and b . The explanation of the visualization or illustration is divided into five cases.

Table 1. Continuity Correction Adjustments

Discrete	Continuous	Case
$P(X \geq a)$	$P(X > a - 0.5)$	1
$P(X > a)$	$P(X > a + 0.5)$	
$P(X \leq a)$	$P(X < a + 0.5)$	2
$P(X < a)$	$P(X < a - 0.5)$	
$P(a \leq X \leq b)$	$P(a - 0.5 < X < b + 0.5)$	3
$P(a < X < b)$	$P(a + 0.5 < X < b - 0.5)$	4
$P(X = a)$	$P(a - 0.5 < X < a + 0.5)$	5

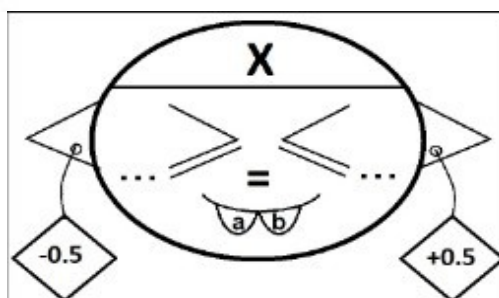


Figure 1. The CC Guy

Figure 1 shows the overall visualization corresponding to the five abovementioned areas. X is the random variable, ± 0.5 is the adjustment, letters a and b represent the integer and the symbols used are the equal and inequality signs.

Case 1

The visualization for the first case is explained below by referring to the area in the pink box.

Table 2. Continuity Correction for Case 1

Discrete	Continuous	Case1
$P(X \geq a)$	$P(X > a - 0.5)$	1
$P(X > a)$	$P(X > a + 0.5)$	

Visualization	Explanation
	If $a = 10$ and the symbols of $< \geq$ are used in the question, we deduct 0.5. For example: $P(X < 10) = P(X < 9.5)$ $P(X \geq 10) = P(X > 9.5)$

Figure 2. Visualization of The CC Guy for Case 1

Case 2

The visualization for the second case is explained below by referring to the area in the blue box.

Table 3. Continuity Correction for Case 2

Discrete	Continuous	Case1
$P(X \leq a)$	$P(X < a + 0.5)$	2
$P(X < a)$	$P(X < a - 0.5)$	

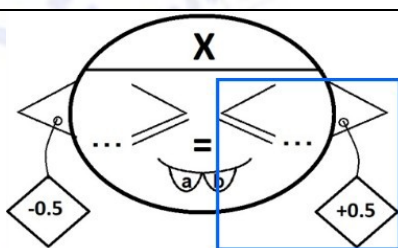
Visualization	Explanation
	If $a = 10$ and the symbols of $\leq >$ are used in the question, we add 0.5. For example: $P(X > 10) = P(X > 10.5)$ $P(X \leq 10) = P(X < 10.5)$

Figure 3. Visualization of The CC Guy for Case 2

Case 3

The visualization for the third case is explained below by referring to the area in the pink box.

Table 4. Continuity Correction for Case 3

Discrete	Continuous	Case
$P(a \leq X \leq b)$	$P(a - 0.5 < X < b + 0.5)$	3

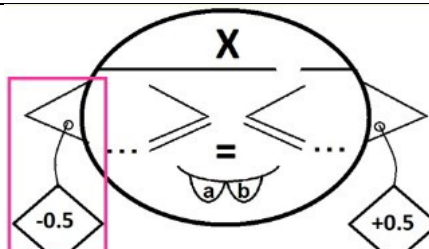
Visualization	Explanation
	If we have this question: ($a = 10, b = 20$) $P(10 < X < 20) = P(10.5 < X < 19.5)$ To start, observe the symbol used for the upper limit. Since the symbol is $<$, we deduct 0.5. Contrarily, we add 0.5 to the lower limit.

Figure 4. Visualization of The CC Guy for Case 3

Case 4

The visualization for the fourth case is explained below by referring to the area in the blue box.

Table 5. Continuity Correction for Case 4

Discrete	Continuous	Case
$P(a < X < b)$	$P(a + 0.5 < X < b - 0.5)$	4

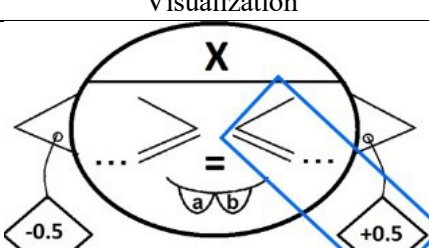
Visualization	Explanation
	If we have this question: ($a = 10, b = 20$) $P(10 \leq X \leq 20) = P(9.5 < X < 20.5)$ To start, observe the symbol used for the upper limit. Since the symbol is $\leq$, we add 0.5. Contrarily, we deduct 0.5 from the lower limit.

Figure 5. Visualization of The CC Guy for Case 4

Case 5

The visualization for the fourth case is explained below by referring to the area in the blue and pink box.

Table 6. Continuity Correction for Case 5

Discrete	Continuous	Cases
$P(X = a)$	$P(a - 0.5 < X < a + 0.5)$	5

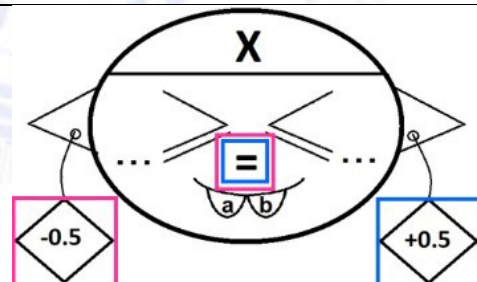
Visualization	Explanation
	If the equal symbol is used: 1. We deduct 0.5 from the given integer and it becomes the lower limit. 2. We add 0.5 from the given integer and it becomes the upper limit. $P(X = 10) = P(9.5 < X < 10.5)$

Figure 6. Visualization of The CC Guy for Case 5

RESULTS AND CONCLUSION

A preliminary survey involving 72 students was conducted to evaluate the effectiveness of The CC Guy. Impressively, 93.1% of the participants agreed that The CC Guy significantly improved their ability to solve questions related to continuity correction. Additionally, an overwhelming majority of 98.6% expressed a strong willingness to recommend this approach to their fellow friends studying these topics. This method empowers students to negotiate the difficulties of continuity correction with greater ease and confidence, especially for visual learners, by providing a user-friendly and visually appealing platform. In conclusion, The CC Guy is an effective intervention to bridge the comprehension gap in continuity correction.

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