Engagement progress, number of correct responses, and number of attempts in chapters
Visualizing the progress of engagement, the number of correct responses, and the number of attempts for each chapter in CourseKata's statistics course provides valuable insights into student participation levels. These visualizations help pinpoint areas that may need improvement or additional resources.
The plots show the total engagement progress, the number of correct responses, and the number of attempts in each chapter. This breakdown allows for a clear understanding of student activity across chapters. CourseKata can then focus efforts on chapters (or sections) with lower engagement levels to enhance student involvement and learning outcomes.

Relationship of Page Views and Checkpoints
CourseKata can utilize the relationship between page views and correct checkpoints to enhance the student learning experience in statistics. By identifying pages with high correct checkpoint counts, they can serve as examples for instructors and focus areas for improvement on pages with low counts. Adding interactive content to highly engaged pages, such as quizzes, can maintain student interest. Implementing feedback mechanisms on low-engagement pages can gather student input for enhancements. Providing this data to instructors allows for targeted class support. Students can benefit by focusing on low-engagement pages for extra study, discussing these topics in collaborative settings, and not hesitating to seek help. These strategies collectively aim to improve engagement and learning outcomes for statistics students.

P-Test Between Response and EOC Averages
This P-Test tests the change in EOC averages depending on how students responded to the start-of-chapter multiple-choice ‘pulse’ questions. The EOC is the average number of questions the student gets correct on the end-of-chapter quiz. The EOC of those who responded 5 (most positively) was subtracted from the EOC of those who answered 0 (most negatively). An observed difference of roughly -0.0633 was found. A simulation was then run, shuffling the responses and EOCs to make the results random. Then the difference was recalculated. This shuffling and calculation was repeated 1,000 times, with the resulting differences graphed in a histogram. The original observed difference was graphed, and because it does not fall near the histogram of simulated differences, we can assume that the correlation between response positivity/negativity affects the average number of correct questions on the end-of-chapter quiz.

Machine Learning Model predicting end-of-chapter scores.
A predictive model was developed to forecast students' end-of-chapter assessment scores using CourseKata's engagement metrics, focusing on 'idleness' and 'engagement' as key features. The figure on the right displays the correlation between the predicted and actual end-of-chapter assessment scores. Though the predictions skew slightly to the right, reflecting the biased dataset, the model demonstrates robust predictive accuracy for higher actual scores, which are more relevant to students. The figure on the left shows the effect of each feature on the model's predictive power. As you can see, engagement had the most significant impact, accounting for 20% of the model's predictive power, underscoring the role of student interaction in academic performance. The long-term aim of the model was to provide a preliminary predictive end-of-chapter assessment score, incorporating a recommendation system that could point students to which pages to look at for how long to optimize their potential score. Through this process, the student’s learning on the CourseKata platform can be optimized by identifying key

areas where students might benefit from additional study or practice. By leveraging machine learning to analyze engagement data, CourseKata can become an even more effective educational tool, tailored to its users' needs and habits.

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