Group Homework 3 Spring 2022 and RUBRIC (at the bottom) (to do with the same group as in homework 1 and 2 unless you wo…

6/1/2022

100 Possible Points

Attempt 1

Next Up: Review Feedback

Offline Score: N/A

Add Comment

Unlimited Attempts Allowed

5/24/2022 to 6/1/2022

Details

Tasks to do to model scooters supply at UCLA

(https://bruinlearn.ucla.edu/courses/133166/modules/items/5068596)

Submit Assignment

The Law of Large Numbers also implies that if we collect a large enough number of observations we will arrive to the discovery of the true probabilities of events. That is why statisticians like their data to be more than less.

The following article describes one attempt at using the LLN to discover something that is of high interest nowadays: micro-mobility.

To get an idea of the task that probability modelers have to do, **read, summarize and associate the probability content of the following article to a lecture from this class, in one paragraph.**

Research article: **Poisson Processes and Linear Programs for Allocating Shared Vehicles, by Evan Fields (Scooter article) (https://bruinlearn.ucla.edu/courses/133166/files/8537070?wrap=1)**
(https://bruinlearn.ucla.edu/courses/133166/files/8537070/download?download_frd=1)

1.2 Setting up your random experiment

Get a UCLA map (https://map.ucla.edu/downloads/pdf/UCLA_Campus_Colored_Map.pdf) . Each of you in your team construct a grid of the area of the campus and close surrounding areas that you frequently visit for your classes, clubs, dorms or apartments in the periphery of the campus. Each of you probably takes different classes and are in different living arrangements, so hopefully, between the four of you, you can cover a large enough area on campus and therefore a large enough random sample to be able to say something close to the truth that we can compare to what others have found. Each of you d**ivide your often visited area into cells to form a grid** similar to that used in the Poisson lecture for the starlings (Module week 4) to describe a Poisson process. **Number the cells in your grid as 1,2,..etc. Observe, at the times you visit the area one day, the number of scooters that are iddle in each cell (because you are interested in the supply, not the demand-demand would be reflected by those riding the scooters).** Any day is fine. You will have to report the day and hour. And each of you must use the same standard for the grid. For example, if one uses blocks, everybody must use blocks; if one uses 20 meters square, everybody must use that convention. The experiment works if you do the observation in all grids the same day and at times where classes are being held on campus (nights or very early mornings or very late afternoons may not be a good time). **Include in your submission the map with the areas of the campus that your team covered along with how you divided the areas into cells. Give the time and hours when observations were made. Remember that the more observations the closer you will get to the true probabilities.**

1.3 Determining whether uniform scatter

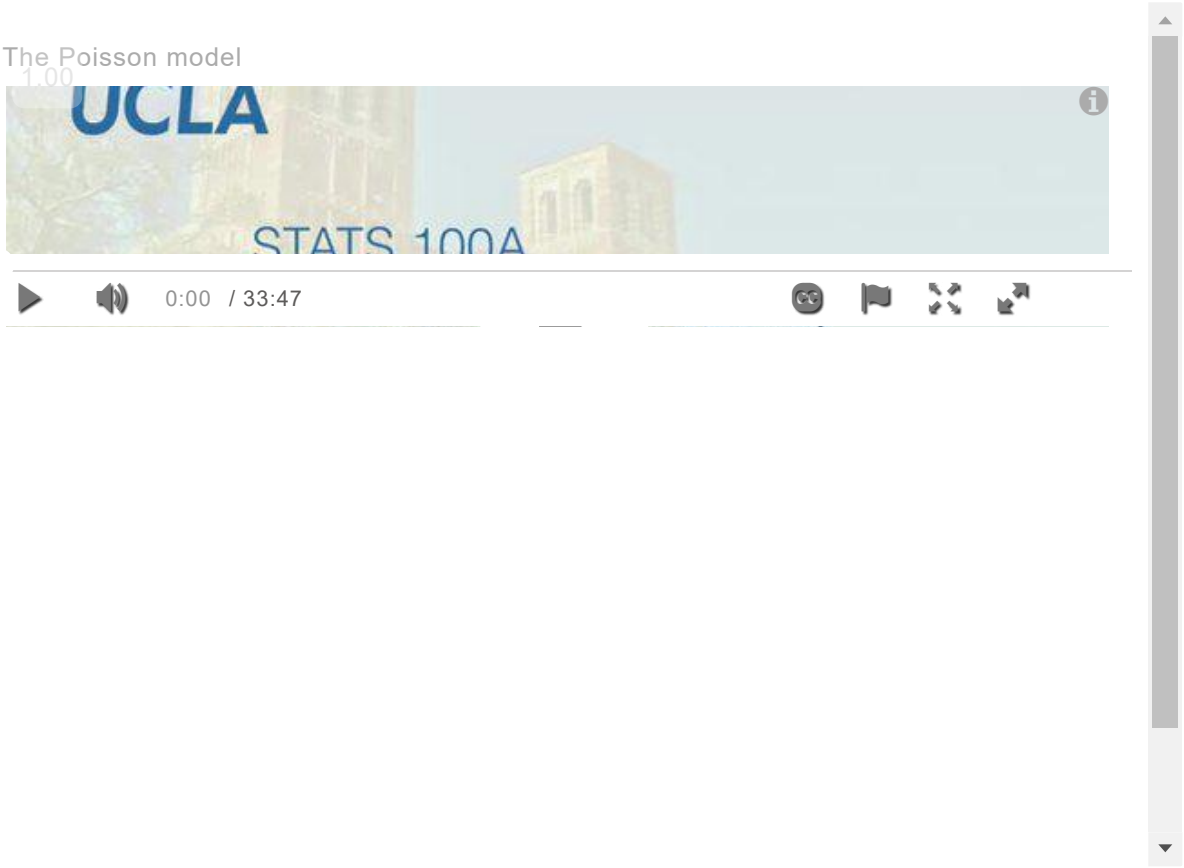
Get together with your group. Tally the numbers of scooters observed iddle (supply) per each

(https://bruinlearn.ucla.edu/courses/133166/modules/items/5068596)

Submit Assignment

(https://bruinlearn.ucla.edu/courses/133166/pages/week-4-biweekly-quiz-cognella?module_item_id=4815525)

View again the video on the Poisson process where we talked about grids and how we determined whether uniform scatter across the grid. This video will help you interpret your results and know how to do this part.



You will have to upload a drawing of your map or grid table indicating how many scooters you saw in each grid. In one column, the grid number, in the other the number of scooters. Submit the table with the tally and the drawn distribution with well labeled axes and answer whether this could have been *a uniform random scatter. Could you proceed as if this could be a Poisson process?*

1.4 Fit a Poisson model to see if right model

Regardless of your conclusion in part 1.3,

View again how we counted the baby births weeks ago and the test we did. (https://bruinlearn.ucla.edu/courses/133166/files/8537059?wrap=1)

View again Module week 4, and biweekly quiz question on extinctions. There is a

(https://bruinlearn.ucla.edu/courses/133166/modules/items/5068596)

Submit Assignment

Those documents above indicate how we tallied the number of babies per hour and how we tallied the number of extinctions in time blocks. You may use the same method for the Poisson part. You are not doing it per hour, but per cell of your grid.

With your group, and again with all the data from your group, **put together a table that tallies the number of scooters seen per cell in one column, and how many cells had that number of scooters.** This distribution, **and the plot with a distribution that has on the horizontal axis the number of scooters observed per cell (0,1,2,.....) and the vertical axis has the proportion of cells with that number of scooters must be submitted.** You may want to review again the baby births Poisson fitting and the exercise done in an assignment on extinctions posted above. **Determine and let us know whether the scooters per segment of grid follow a Poisson probability mass function and provide the estimated parameter lambda of the Poisson model. Use the Chi-square goodness of fit test that statisticians use.** You will want to follow the procedure used in those exercises mentioned above on the baby counts and the extinction counts. Remember that you are comparing the proportions predicted by the model and the proportions observed. Conduct the Chi-square test as in those handouts.

1.5 Conclusions of the experiment

Discuss what you found. Relate what you find to the article read in 1.1 above. Add the pros and cons of this experiment and how you could improve it.

One think that you need to add is the following: it is common to make the parameter lambda of a Poisson distribution depend on other variables that affect its value. It is a way of making the problem multivariate. The equation is written often as a linear model as follows:

lambda= a (variable 1) + b (variable 2) +.... +f(variable6)

What variables would you include to explain lambda at UCLA? Give some examples and justify your answer.

1.6 Does your brain construct probability mass functions?

The first parts of the article "Can the Brain Build Probability Distributions" by Lindskog (https://www.frontiersin.org/articles/10.3389/fpsyg.2021.596231/full) et al talks about an experiment. Discuss what these authors' experiment has in common with your group's experiment, both in terms of its goal and the approach to find an answer. You may ignore all the parts of the article talking about significant effect, p-values and CI, because those, although using probability, are

(https://bruinlearn.ucla.edu/courses/133166/modules/items/5068596)

Submit Assignment

Provide an example for each member of the group where you think your brain was using a probability distribution and which distribution to help you conclude something. Did your brain use a distribution similar to the one you observed before you did the field work to observe scooters?

Submit one homework per group.

Students in the group that do not contribute a large proportion of the work, will not be included in the filename.Everybody must work equal amount and contribute equal amount. **Please, be specific and write at the beginning of your document how much each member did. Names of the members must be at the top of the first page of the document.**

By June 1st, before 11:55 PM

- A pdf file with all of the items requested above.See above.
- For example, if the only two people working in my group are myself and Reynolds, my file would be Sanchez-Reynolds.pd. **Do not include the names of a student that did not contribute, made an effort to meet or do the work.**
- Your file must have the sections numbers and sections titles in the same order and identical to those given above. If there are no section numbers or section titles the pdf file will not be graded. We want to see how you answer each part. Label your parts by writing Part 1, Part 2, ...etc. Notice that some things are a map, a grid, ... so we will not put a page limit to allow you to put your plots and maps and drawings as you please, albeit in the order asked.
- **No late submissions and no other form of submissions are allowed.**

The group performance will be evaluated by each of you after the homework is submitted.

Homework 3 grading rubric (https://bruinlearn.ucla.edu/courses/133166/files/8537077?wrap=1)
(https://bruinlearn.ucla.edu/courses/133166/files/8537077/download?download_frd=1)

Keep in mind, this submission will count for everyone in your 100A Homework 2 Spring 2022 group.

C

(https://bruinlearn.ucla.edu/courses/133166/modules/items/5068596)

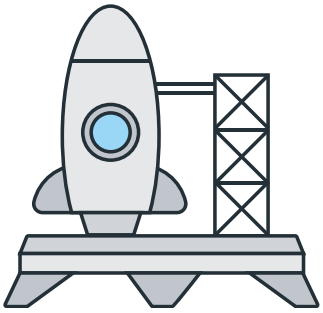
Submit Assignment

Upload

More

Canvas Files

or



Choose a file to upload

File permitted: PDF

(https://bruinlearn.ucla.edu/courses/133166/modules/items/5068596)

Submit Assignment