END 322 E Assignment 2

Due May 17, 2024

Submission Guidelines: Please submit your results as a single excel file via Ninova system. You can work on your assignment until the midnight of the due date. After that, it will be assessed according to the late homework policy.

We are given real world data about the service times in a call center (Download "Assignment 2 Data.xlsx" file from Ninova). For each customer, the start and end times of the call are recorded. With this data, total duration of the call is calculated in seconds (i.e. service time). You are asked to fit a distribution to for the service times in this call center and write small notes explaining each step you conducted. Add your comments in the same sheet you conduct your analyses.

1. By using Excel, create a histogram of the service times. Play with the bin sizes and inspect the shape of the histogram. Mention the bin sizes you used. Decide the type of the distribution considering the shape you see in the final histogram. Estimate the parameter(s) of the distribution using the data you have.

2. Again using Excel, create Quantile-Quantile and Probability-Probability plots. Comment on the fit of the distribution by looking at the plots.

3. Conduct a *Chi Square Goodness of Fit* test to check if distribution you selected is passing this test (if you can reject the H0). Do not use excel's Chi-square test function, apply the test by following these steps:

   - Select your E_i to be equal to 100 for all bins. Thus you will have total of 10 bins.
   - Divide probability space into 10 equal intervals $(0.1, 0.2, \ldots, 0.9)$. Find the time values corresponding to these probabilities by using inverse transformation. These time values will be the limits of your bins
   - By using *FREQUENCY* formula (or any other method) calculate the observed frequencies (O_i) in the data.

- Calculate χ^2 statistic and find the corresponding critical value from the table for $\alpha = 0.05$.

- State your verdict

4. Download and install EasyFit(https://easyfit.en.softonic.com/). Fit distributions using this program. In a separate Excel tab, report top 5 distributions that fits this data the best (EasyFit automatically tries all distributions, you don't need to try them one by one). Pay attention to what types of tests EasyFit do to check goodness of fit. Add screen shots from the results. If using EasyFit is not available for any reason, use a distribution fitting tool of your choosing.