Probability Theory Course Project

TASK 1

1. Select any file (large enough to have recordable download time) from the Internet and do the following:
Download the file three times (for example at 7 am, 12 pm and 10 pm. You are free to change the times) each day for a week.
Let the download times you record through the week at 7 am be $D7_i$ where i=1,…,7 (one download time at 7 am recorded per day). Similarly, the download times at 12 pm are $D12_i$, and those at 10 pm are $D10_i$.

2. Find three distributions that fit $D7_i$, $D12_i$, $D10_i$, respectively.

3. Answer the following questions in the conclusion section of your report:
a. Are the distributions similar?
b. In view of the distributions properties, do you recommend a particular time for downloading the file? If so, what is the expected gain in time saving based on your recommendation?
c. Try to repeat the experiment for a different file, located at a different server in different countries. How does your recommendation change? Try to relate your recommendation to server location and file size.

TASK 2

Use bluetooth to transfer a file between two wireless devices. Choose a suitable file size so that the transfer time is measurable (not too small). Find the distribution of file transfer time in each of the following cases:
a. by repeating the measurement at different times.
b. by repeating the measurement for different distances between the wireless devices.
c. by repeating for different file sizes.
Comment on your results. Relate your comments to distance between devices and file sizes. If you recommend a particular maximum distance between devices, explain in terms of the percentage improvement in transfer time.

TASK 3

Choose a set of random variables (for example the weight of an adult, his/her height, the weight of the transfer time in previous task). Take a sample of each variable and compute its mean from the sample you collected (for example 5 readings). Gradually, increase the sample size (for example to 10 readings, 12 then 15 and so on) until the mean you compute is independent from the sample size. Based on that recommend a suitable sample size for each variable for accurate estimation of the mean.

Regulations

1. You should work in teams including 8-10 students.
2. You should provide in your report the measured values, snapshots of any codes used in addition to illustrative figures. Comment clearly on all figures included in the report.
3. You should submit your project report on 10th January 2021.