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Probability and Applied Statistics

The Normal, Gamma, and Beta Probability Distribution

Normal Distribution is the most used continuous probability distribution according to the book. It’s basically data being visualized as symmetrically distributed with no skew on the visual. It almost looks like a upside down parabola the clustering mostly confined in the middle of the curve. On the top of the curve, we will find the mean, median and mode because they are all the same in this distribution. As the rest of the chapter 4, normal distribution uses integration to solve the areas under the normal density function. The formula requires evaluating a and b using integration, where 1 is divided by standard deviation multiplied by 2 times pi, and then multiplied by Euler raised to the power of negative variable y minus the mean raised to the 2nd power divided by 2 times standard deviation raised to the 2nd power as shown in figure 1 from the book. The evaluation of this distribution unfortunately requires the use of numerical integration techniques as we see in the explanation. As explained by the book, it’s not really feasible to use any types of software to solve normal distribution functions of variables because of decimal places needed to be gotten correctly.

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*figure 1*

Gamma Distribution refers to random variables that are always nonnegative which for various reasons, yield distributions of data that are skewed to the right, which means most of the density of the function is near the origin of (0,0). This greatly differs from the Normal Distribution since it’s not in the middle of the graph. This distribution also has two parameters like the other distribution in this chapter. Parameter alpha, sometimes called the shape parameter of the gamma distribution. We also have a parameter beta, which is also called the scale parameter “because multiplying a gamma-distributed random variable by a positive constant and thereby changing the scale on which the measurement is made produces a random variable that also has a gamma distribution with the same value of alpha (shape parameter) but with an altered value of beta. In the special case when alpha is an integer, the distribution function of a gamma-distributed random variable can be expressed as a sum of certain Poisson probabilities” (Wackerly et al., 2008).

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*figure 2*

Lastly, a Beta Distribution function is a density function that has two-parameter over the closed interval of 0 and 1. Unlike normal distribution and gamma distribution, there are different shapes of how beta distribution takes place due to the values of the two parameters. The apex or curve point could be near the origin like gamma distribution or could be in the middle just like a normal distribution. Also, the apex or curve could also be at the very far right away from origin unlike the other distribution. The parameters, just like in Gamma Distribution, are also called alpha and beta. Per the book, “The cumulative distribution function for the beta random variable is commonly called the incomplete beta function” (Wackerly et al., 2008). According to the book, the easiest way to calculate Beta probabilities is using software.

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*figure 3*

In conclusion, these three probability distributions are highly recommended if we are to use it to analyze a lot of different real life scenarios such as stock market, insurance claims, or even rainfall averages. If enough time was allocated in learning these distributions, I feel that it would be very beneficial to each and every student in the class by understanding the meaning behind each curve of the distributions and be able to take away some important statistical information to serve us. Chapter 4 in general included real life scenarios of how we can apply these theories and concept that help with everyday life and/or job application. They can be tedious in solving, as some of the complicated formulas in this chapter, but with the proper amount of learning time, it is achievable and will be beneficial. I hope that future classes under this class will be able to touch upon the three different probability distributions and be able to learn it even though their previous peers could not such as my class mates.

Work Cited

Wackerly, D. D., Mendenhall, W., & Scheaffer, R. L. (2008). Mathematical statistics with applications (7th ed.). Thomson Brooks/Cole.