Poisson Distrebution

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1 Introduction

Poisson distribution is one of the most famous and commonly used diagrams in statistics, it is a probability distribution that is used to show how many times an event is likely to occur over a specified period. In other words, it is a count distribution. In this experiment, see how it manifests while counting the number of counts over a period of time, and we will extract some of its parameters using CASSY Lab 2 software. The experiment will have two parts. we will check a radioactive source first then we will use the x-ray device and we will use it to show the Gaussian distribution.

2 Experimental Setup & Procedure

First, we adjusted the distance between the radioactive source and the GM tube so that a convenient rate of about 5 counts per second is obtained. Then In the CASSY Lab program, we selected the x-axis to be the count rate, and the y-axis - to be the frequency of occurrence with bars and n = 1000 for frequency distribution. the time interval was set to be 1s.

After conducting that, we then set the time interval to be 5s and took n = 500. Then we will start the second part of this experiment in which we will use x-ray source with a time interval of 5 seconds and we will take 500 reads.

3 Data & Analysis

3.1 Poisson Distribution

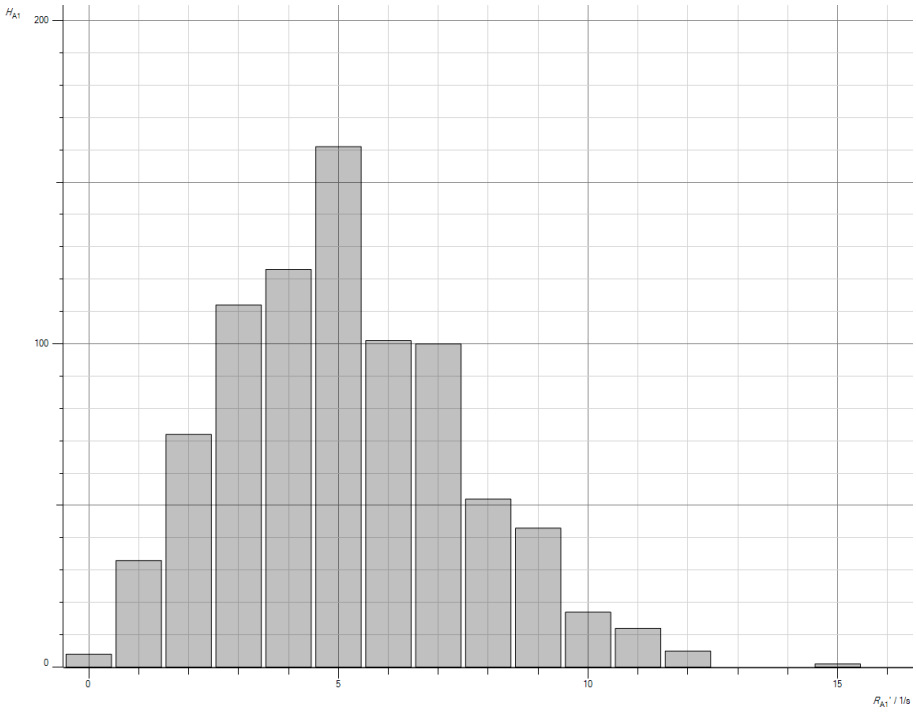

Figure 1. Using CASSY lab 2, we got this histogram for gamma source when n = 1000, $\Delta t = 1$ s.

Using CASSY lab 2 to calculate the poisson distribution parameters, it calculated σ to be 2.35 Counts/s and μ to be 5.13 Counts/s

3.2 Gaussian Distribution

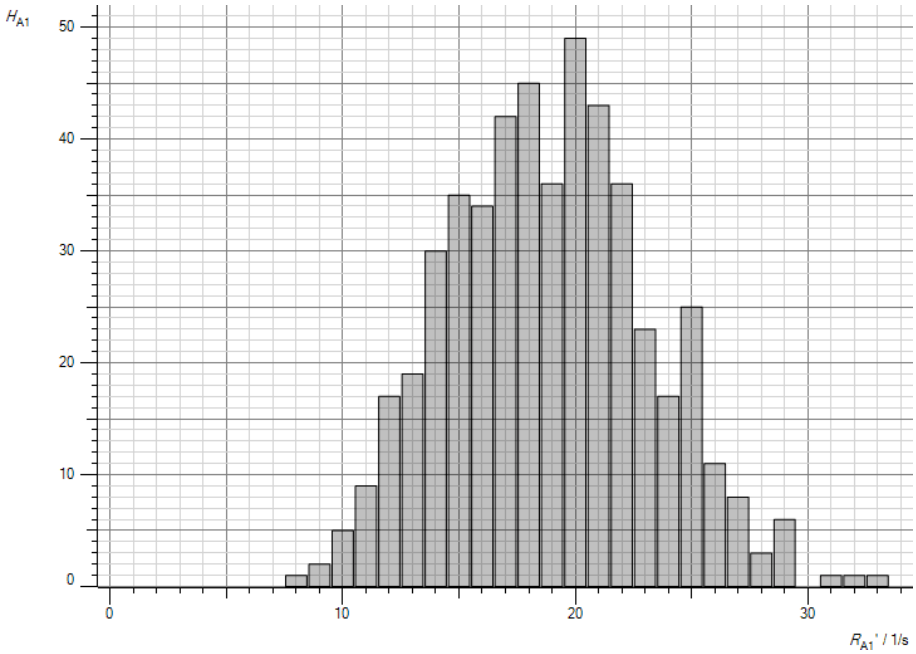

Figure 2. Using CASSY lab 2, we got this histogram for gamma source when n = 500, $\Delta t = 5$ s.

Using CASSY lab 2 to calculate the gaussian distribution parameters, it calculated σ to be 4.3 Counts/s and μ to be 18.9 Counts/s. In this part, the sample btought even closer to the GN detector to further ensure more accurate data, hence the increase of μ.

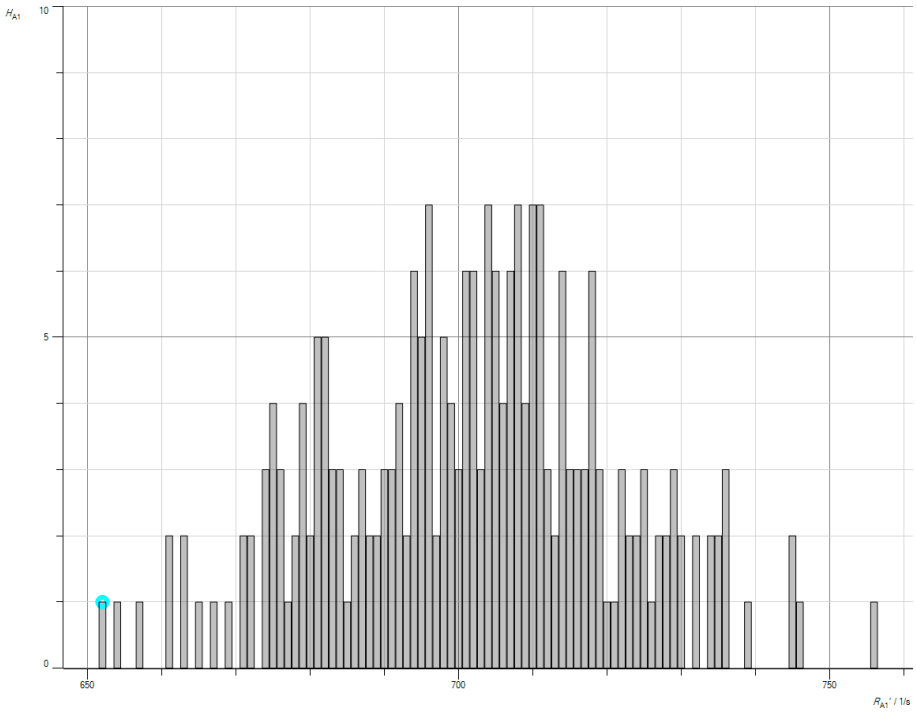

Figure 3. Using CASSY lab 2, we got this histogram for x-ray source when n = 500, $\Delta t = 5$ s.

Using CASSY lab 2 to calculate the gaussian distribution parameters, it calculated σ to be 19.0 Counts/s and μ to be 701.6 Counts/s.

4 Conclusion

We can see the behavior of counting experiments using data fitting, like we did here using gaussian and poisson fitting with the help of CASSY Lab 2 software.