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This branch is [11 commits ahead](#), [12 commits behind](#) master.

Cheffrey2000 fixed error message ...

on Oct 21, 2020  15[View code](#) README.md

# The Normal Distribution - Lab

## Introduction

In this lab, you'll learn how to generate random normal distributions in Python. You'll learn how to visualize a histogram and build a density function using the formula.

## Objectives

You will be able to:

- Use `numpy` to generate a random normal distribution
- Calculate the density function for normal distributions with a Python function
- Plot and interpret density plots and comment on the shape of the plot

## A quick refresher!

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Here's the formula for the normal distribution density function once more:

$$N(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

Here,

- $\mu$  is the mean
- $\sigma$  is the standard deviation
- $\pi \approx 3.14159$
- $e \approx 2.71828$

## First generate a normal distribution containing 5000 values with $\mu = 14$ and $\sigma = 2.8$

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```
# Generate a random normal variable with given parameters , n=5000
import numpy as np

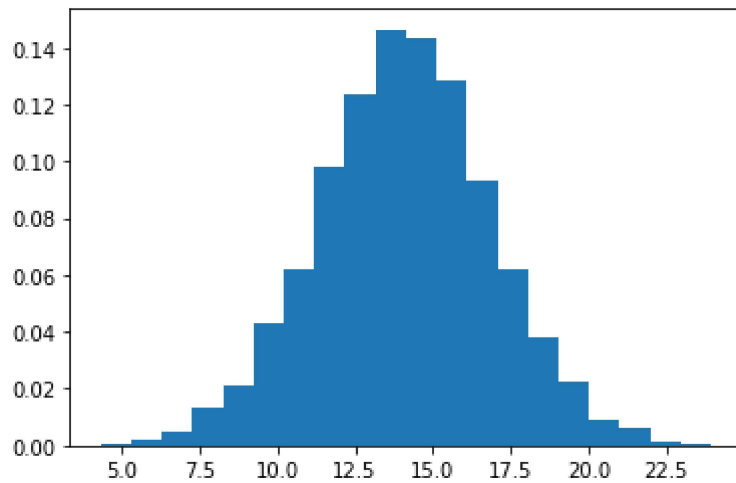
mu, sigma = 14, 2.8
n = 5000
s = np.random.normal(mu, sigma, n)
```

## Calculate a normalized histogram for this distribution in matplotlib, with bin size = 20

---

Make sure to get the bin positions and counts for each of the obtained bins. You can use [official documentation](#) to view input and output options for `plt.hist()`

```
import matplotlib.pyplot as plt
%matplotlib inline
# Create the bins and histogram
count, bins, ignored = plt.hist(s, 20, density=True)
```

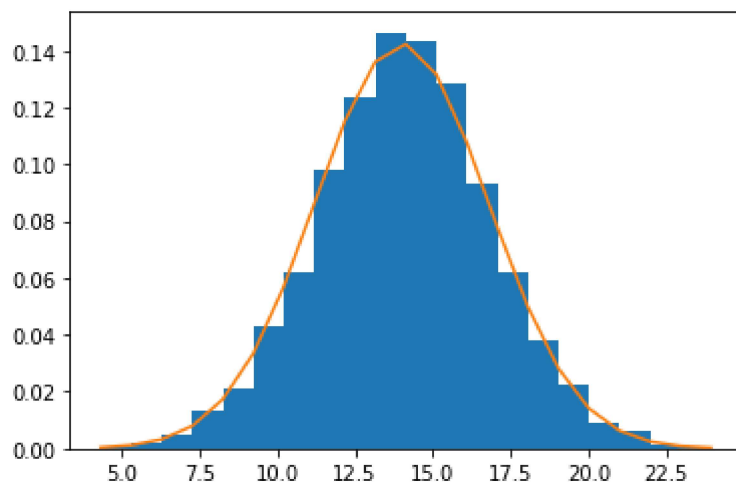


Use the formula to calculate the density function with  $\mu$ ,  $\sigma$  and bin information obtained before

```
# Calculate the normal Density function
density = 1/(sigma * np.sqrt(2 * np.pi)) * np.exp( - (bins - mu)**2 / (2 * sigma**2))
```

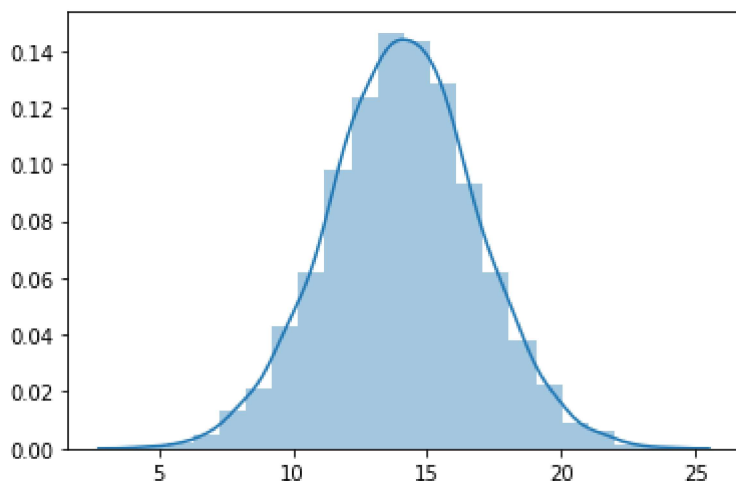
Plot the histogram and density function

```
# Plot histogram along with the density function
plt.hist(s, 20, density=True)
plt.plot(bins, density)
plt.show()
```



# Visualize the distribution using seaborn and plot the KDE

```
import seaborn as sns
import warnings
warnings.filterwarnings(action='ignore', category=FutureWarning)
sns.distplot(s, bins=20, kde=True);
```



## Summary

In this lab, you learned how to generate random normal distributions in Python using Numpy. You also calculated the density for normal distributions using the general formula as well as seaborn's KDE. Next, you'll move on to learn about the standard normal distribution and how normal distributions are used to answer analytical questions.

## Releases

No releases published

## Packages

No packages published

## Contributors 6



## Languages

● Jupyter Notebook 100.0%