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Article

Videos

Interview Questions

Overview

- Hypothesis testing is a key concept in statistics, analytics, and data science
- Learn how hypothesis testing works, the difference between Z-test and t-test, and other statistics concepts

Introduction

The coronavirus pandemic has made a statistician out of us all. We are constantly checking the numbers, making predictions on how the virus will play out, and generating hypotheses on when the “peak” will occur. Hypothesis building – the media is thriving on it.

For example, a news article from [CNBC](https://www.cnbc.com/2020/01/29/coronavirus-outbreak-could-potentially-be-seasonal.html) that mentioned this outbreak “could potentially be seasonal” and that the “virus may be seasonal like the flu and subsides in the summer.”

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Coronavirus outbreak is seasonal like the flu and subsides in the summer

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“The coronavirus outbreak is seasonal, including influenza and other diseases we do see a decrease in disease in spring and summer,” a top CDC official said.

So I started wondering – what else can we hypothesize about the coronavirus? Are adults more likely to be affected by the outbreak of coronavirus? How does Relative Humidity impact the spread of the virus? What is the evidence to support these claims? How can we test these hypotheses?

As a Statistics enthusiast, all these questions dig up my old knowledge about the fundamentals of Hypothesis Testing. In this article, we will discuss the concept of Hypothesis Testing and the difference between the Z Test and t-Test. We will then conclude our Hypothesis Testing learning using a COVID-19 case study.

Are you new to the world of statistics and analytics? You should go through the below resources as well:

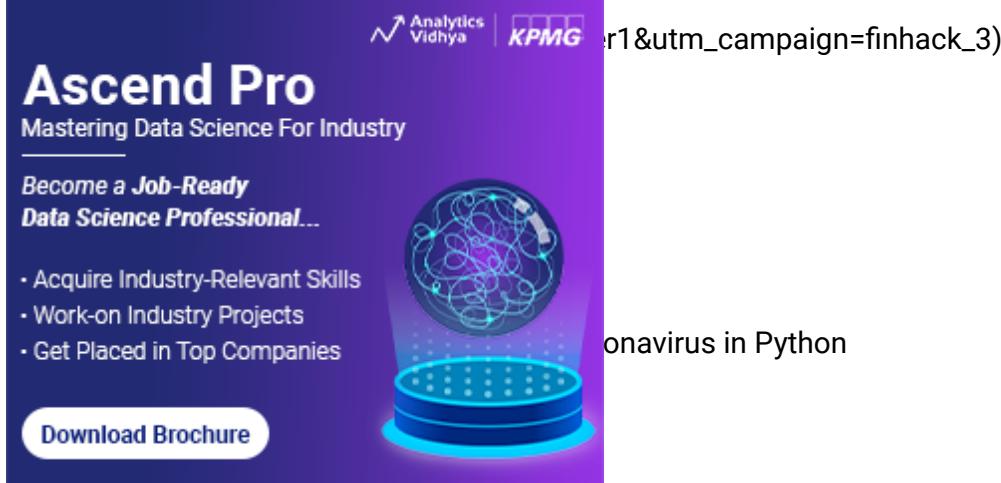
- [Introduction to Business Analytics \(\[https://courses.analyticsvidhya.com/courses/introduction-to-analytics?utm_source=blog&utm_medium=statistics-analytics-hypothesis-testing-z-test-t-test\]\(https://courses.analyticsvidhya.com/courses/introduction-to-analytics?utm_source=blog&utm_medium=statistics-analytics-hypothesis-testing-z-test-t-test\)\)](https://courses.analyticsvidhya.com/courses/introduction-to-analytics?utm_source=blog&utm_medium=statistics-analytics-hypothesis-testing-z-test-t-test)

- [Introduction to Data Science \(\[https://courses.analyticsvidhya.com/courses/introduction-to-data-science-2?utm_source=blog&utm_medium=statistics-analytics-hypothesis-testing-z-test-t-test\]\(https://courses.analyticsvidhya.com/courses/introduction-to-data-science-2?utm_source=blog&utm_medium=statistics-analytics-hypothesis-testing-z-test-t-test\)\)](https://courses.analyticsvidhya.com/courses/introduction-to-data-science-2?utm_source=blog&utm_medium=statistics-analytics-hypothesis-testing-z-test-t-test)



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(<https://datahack.analyticsvidhya.com/contest/ltsfscodatosciencefinhack3/z-test-t-test>)



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Fundamentals of Hypothesis Testing
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Let's take an example to understand the concept of Hypothesis Testing. A person is on trial for a criminal offense and the judge needs to provide a verdict on his case. Now, there are four possible combinations in such a case:



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We consider the **Null Hypothesis** to be true until we find strong evidence against it. Then, we accept the **Alternate Hypothesis**. We also determine the **Significance Level (α)** which can be understood as the Probability of (Judge Decided Guilty | Person is Innocent) in the previous example. Thus, if α is smaller, it will require more evidence to reject the Null Hypothesis. Don't worry, we'll cover all of this using a case study later.

the judge identifies the person as innocent
and the judge identifies the person as guilty
the judge identifies the person as innocent
the judge identifies the person as guilty

		The Person is	
		Innocent	Guilty
Innocent	No Error	Type 2 error	
	Guilty	Type 1 error	No Error

of error in the judgment – Type 1 error, when the verdict is against him while he was innocent
error, when the verdict is in favor of Person while he was guilty

he person is considered innocent until proven guilty. That means the law considers him "beyond a reasonable doubt". This phenomenon of "**Beyond a Reasonable Doubt**" is analogous to the Null Hypothesis. The probability (Judge Decided Guilty | Person is Innocent) should be small.

Truth about Population

		In inferential statistics	
		Null Hypothesis (H_0)	Alternative Hypothesis
	No error ($1 - \alpha$)	Type 2 error	
	Type 1 error (α)	No error	

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Steps to Perform Hypothesis testing

data-science-finhack-3/2

(https://www.analyticsvidhya.com/test/ltfs-financial-hackathon?utm_medium=medium&utm_campaign=finhack_3)

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(Population)

decision

STEP 2: Set the level of Significance (Criterion)

α

STEP 3: Compute test Statistics (Sample)



p

STEP 4: Make a decision based on p value

Steps 1 to 3 are quite self-explanatory but on what basis can we make a decision in step 4? What does this p-value (https://www.analyticsvidhya.com/blog/2019/09/everything-know-about-p-value-from-scratch-data-science/?utm_source=blog&utm_medium=statistics-analytics-hypothesis-testing-z-test-t-test) indicate?

We can understand this p-value as the measurement of the Defense Attorney's argument. If the p-value is less than α , we reject the Null Hypothesis or if the p-value is greater than α , we fail to reject the Null Hypothesis.



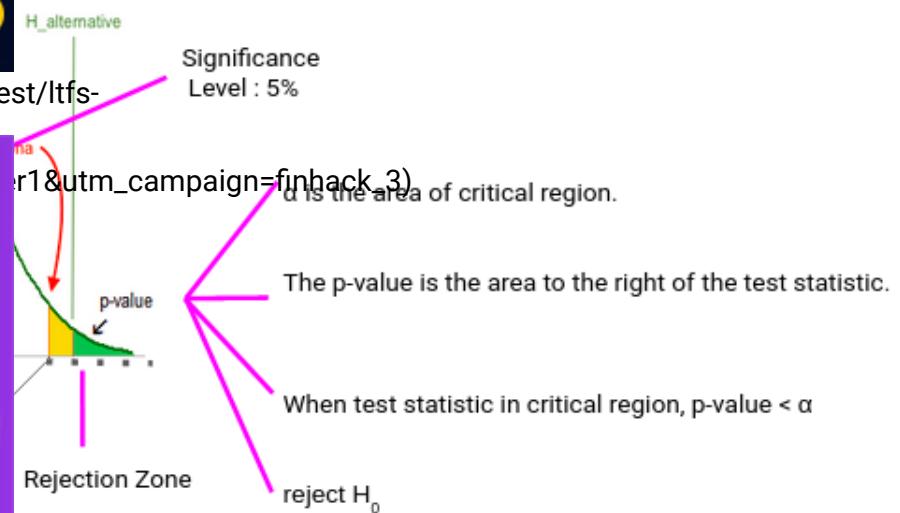
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Typically, we set the Significance level at 10%, 5%, or 1%. If our test score lies in the Acceptance Zone we fail to reject the Null Hypothesis. If our test score lies in the critical zone, we reject the Null Hypothesis and accept the Alternate Hypothesis.



Critical Value is the cut off value between Acceptance Zone and Rejection Zone.

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So the critical value and if the test score is greater than the critical value means our test score lies in the Rejection Zone and we reject the null hypothesis. On the opposite side, if the test score is less than the critical value means the test score lies in the Acceptance Zone and we accept the null hypothesis.

What is p-value? How do we use it to accept/reject hypotheses based on test scores and critical value?

p-value to make a decision about the hypothesis. We don't need to compute test scores and critical values for each significance level. Instead, we can directly compare the p-value to the significance level.

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So You're Saying There's a Chance.

This way we don't need to compute test scores and critical value for each significance level. We can get the p-value and directly compare it with the significance level.

Directional Hypothesis

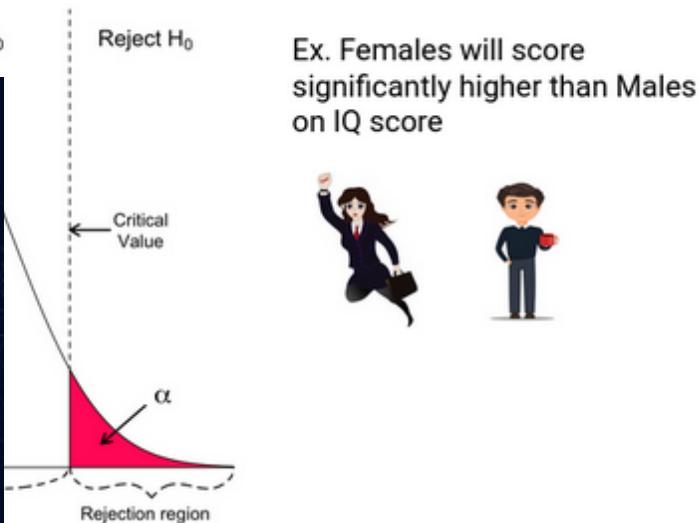
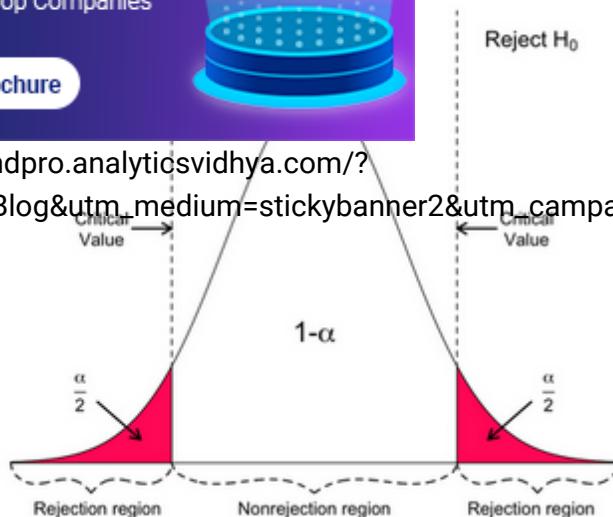
In the Directional Hypothesis, the null hypothesis is rejected if the test score is too large (for right-tailed) and too small (for left tailed). Thus, the rejection region for such a test consists of one part, which is either to the right or to the left of the center.

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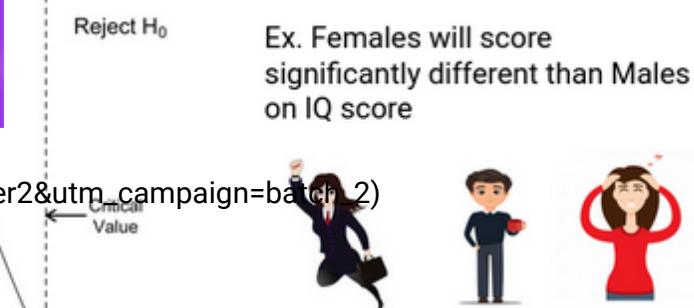
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Hypothesis is rejected if the test score is either too small or too large. A one-tailed test consists of two parts: one on the left and one on the right.



Ex. Females will score significantly different than Males on IQ score



What is the Z Test?

z tests are a statistical way of testing a hypothesis when either:

- We know the population variance, or



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Here's an Example to Understand a One Sample Z Test

Let's say we need to determine if girls on average score higher than 600 in the exam. We have the information that the standard deviation for girls' scores is 100. So, we collect the data of 20 girls by using random samples and record their marks. Finally, we also set our α value (significance level) to be 0.05.



(https://datahack.analyticsvidhya.com/contest/ltsfscodatosciencefinhack_3/)

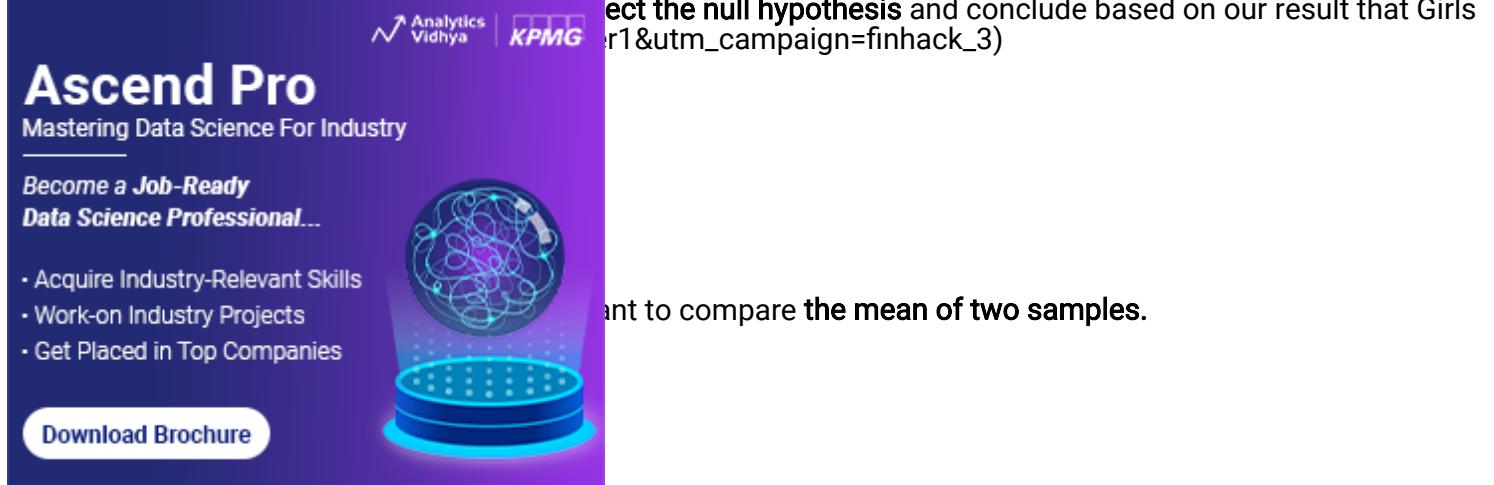


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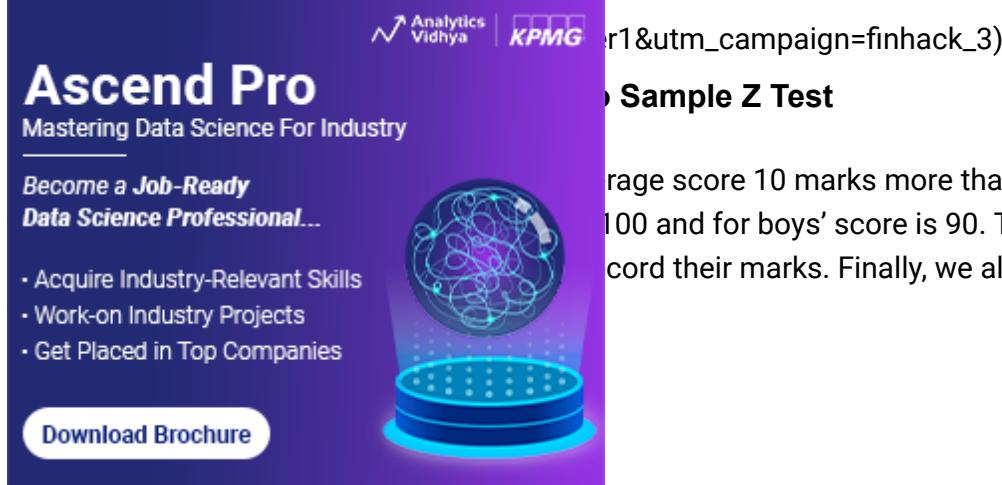
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(<https://datahack.analyticsvidhya.com/contest/ltsf-data-science-finhack-3/>)



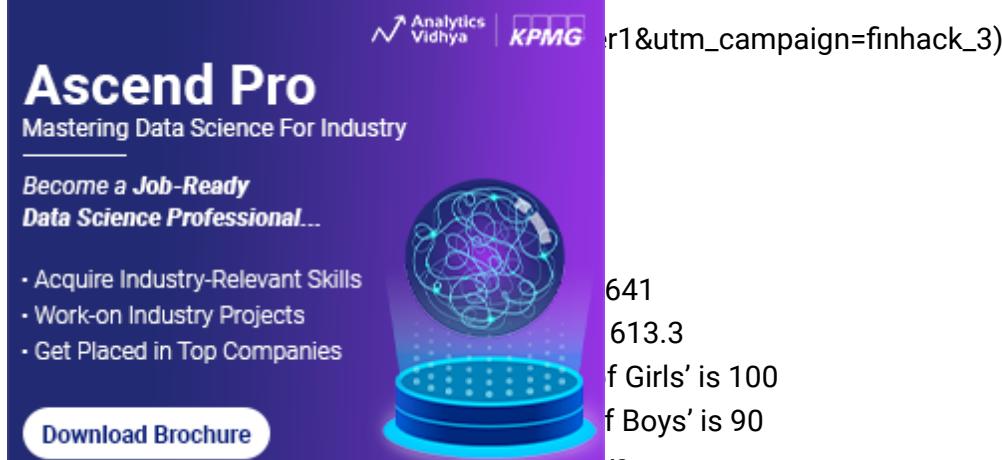
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(https://Difference-between-Mean-of-Population-is-10-utm_source=Blog&utm_medium=stickybanner2&utm_campaign=batch_2)



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(<https://datahack.analyticsvidhya.com/contest/ltdfs-fin-hack-3/>)
 Thus, we can conclude based on the P-value that we fail to reject the Null Hypothesis. We don't have enough evidence to say that girls score more than the boys. Pretty simple, right?



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One-Sample t-Test

We perform a One-Sample t-test when we want to **compare a sample mean with the population mean**. The difference from the Z Test is that we do **not have the information on Population Variance** here. We use the **sample standard deviation** instead of population standard deviation in this case.



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In this example:

- Mean Score for Girls is 606.8
- The size of the sample is 10
- The population mean is 600
- Standard Deviation for the sample is 13.14



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reject the null hypothesis and don't have enough evidence to support the hypothesis that on average girls score more than 600 in the exam.

<https://datascience.finhack.analyticsvidhya.com/contests/ltsf-data-science-finhack-3/>



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Here's an Example to Understand a Two-Sample t-Test

Here, let's say we want to determine if on average, boys score 15 marks more than girls in the exam. We do not have the information related to variance (or standard deviation) for girls' scores or boys' scores. To perform a t-test, we randomly collect the data of 10 girls and boys with their marks. We choose our α value (significance

Testing.



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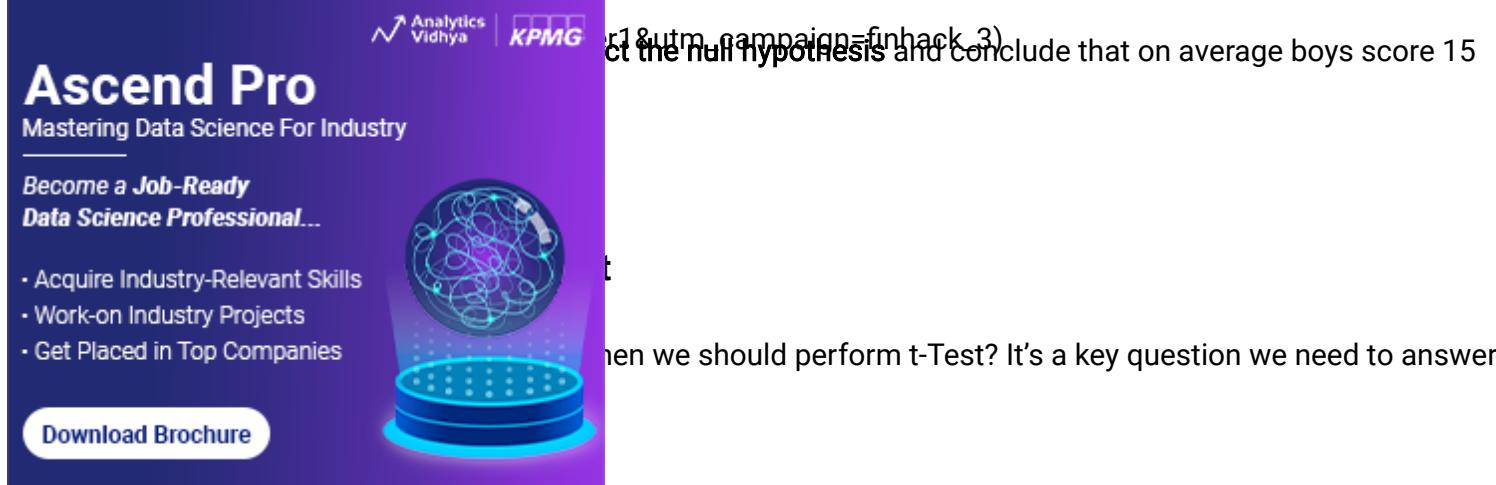


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If the sample size is large enough, then the Z test and t-Test will conclude with the same results. For a **large sample size**, **Sample Variance will be a better estimate of Population variance** so even if population variance is unknown, we can use the Z test using sample variance.

(<https://datahack.analyticsvidhya.com/contest/lvfs-fin-hack-3/>)

This dataset (https://covid19.rki.de/time/cases_per_day.csv) is taken from John Hopkins's repository and you can find the link [here](#)

(https://ascendpro.analyticsvidhya.com/?utm_source=Blog&utm_medium=stickybanner2&utm_campaign=batch_2)

And we have added the feature of **Temperature and Humidity** for Latitude and Longitude using Python's Weather API – *Pyweatherbit*. A common perception about COVID-19 is that Warm Climate is more resistant to the corona outbreak and we need to verify this using Hypothesis Testing. So what will our null and alternate hypothesis be?

- Null Hypothesis: Temperature doesn't affect COV-19 Outbreak
- Alternate Hypothesis: Temperature does affect COV-19 Outbreak

Note: We are considering Temperature below 24 as Cold Climate and above 24 as Hot Climate in our dataset.

```
import pandas as pd
import numpy as np
```



The banner for the DataScience FINHACK contest features the Analytics Vidhya logo at the top left and the L&T Financial Services logo at the top right. The main title 'DATASCIENCE FINHACK' is displayed prominently in large white and yellow letters. Below the title, it says 'Win Cash Prizes worth INR 3.5 Lacs & Interview Opportunities with LTFS'. It includes a calendar icon showing 'Jan 30 - Feb 7' and a yellow button labeled 'Register Now'.

(<https://datahack.analyticsvidhya.com/contest/lvfs-data-science-finhack-3/>)



The banner for Ascend Pro features the Analytics Vidhya logo at the top left and the KPMG logo at the top right. The main title 'Ascend Pro' is in large white letters, with the subtitle 'Mastering Data Science For Industry' below it. It says 'Become a Job-Ready Data Science Professional...' and lists three bullet points: 'Acquire Industry-Relevant Skills', 'Work-on Industry Projects', and 'Get Placed in Top Companies'. A blue button labeled 'Download Brochure' is at the bottom left, and a circular graphic with a brain-like pattern is in the center.

(https://ascendpro.analyticsvidhya.com/?utm_source=Blog&utm_medium=stickybanner2&utm_campaign=batch_2)

```
z_score = np.round(z,8)
p_val = np.round(p,6)

if (p_val<0.05):
    Hypothesis_Status = 'Reject Null Hypothesis : Significant'
else:
    Hypothesis_Status = 'Do not reject Null Hypothesis : Not Significant'

print (p_val)
print (Hypothesis_Status)
```

0.180286

Do not reject Null Hypothesis : Not Significant



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(<https://databack.analyticsvidhya.com/contest/lvfs-data-science-finhack-3/>)

Some states could be hiding the data for geopolitical reasons
<https://databack.analyticsvidhya.com/contest/lvfs-data-science-finhack-3/>



The banner for the Ascend Pro Mastering Data Science For Industry course. It features the Analytics Vidhya logo at the top left, the KPMG logo at the top right, and the text "Ascend Pro" in large bold letters. Below the title, it says "Mastering Data Science For Industry". A section titled "Become a Job-Ready Data Science Professional..." lists three bullet points: "Acquire Industry-Relevant Skills", "Work-on Industry Projects", and "Get Placed in Top Companies". A blue button says "Download Brochure". To the right of the text is a circular graphic showing a globe with data points and arrows.

For more details you can also read these articles:
[\(https://ascendpro.analyticsvidhya.com/?\)](https://ascendpro.analyticsvidhya.com/)

[utm_source=Blog&utm_medium=stickybanner2&utm_campaign=batch_2\)](https://ascendpro.analyticsvidhya.com/?utm_source=Blog&utm_medium=stickybanner2&utm_campaign=batch_2)

https://www.analyticsvidhya.com/blog/2015/09/hypothesis-testing-explained/?utm_source=blog&utm_medium=statistics-analytics-hypothesis-testing-z-test-t-test

- [Statistics for Data Science: Introduction to t-test and its Different Types \(with Implementation in R\)](https://www.analyticsvidhya.com/blog/2019/05/statistics-t-test-introduction-r-implementation/?utm_source=blog&utm_medium=statistics-analytics-hypothesis-testing-z-test-t-test)
https://www.analyticsvidhya.com/blog/2019/05/statistics-t-test-introduction-r-implementation/?utm_source=blog&utm_medium=statistics-analytics-hypothesis-testing-z-test-t-test

Always remember – “Statistics is the Grammar of Data Science”. Did you find this article useful? Can you think of any other applications of different statistical tests? Let me know in the comments section below and we can come up with more ideas.



You can also read this article on our Mobile APP



DATASCIENCE FINHACK

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(<https://www.analyticsvidhya.com/blog/2020/12/quick-guide-to-perform-ab-testing-for-data-science/>)

rr1&utm_campaign=finhack_3)



<https://www.analyticsvidhya.com/blog/2020/10/ab-testing-data-science/>

sting for Data Science using
- A Must-Read Guide for Data
sts

(<https://www.analyticsvidhya.com/blog/2020/12/quick-guide-to-perform-ab-testing-for-data-science/>)

(<https://www.analyticsvidhya.com/blog/2020/10/ab-testing-data-science/>)

Hypothesis Testing: A Way to Accept or Reject Your Hypothesis Using p-value

(<https://www.analyticsvidhya.com/blog/2020/07/hypothesis-testing-68351/>)

TAGS : [HYPOTHESIS BUILDING \(HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/HYPOTHESIS-BUILDING/\)](https://www.analyticsvidhya.com/blog/tag/hypothesis-building/), [HYPOTHESIS TESTING \(HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/HYPOTHESIS-TESTING/\)](https://www.analyticsvidhya.com/blog/tag/hypothesis-testing/), [STATISTICAL TESTS \(HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/STATISTICAL-TESTS/\)](https://www.analyticsvidhya.com/blog/tag/statistical-tests/), [STATISTICS \(HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/STATISTICS/\)](https://www.analyticsvidhya.com/blog/tag/statistics/), [STATISTICS FOR DATA SCIENCE](https://www.analyticsvidhya.com/blog/tag/statistics-for-data-science/)

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NEXT ARTICLE

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<https://www.analyticsvidhya.com/blog/2020/06/unlock-2020-machine-learning-business-analytics-programs/>

...

PREVIOUS ARTICLE

10 Advanced Excel Charts Every Analytics Professional Should Try

(<https://datascience.finhack.analyticsvidhya.com/blogs/10-advanced-excel-charts-every-analytics-professional-should-try/>)
data-science-finhack-3/2



[\(https://www.analyticsvidhya.com/blog/author/subhash/\)](https://www.analyticsvidhya.com/blog/author/subhash/)

(https://ascendpro.analyticsvidhya.com/?utm_source=Blog&utm_medium=stickybanner2&utm_campaign=batch_2)

18 COMMENTS

CATHERINE

[Reply](#)

June 18, 2020 at 9:01 am (<https://www.analyticsvidhya.com/blog/2020/06/statistics-analytics-hypothesis-testing-z-test-t-test/#comment-161932>).

For the one-sample T-test, shouldn't critical value > t-score ($1.833 > 1.64$)?

SUBHASH MEENA[Reply](#)

July 10, 2020 at 6:30 pm (<https://www.analyticsvidhya.com/blog/2020/06/statistics-analytics-hypothesis-testing-z-test-t-test/#comment-161944>)



The banner for the DataScience FINHACK contest. It features the Analytics Vidhya logo at the top left and the L&T Financial Services logo at the top right. The main title 'DATASCIENCE FINHACK' is prominently displayed in large white letters. Below it, a sub-headline reads 'Win Cash Prizes worth INR 3.5 Lacs & Interview Opportunities with LTFS'. A calendar icon indicates the event runs from Jan 30 - Feb 7. A yellow button labeled 'Register Now' is visible.

(<https://datahack.analyticsvidhya.com/contest/lvfs-data-science-finhack-3/>)



The banner for Ascend Pro. It features the Analytics Vidhya logo at the top left and the KPMG logo at the top right. The main title 'Ascend Pro' is displayed in large white letters, with a subtitle 'Mastering Data Science For Industry' below it. A section titled 'Become a Job-Ready Data Science Professional...' lists three bullet points: 'Acquire Industry-Relevant Skills', 'Work-on Industry Projects', and 'Get Placed in Top Companies'. A blue button labeled 'Download Brochure' is at the bottom left. A circular graphic in the center shows a brain with neural pathways.

(<https://ascendpro.analyticsvidhya.com/>)

Yes, Type I error is a rejection of Null Hypothesis even if its true (Verdict against the Person even if he is innocent) which is also the False Positive.

DHRUV[Reply](#)

June 18, 2020 at 5:47 pm (<https://www.analyticsvidhya.com/blog/2020/06/statistics-analytics-hypothesis-testing-z-test-t-test/#comment-161944>)

Hi Subhash, well written article! Thanks

SUBHASH MEENA[Reply](#)

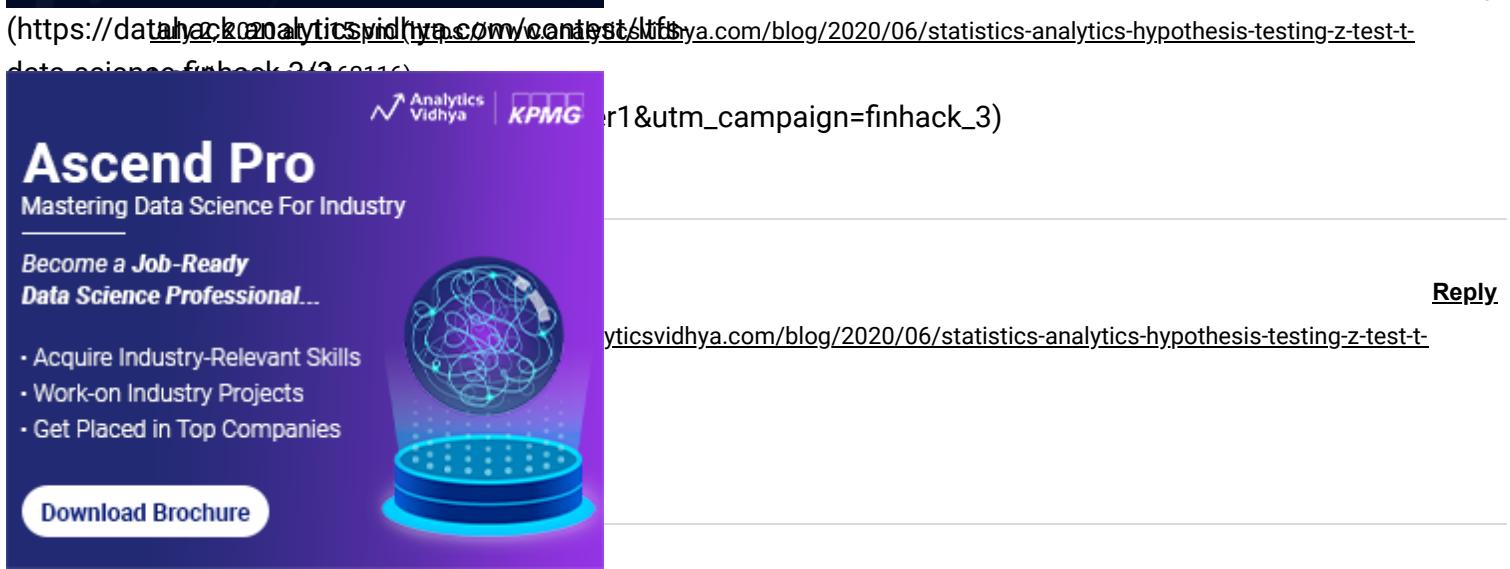
July 10, 2020 at 6:29 pm (<https://www.analyticsvidhya.com/blog/2020/06/statistics-analytics-hypothesis-testing-z-test-t-test/#comment-162211>)



The banner for the DataScience FINHACK competition. It features the Analytics Vidhya logo at the top left and the L&T Financial Services logo at the top right. The main title 'DATASCIENCE FINHACK' is displayed prominently in large white letters. Below the title, it says 'Win Cash Prizes worth INR 3.5 Lacs & Interview Opportunities with LTFS'. A calendar icon indicates the event runs from Jan 30 - Feb 7, and a yellow button says 'Register Now'. The background has a dark blue theme with a circuit board pattern.

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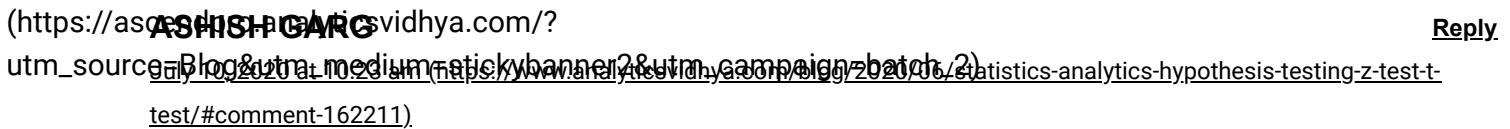
<https://www.analyticsvidhya.com/blog/2020/06/statistics-analytics-hypothesis-testing-z-test-t-test/#comment-162211>



The banner for Ascend Pro. It features the Analytics Vidhya logo at the top left and the KPMG logo at the top right. The main title 'Ascend Pro' is displayed in large white letters, with the subtitle 'Mastering Data Science For Industry' below it. A section titled 'Become a Job-Ready Data Science Professional...' lists three bullet points: 'Acquire Industry-Relevant Skills', 'Work-on Industry Projects', and 'Get Placed in Top Companies'. A blue button says 'Download Brochure'. The background has a purple gradient with a circular graphic showing a brain and data points.

[Reply](#)

<https://www.analyticsvidhya.com/blog/2020/06/statistics-analytics-hypothesis-testing-z-test-t-test/#comment-162211>



The banner for Ashish Meena's comment. It features the Analytics Vidhya logo at the top left and the text 'ASHISH MEENA' in large white letters. Below the name, it says 'Data Science Enthusiast' and 'Commenter'. A blue button says 'View Profile'. The background has a light blue gradient.

[Reply](#)

<https://www.analyticsvidhya.com/blog/2020/06/statistics-analytics-hypothesis-testing-z-test-t-test/#comment-162211>

Nice article.

I think two-sample Z-test computations are wrong.

SUBHASH MEENA

[Reply](#)

July 10, 2020 at 6:33 pm (<https://www.analyticsvidhya.com/blog/2020/06/statistics-analytics-hypothesis-testing-z-test-t-test/#comment-162211>)

Hi Ashish, Thanks for your feedback.

Would you please highlight the computations you found wrong?



GERALD[Reply](#)

(https://datahack.analyticsvidhya.com/contest/ltsfscodessciencefinhack?utm_source=Blog&utm_medium=stickybanner2&utm_campaign=batch_2)



(https://ascendpro.analyticsvidhya.com/?utm_source=Blog&utm_medium=stickybanner2&utm_campaign=batch_2)

SUBHASH MEENA[Reply](#)

August 24, 2020 at 11:04 pm (<https://www.analyticsvidhya.com/blog/2020/06/statistics-analytics-hypothesis-testing-z-test-t-test/#comment-162839>)

Hi Ishan,

That is actually:-

$$(630.1 - 606.8) - 15 / \sqrt{[(13.42)^2 / 10 + (13.14)^2 / 10]} = 2.23$$

For a two sampled test, DoF would be 18 here.

FAHIM[Reply](#)

August 6, 2020 at 10:25 am (<https://www.analyticsvidhya.com/blog/2020/06/statistics-analytics-hypothesis-testing-z-test-t-test/#comment-162603>)



The banner for the DataScience FINHACK contest. It features the Analytics Vidhya logo at the top left, the L&T Financial Services logo at the top right, and the text "DATASCIENCE FINHACK" in large bold letters. Below the title, it says "Win Cash Prizes worth INR 3.5 Lacs & Interview Opportunities with LTFS". It also shows a calendar icon indicating the event runs from Jan 30 - Feb 7 and a yellow "Register Now" button. The background has a dark blue theme with a circuit board pattern.

(<https://datahack.analyticsvidhya.com/contest/ltsfsc-data-science-finhack-3/>)



The banner for Ascend Pro. It features the Analytics Vidhya logo at the top left and the KPMG logo at the top right. The main heading is "Ascend Pro" with the subtitle "Mastering Data Science For Industry". Below this, it says "Become a Job-Ready Data Science Professional...". A list of benefits follows: "Acquire Industry-Relevant Skills", "Work-on Industry Projects", and "Get Placed in Top Companies". To the right is a circular graphic showing a brain with neural pathways. At the bottom left is a "Download Brochure" button.

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(<https://datahack.analyticsvidhya.com/contest/ltsf-data-science-finhack-3/>)



The banner for Ascend Pro. It features the Analytics Vidhya logo at the top left and the KPMG logo at the top right. The main title 'Ascend Pro' is in large white letters, with 'Mastering Data Science For Industry' in smaller text below it. A sub-section titled 'Become a Job-Ready Data Science Professional...' lists three bullet points: 'Acquire Industry-Relevant Skills', 'Work-on Industry Projects', and 'Get Placed in Top Companies'. To the right is a circular graphic showing a brain with arrows indicating thought processes. A blue button labeled 'Download Brochure' is at the bottom left. A small 'X' icon is in the top right corner of the banner area.

(https://ascendpro.analyticsvidhya.com/?utm_source=Blog&utm_medium=stickybanner&utm_campaign=batch_2) (<https://www.analyticsvidhya.com/blog/2020/12/10-data-science-projects-for-beginners/>)

Commonly used Machine Learning Algorithms (with Python and R Codes)

(<https://www.analyticsvidhya.com/blog/2017/09/common-machine-learning-algorithms/>)

Introductory guide on Linear Programming for (aspiring) data scientists

(<https://www.analyticsvidhya.com/blog/2017/02/introductory-guide-on-linear-programming-explained-in-simple-english/>)

Making Exploratory Data Analysis Sweeter with Sweetviz 2.0

(<https://www.analyticsvidhya.com/blog/2021/01/making-exploratory-data-analysis-sweeter-with-sweetviz-2-0/>)

40 Questions to test a data scientist on Machine Learning [Solution: SkillPower – Machine Learning, DataFest 2017] (<https://www.analyticsvidhya.com/blog/2017/04/40-questions-test-data-scientist-machine-learning-solution-skillpower-machine-learning-datafest-2017/>)

40 Questions to test a Data Scientist on Clustering Techniques (Skill test Solution)
[\(https://www.analyticsvidhya.com/blog/2017/02/test-data-scientist-clustering/\)](https://www.analyticsvidhya.com/blog/2017/02/test-data-scientist-clustering/)



The banner for the DataScience FINHACK contest features the Analytics Vidhya logo at the top left and the L&T Financial Services logo at the top right. The main title 'DATASCIENCE FINHACK' is prominently displayed in large white letters. Below it, a circular graphic shows a '3' surrounded by blue dots connected by lines, representing a neural network or graph. A purple button with a play and stop icon is on the right. The text 'Win Cash Prizes worth INR 3.5 Lacs & Interview Opportunities with LTFS' is written in yellow. At the bottom, a calendar icon indicates the event dates from Jan 30 to Feb 7, and a yellow button says 'Register Now'.

[\(https://datahack.analyticsvidhya.com/contest/ltsfsc-hackathon-2020/\)](https://datahack.analyticsvidhya.com/contest/ltsfsc-hackathon-2020/)



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[Key Questions You Should Answer Before Transitioning into Data Science \(https://www.analyticsvidhya.com/16-key-questions-data-science-career-transition/\)](https://ascendpro.analyticsvidhya.com/16-key-questions-data-science-career-transition/)

&utm_source=Blog&utm_medium=stickybar&utm_campaign=match_2)

NOVEMBER 23, 2020



Here's What You Need to Know to Become a Data Scientist!

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JANUARY 22, 2021



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[\(https://www.analyticsvidhya.com/blog/2020/11/how-to-have-a-career-in-data-science-business-analytics/?utm_source=Blog&utm_medium=CareerResourceWidget\)](https://www.analyticsvidhya.com/blog/2020/11/how-to-have-a-career-in-data-science-business-analytics/?utm_source=Blog&utm_medium=CareerResourceWidget)

NOVEMBER 3, 2020

NOVEMBER 26, 2020

[Should I become a data scientist \(or a business analyst\)?
utm_source=Blog&utm_medium=CareerResourceWidget\)](https://www.analyticsvidhya.com/blog/2020/11/become-data-scientist-business-analyst/?utm_source=Blog&utm_medium=CareerResourceWidget)

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NOVEMBER 24, 2020



The banner features the Analytics Vidhya logo at the top left and the KPMG logo at the top right. The main title "Ascend Pro" is displayed in large white letters. Below it, a subtitle reads "Mastering Data Science For Industry". A section titled "Become a Job-Ready Data Science Professional..." lists three bullet points: "Acquire Industry-Relevant Skills", "Work-on Industry Projects", and "Get Placed in Top Companies". A blue button labeled "Download Brochure" is at the bottom left. A central image shows a glowing blue cylinder with a globe inside, surrounded by a network of lines.

[What You Need To Know To Become a Data Scientist!
utm_source=Blog&utm_medium=stickybanner2&utm_campaign=batch_2\)](https://www.analyticsvidhya.com/blog/2021/01/heres-what-you-need-to-know-to-become-a-data-scientist/?utm_source=Blog&utm_medium=stickybanner2&utm_campaign=batch_2)

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Kaggle Grandmaster Series – Exclusive Interview with 2x Kaggle Grandmaster Marios Michailidis
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JANUARY 21, 2021

Understanding Architecture of LSTM (<https://www.analyticsvidhya.com/blog/2021/01/understanding-architecture-of-lstm/>)

JANUARY 21, 2021

DATASCIENCE FINHACK 3

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Jan 30 - Feb 7 **Register Now**

(<https://datahack.analyticsvidhya.com/contest/ltsf-data-science-finhack-3/>)

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