COMPLETE

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Revision Questions

Instructor: Applied AI Course **Duration:** 30 mins

Revision Questions:

What is PDF?(https://www.appliedaicourse.com/lecture/11/applied-machine-learning-onlinecourse/2842/gaussiannormal-distribution-and-its-pdfprobability-density-function/2/module-2data-science-exploratory-data-analysis-and-data-visualization)

What is CDF?https://www.appliedaicourse.com/lecture/11/applied-machine-learning-onlinecourse/2843/cdfcumulative-distribution-function-of-gaussiannormal-distribution/2/module-2data-science-exploratory-data-analysis-and-data-visualization

explain about 1-std-dev, 2-std-dev, 3-std-dev range?

What is Symmetric distribution, Skewness and Kurtosis? https://www.appliedaicourse.com/lecture/11/applied-machine-learning-onlinecourse/2844/symmetric-distribution-skewness-and-kurtosis/2/module-2-data-scienceexploratory-data-analysis-and-data-visualization

How to do Standard normal variate (z) and standardization? https://www.appliedaicourse.com/lecture/11/applied-machine-learning-onlinecourse/2845/standard-normal-variate-z-and-standardization/2/module-2-data-scienceexploratory-data-analysis-and-data-visualization

What is Kernel density estimation?https://www.appliedaicourse.com/lecture/11/appliedmachine-learning-online-course/2846/kernel-density-estimation/2/module-2-data-scienceexploratory-data-analysis-and-data-visualization

Importance of Sampling distribution & Central Limit theoremhttps://www.appliedaicourse.com/lecture/11/applied-machine-learning-onlinecourse/2847/sampling-distribution-central-limit-theorem/2/module-2-data-scienceexploratory-data-analysis-and-data-visualization

Importance of Q-Q Plot: Is a given random variable Gaussian distributed? https://www.appliedaicourse.com/lecture/11/applied-machine-learning-online-course/2848/qq-plothow-to-test-if-a-random-variable-is-normally-distributed-or-not/2/module-2-datascience-exploratory-data-analysis-and-data-visualization

What is Uniform Distribution and random number generatorshttps://www.appliedaicourse.com/lecture/11/applied-machine-learning-onlinecourse/2850/how-to-randomly-sample-data-points-uniform-distribution/2/module-2-datascience-exploratory-data-analysis-and-data-visualization

What Discrete and Continuous Uniform distributions?

https://www.appliedaicourse.com/lecture/11/applied-machine-learning-onlinecourse/2849/discrete-and-continuous-uniform-distributions/2/module-2-data-scienceexploratory-data-analysis-and-data-visualization

How to randomly sample data points?https://www.appliedaicourse.com/lecture/11/appliedmachine-learning-online-course/2850/how-to-randomly-sample-data-points-uniformdistribution/2/module-2-data-science-exploratory-data-analysis-and-data-visualization

Explain about Bernoulli and Binomial distribution? https://www.appliedaicourse.com/lecture/11/applied-machine-learning-onlinecourse/2851/bernoulli-and-binomial-distribution/2/module-2-data-science-exploratory-dataanalysis-and-data-visualization

Plotting for exploratory data analysis (EDA)					
L ir	Linear Algebra				
■ Pr	obability and Statistics				
③ 3.1	Introduction to Probability and Statistics ✔	1 7 min			
③ 3.2	Population and Sample ✔	o 7 min			
③ 3.3	Gaussian/Normal Distribution and its PDF(Probability Density Function) ✓	② 27 mir			
3 .4	CDF(Cumulative Distribution function) of Gaussian/Normal distribution ✓	11 mir			
③ 3.5	Symmetric distribution, Skewness and Kurtosis ✔	25 mir			
③ 3.6	Standard normal variate (Z) and standardization ✔	6 min			
③ 3.7	Kernel density estimation ✔	7 min			
3 .8	Sampling distribution & Central Limit theorem ✔	19 mir			
③ 3.9	Q-Q plot:How to test if a random variable is normally distributed or not? ✓	23 mir			
3 .10	How distributions are used? ✔	17 mir			
3 .11	Chebyshev's inequality 🗸	20 mir			
3 .12	Discrete and Continuous Uniform distributions ✔	13 mir			
© 3.13	How to randomly sample data points (Uniform Distribution)	10 mir			
© 3.14	Bernoulli and Binomial Distribution ✔	11 mir			
© 3.15	Log Normal Distribution ✔	12 mir			
© 3.16	Power law distribution ✔	12 mir			
© 3.17	Box cox transform ✔	12 mir			
(Applications of non-gaussian	26 mir			

What is Log-normal and power law distribution? https://www.appliedaicourse.com/lecture/11/applied-machine-learning-online-course/2852/log-normal-distribution/2/module-2-data-science-exploratory-data-analysis-and-data-visualization

What is Power-law & Pareto distributions: PDF, exampleshttps://www.appliedaicourse.com/lecture/11/applied-machine-learning-online-course/2853/power-law-distribution/2/module-2-data-science-exploratory-data-analysis-and-data-visualization

Explain about Box-Cox/Power transform?https://www.appliedaicourse.com/lecture/11/applied-machine-learning-online-course/2854/box-cox-transform/2/module-2-data-science-exploratory-data-analysis-and-data-visualization

What is Co-variance?https://www.appliedaicourse.com/lecture/11/applied-machine-learning-online-course/2855/co-variance/2/module-2-data-science-exploratory-data-analysis-and-data-visualization

Importance of Pearson Correlation Coefficient?

https://www.appliedaicourse.com/lecture/11/applied-machine-learning-online-course/2856/pearson-correlation-coefficient/2/module-2-data-science-exploratory-data-analysis-and-data-visualization

Importance Spearman Rank Correlation Coefficient?

https://www.appliedaicourse.com/lecture/11/applied-machine-learning-online-course/2857/spearman-rank-correlation-coefficient/2/module-2-data-science-exploratory-data-analysis-and-data-visualization

Correlation vs Causation?https://www.appliedaicourse.com/lecture/11/applied-machine-learning-online-course/2858/correlation-vs-causation/2/module-2-data-science-exploratory-data-analysis-and-data-visualization

What is Confidence Intervals?https://www.appliedaicourse.com/lecture/11/applied-machine-learning-online-course/2859/confidence-interval-ci-introduction/2/module-2-data-science-exploratory-data-analysis-and-data-visualization

Confidence Interval vs Point estimate?

Explain about Hypothesis testing?https://www.appliedaicourse.com/lecture/11/applied-machine-learning-online-course/2863/hypothesis-testing-methodology-null-hypothesis-p-value/2/module-2-data-science-exploratory-data-analysis-and-data-visualization

Define Hypothesis Testing methodology, Null-hypothesis, test-statistic, p-value? https://www.appliedaicourse.com/lecture/11/applied-machine-learning-online-course/2863/hypothesis-testing-methodology-null-hypothesis-p-value/2/module-2-data-science-exploratory-data-analysis-and-data-visualization

How to do K-S Test for similarity of two distributions?

https://www.appliedaicourse.com/lecture/11/applied-machine-learning-online-course/2865/k-s-test-for-similarity-of-two-distributions/2/module-2-data-science-exploratory-data-analysis-and-data-visualization

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103 Comment(s) Leave a response	search comments	Search	
Format →			

3.18	distributions? ✓			
6 3.19	Co-variance ✓	14 min		
3 .20	Pearson Correlation Coefficient 🗸	13 min		
⑤ 3.21	Spearman Rank Correlation Coefficient ✔	7 min		
⑤ 3.22	Correlation vs Causation ✔	5 min		
3 .23	How to use correlations? ✔	13 min		
3 .24	Confidence interval (C.I) Introduction ✓	8 min		
() 3.25	Computing confidence interval given the underlying distribution	11 min		
3 .26	C.I for mean of a random variable	14 min		
3 .27	Confidence interval using bootstrapping ✓	18 min		
3 .28	Hypothesis testing methodology, Null-hypothesis, p-value ✔	16 min		
3 .29	Hypothesis Testing Intution with coin toss example	27 min		
3 .30	Resampling and permutation test	15 min		
() 3.31	K-S Test for similarity of two distributions ✓	15 min		
6 3.32	Code Snippet K-S Test ✔	6 min		
3 .33	Hypothesis testing: another example ✔	18 min		
3 .34	Resampling and Permutation test: another example ✔	19 min		
3 .35	How to use hypothesis testing? ✔	23 min		
3 .36	Proportional Sampling 🗸	18 min		
3 .37	Revision Questions	30 min		
Interview Questions on Probability and statistics				
Dimensionality reduction and Visualization:				
PCA(principal component analysis)				
(t-SNE)T-distributed Stochastic Neighbourhood Embedding				

Reduction

Interview Questions on Dimensionality

Module 2: Live Sessions

Submit

🚨 Aarju Gupta

Hello sir.... In starting you told.... First apply breadth first search to learn concept.... I watch video.... Understand but don't go in deep.... But when i see comments of people.... I terrify and doubt on my self...whether I am studying correctly or not..... If every endings of video if i am going to deep it becomes some time boring to me..... I understand video content after watching 2 or more videos (because of chain)what should I do.... To learn content very better way....







Nov 17, 2019 12:35 PM

Applied AI Course Team1

Learn from videos -> go for blogs -> learn from various sources for deeper understanding like books/you tube/MIT courses/coursera. Every topic can be very deep so you should know when to stop.





Nov 17, 2019 22:11 PM

shubhamag

■ 13 Votes

How do we estimate the parameters for a given distribution(ex: uniform distribution) for a given set of data? (One of the interview questions).







Feb 01, 2019 19:07 PM

shubhamag

I understood this can be achieved using Maximum Likelihood estimation. This is the text on its Wikipedia page:

"In statistics, maximum likelihood estimation (MLE) is a method of estimating the parameters of a statistical model, given observations. The method obtains the parameter estimates by finding the parameter values that maximize the likelihood function. The estimates are called maximum likelihood estimates, which is also abbreviated as MLE.

The method of maximum likelihood is used with a wide range of statistical analyses. As an example, suppose that we are interested in the heights of adult female penguins, but are unable to measure the height of every penguin in a population (due to cost or time constraints). Assuming that the heights are normally distributed with some unknown mean and variance, the mean and variance can be estimated with MLE while only knowing the heights of some sample of the overall population. MLE would accomplish that by taking the mean and variance as parameters and finding particular parametric values that make the observed results the most probable given the normal model."

I had few doubts here:

- 1. What is the meaning of likelihood function here and why are we maximizing it?
- 2. Did not understand the last line.

Applied AI Course

Audio reply: https://soundcloud.com/applied-ai-course/maximum-likelihood

➡ Reply 🖺

Feb 02, 2019 15:17 PM

shubhamag

Hi. Thanks a lot for the efforts to record the audio to explain the concept. Really appreciate this. But there seems to be a problem with the audio. There is no audio after 1-minute mark. Could you please recheck this?

Thanks.

← Reply 🖺

Feb 02, 2019 18:11 PM

Applied AI Course

Updated the above link. Thank you for pointing the recording error.

➡ Reply

Feb 03, 2019 16:23 PM

shubhamag

I am sorry but this time there is no audio after 3 minute mark. I understood the concept till 3 minute mark. I get that creating the audio reply again could be frustrating for you. If you want, you can give me the remaining answer in text form as well. :)

➡ Reply 🖺

Feb 03, 2019 16:33 PM

Applied Al Course

Sorry, updated again and tested that the audio is complete this time around. It is easier and faster to convey slightly complex concepts over audio than text and hence we sometimes prefer it.

Reply 🖺

Feb 04, 2019 01:28 AM

a shashank vangolu

Hello sir,

I understand that MLE is used to estimate the parameters from the observed sample data we have. (i.e., finding out the best parameters for the population sample by finding out the best probability of how these samples got these parameters.)

doubt: Once we find out the estimators, what would be our next step, why is this useful?

doubt 2: we can just use the sample data and predict the confidence interval for our population sample. why go for all these MLE stuff?

Please correct me if I am wrong

Thank you, sir

doubt 3:In the end, you told that, we perform optimization for this method. can you please provide me a gist about that. or provide me any good reference?

Thank you

➡ Reply 🖺

Aug 11, 2019 05:50 AM

please check this video. You can use MLE to derive the many ML algorithms like Logistic regression, you can check probabilistic interpretation of LR (You will have a log liklihood function and will eatimate the params by maximizing that liklihood fn)

Reply

Aug 13, 2019 16:22 PM

Vinit Neogi

I watched the above video and audio reply by Sir, I wanted to clarify few doubts.

- 1. Is MLE an alternative to Confidence Intervals? If so, when should one use one over the another.
- 2. We know the samples, sample mean and sample std-dev (assuming normal dist). Does sample mean and sample std-dev help in calculating the MLE or likelihood function? As per my understanding, Likelihood function finds the probability that given some value of population mean and population std-dev, what is the probability of observing value x (sample).
- 3. Does the procedure for MLE start with a random value for population mean and std-dev, find Likelihood function and then make small changes to it until we find the max value.

Reply

May 26, 2020 14:10 PM

AppliedAl Team

- 1 No, both will serve different purposes.
- 2. MLE estimates parameters of distribution using likelihood probability.

Likelihood probability nothing but a conditional probability so we will find the condition where we the maximum probability. so to get the probability with respect to all the points, we can use the joint probability with respect to all the points and we can get the parameter values that maximize that joint probability. in the stats, we will assume all are independent samples so you can get the joint probability as the multiplication of individual probabilities. so we will maximize the multiplication of individual probabilities. You can solve this using Bayesian inference or basic iterative GD.

Reply

May 27, 2020 13:13 PM

Raman Sharma

- Hi. I've understood how MLE can be used on a given sample "assuming" the data comes from a normal distribution. I have a doubt:
- (1) But what happens when we have no clue what type of distribution it comes from? Do we have to do MLE for a variety of different distribution assumptions?
- (2) If yes, then how do we decide which is best suitable, because all we'll have after MLE are well estimated parameters for a particular distribution?

Reply

Aug 20, 2020 16:21 PM

Applied AI Course Team1

Well I would suggest you to get through this link to get some idea https://www.google.com/url?

sa=t&source=web&rct=j&url=https://www.projectrhea.org/rhea/index.php/Maximum_Lik

elihood_Estimation_Analysis_for_various_Probability_Distributions&ved=2ahUKEwiqk9T SuKrrAhWo9XMBHQt9AZMQFjAAegQIBRAB&usg=AOvVaw15EzqbtdUWg7DzRqwB_x0A

Kirandeep Marala

Hi Team, Thanks for The Audio..Nicely Explained..Does These Type of Questions Also asked in Actual Interviews[Maximum Likelihood]..Thank you..



Feb 04, 2021 11:01 AM

≗+ team aaic

Yes, can be asked, mostly It depends on the interviewer and profile.



Feb 04, 2021 15:13 PM

Applied AI Course

This differs for every distribution. For Uniform, a and b are the parameters and are the min and max values. So, given a sample, you pick the max and min values as estimates of a and b often written as a_hat and b_hat. These are crude estimates. There are more refined estimates

For Gaussian, we use the sample mean and sample std-dev as estimates of mu and sigma.

For any distribution, you can find a section called "parameter estimation" on it's Wikipedia page which gives more details on this topic.



Feb 02, 2019 08:58 AM

Amneet Singh

I understand what you are saying about the Maximum liklehood fucntions we can estimate the parameters.

so suppose we hie 100 samples what we want is the our sample mean ans std.. is approximitly similar to population mean and std..

so we choose mean and std that has the maximum liklehood or probalility in these samples to generate these 100 samples.

as u said that this is the optimizaiotn problem-> but as we are taking the average of the sample and taking the mean so this is also same as this maximum liklehod defination - because Mean is the average (it means maximum data close to this).so this has the maximum probablility to chosen in out dataset.

is my understanding is correct?



Mar 13, 2019 05:10 AM

♣ AppliedAI

yes, right.



Mar 13, 2019 17:15 PM

Rishabh Rao

https://www.youtube.com/watch?v=Dn6b9fCIUpM

the mean and std deviation from the maximum likelihood estimation come out to be the same as that of the sample's std dev and mean. Then how does it help to estimate the parameters of population? And what good does it do then?



Sep 05, 2020 13:46 PM

♣ team aaic

maximum-likelihood estimation gives the approximation for the population mean and sigma given sample data, and if we know the population data follows the normal distribution, and the sample size is increasing then we are more approximate

1 Votes





Anchit Hi Team,

In my understating:

- 1) KS Test -> Test to determine whether two distributions are same or not. Can be used only with CDF's of two Distributions.
- 2) Permutation Test -> A method that can be used to estimate any statistic which you specify such as difference in means, difference in medians, difference in CDF's etc.
- 4) Chi Square Test -> chi square is used when we have two categorical variables (e.g., gender and alive/dead) and want to determine if one variable is related to another.
- 5) t-Test -> It is used to determine whether there is a significant difference between the means of two groups.
- 6) Anova Test -> Analysis of variance (ANOVA) is a statistical technique that is used to check if the means of two or more groups are significantly different from each other. In this test, one variable must be categorical and the other must be continuous.
- 7) Correlation -> How strongly 2 random variables are related.
- Q1) What is the difference between
- i) Anova test and t-test
- ii) t-test and chi-squared test
- iii) chi-square test and ks test
- iv) chi-square test and permutation test
- v) chi-square test and correlation co-efficients
- Q2) In what scenarios we will prefer which test?







Jan 11, 2019 08:54 AM

Applied AI Course

- 1. KS-Test:Correct.
- 2. Permutation testing and Resampling: A method to simulate null-hypothesis when it is of the form that there is no difference between the two samples. It is often used in hypothesis testing.
- 3. Chi-Square test: Correct.
- 4. t-Test: Correct.
- 5. ANOVA: Correct.
- 7. Correlation: Correct

t-test and chi-square and KS-tests all follow the hypothesis-testing concept to test different things with different test-statistics in different contexts as stated by your above. For example, chi-square is used to compare two discrete r.v's while KS is used to compare distributions of two r.v's and t-test is used to measure if the means of two distributions are different or not when the test statistic would follow a normal distribution if the value of a variance in the test statistic were known.

correlation-coefficients like PCC and SRCC work well if we want to measure how correlated two r.v's are and would work only when the r.v's are linearly or monotonically related as we discussed in earlier videos.

Permutation testing and resampling is not a test but a statistical method to simulate certain types of null-hypothesis.





Jan 12, 2019 07:16 AM

Is it available in videos and i missed it or the person whi commented just happens to know.

Can you please send me some links so that i can know better? Frankly speaking from below 7 i think I know only 1,2,7

- 1. KS-Test
- 2. Permutation testing and Re-sampling
- 3. Chi-Square test
- 4. t-Test
- 5. ANOVA
- 7. Correlation

Please help me.



Mar 28, 2019 11:31 AM

AppliedAlCourse Team

We havent discussed any of those methods in our videos.. if you want to learn about them you can learn from this link



Mar 28, 2019 17:09 PM

Raj Kamal

Hi Sir, Is it really important to cover 3. Chi-Sqare test, 4. t-test, 5. ANOVA test apart from the concepts you covered in Probability & Statistics? Please suggest me sir.



Aug 18, 2020 22:32 PM

AppliedAl Course

We have covered most widely used concepts. If you wish to learn, we will try to cover them in future videos. For now, you can learn it from the above link.



Aug 19, 2020 08:34 AM

♣ Vikas KM

Thanks for sharing this





Nov 25, 2020 11:59 AM

a sandeepnaidu gottapu



I was asked in an interview if I know statistical tests used in ML like Ftest,T test ,Chi square test, Annova test which I failed to answer.

Now I tried learning online. But no video or article helped me. I request Srikanth sir to make a small video on these topics.







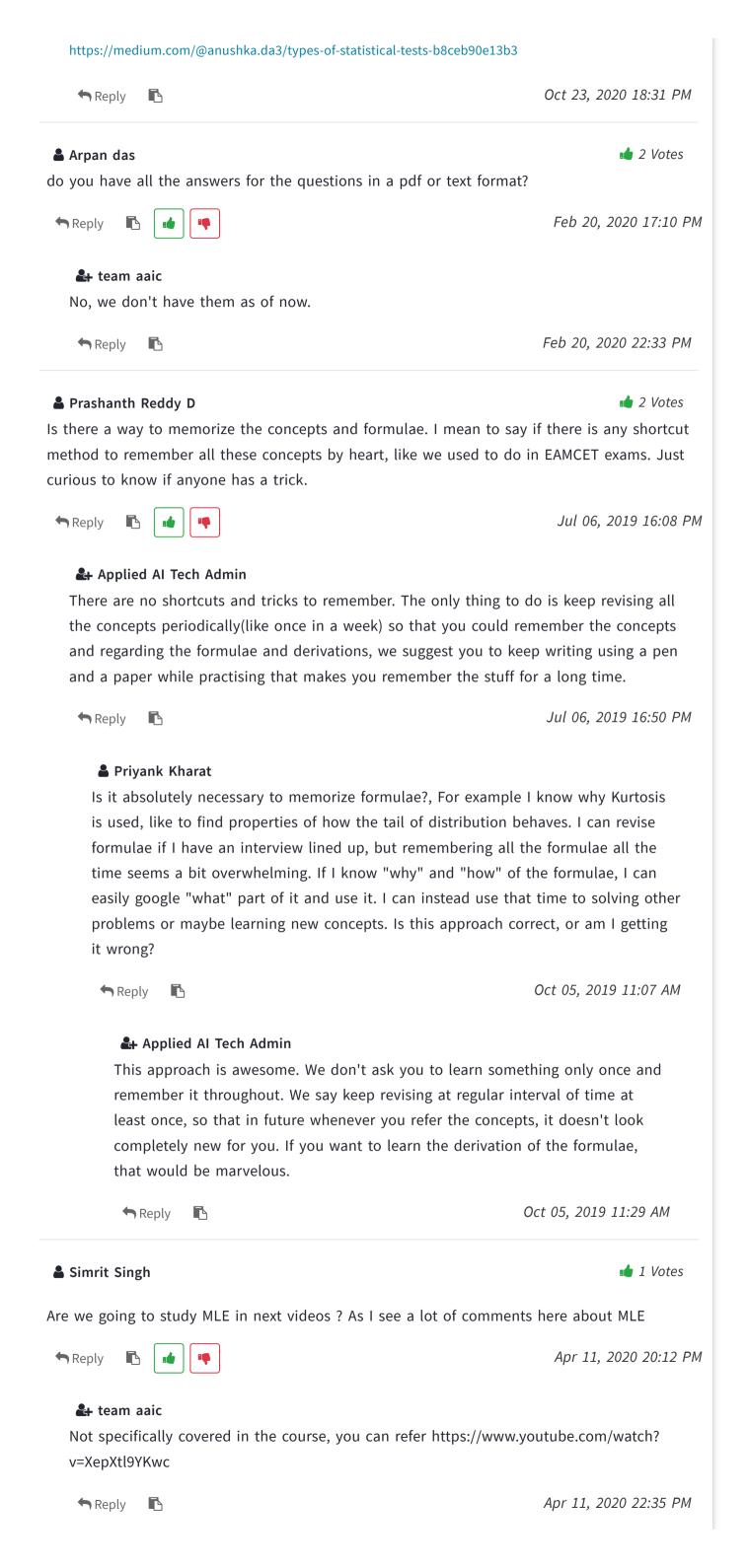


Oct 23, 2020 15:59 PM

4 team aaic

Thanks for your suggestion. We will try to upload videos on these topics. Meanwhile please refer these links: https://medium.com/datadriveninvestor/p-value-t-test-chi-square-test-anova-when-to-use-which-strategy-

32907734aa0e#:~:text=Chi%2DSquare%20test%20is%20used,variables%20from%20a%20single%20popul ation.&text=Null%3A%20Variable%20A%20and%20Variable,Variable%20B%20are%20not%20independen





Hi Team!

💼 1 Votes

Can you please share if there any standard definitions(easy to understand) of all the above questions because I think in the interview it is better to just give the overview of the question instead of describing the whole process and method. I have read definitions of all above questions from Wikipedia, some are good and understandable but some definitions are very big and complex. For eg. PDF definition in Wikipedia is difficult to understand.







Feb 23, 2019 05:13 AM

naveench

Modification to the above comment:

Hi Team!

Actually, I am unable to say the exact answer to the question. I can explain the whole concept and methods related to question but I am unable to give a short overview of the answer to the question. Can I please get some help with this?



Feb 23, 2019 05:36 AM

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When you read a question, write down your understanding of the problem and the concept tested behind it.

Then, apply the concept on the question asked and with practise, you will be able to provide a crisp and concise answer to the problem.



Feb 23, 2019 08:16 AM

AppliedAl Course

there is no standard document giving concise explanation of all the topics. Pickup a standard Stats book to master the concepts. You may want to chk out the resources in this post: https://www.quora.com/What-are-the-best-books-on-statistics-for-data-science





Feb 23, 2019 08:57 AM

Aman Kumar Phogat

is there any video in this course on maximum likelihood estimation beacuse i have seen some comments on this topic but haven't seen this concept in the videos







Feb 20, 2021 18:44 PM

♣ team aaic

No, we've not covered it in one specific video.





Feb 20, 2021 22:24 PM

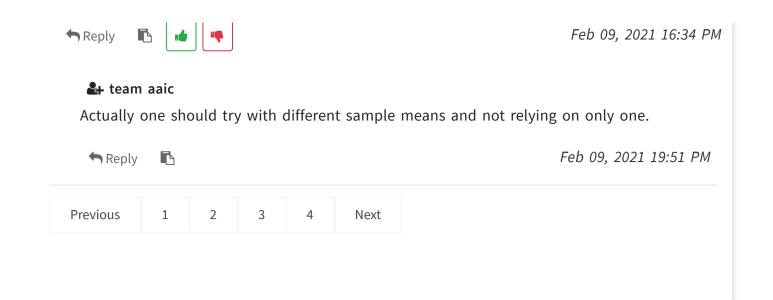
Rabindra Laheri



Many places we are using sample values(ex: CLT). Are we not compromising with the accuracy level of our computation?

Ex: let for population height 5,10,15,20,25,30,35, here actual mean is 20. But if we take random sample of n = 3, the sample mean here found to be $10 \ge 3$ sample mean 3.

Above example we can get different sample mean that can vary between 10 (5,10,15) and 30(25,30,35) for randomly selected 3 numbers.



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