University of Bolzano
Faculty of Computer Science
Seminar in Human-Machine Interaction
Professor Gennari Rosella
Subject: Lab 6 and Lab 7

Abstract
This document contains the solutions of lab 6 and Lab7, SHMI Class 2016/2017.

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SHMI: Lab 6

Exercise 1.1

In our resolution

3. report what the average is (mean or median or…) and its approx. value
The mean is 44

4. explain how it should be calculated (briefly)

We convert times into log times rounded to 2 decimal places. Next, we compute the mean and standard deviation of log times. Now we compute the exponential of the mean of log times to obtain the geometric mean of the input times; do the same for the standard deviation

5. report approx. the 95%-confidence interval

35-61

6. explain how it should be calculated (what distribution)

Compute the t-confidence interval (t-CI) for the geometric mean, and take the exponential of the bounds.
We use CONFIDENCE.T(alpha; standard deviation; size). Alpha is given by alpha = (1-(95%/100))

7. discuss results

confidence interval is large. I am 95% confident that the mean will lie between the interval 35 and 61. Since sample size is small there is a large margin of error. The standard deviation is high too. So confidence interval is large.

Lab6

Exercise 1.2

3. report what the likely average is (mean, median or…) and its value from the plot
the likely mean is 4.3

4. report the 95%-confidence interval
4.1 0– 4.6

5. explain how it should be calculated (what distribu1on)

$$\bar{x} \pm t.\frac{s}{\sqrt{n}}$$

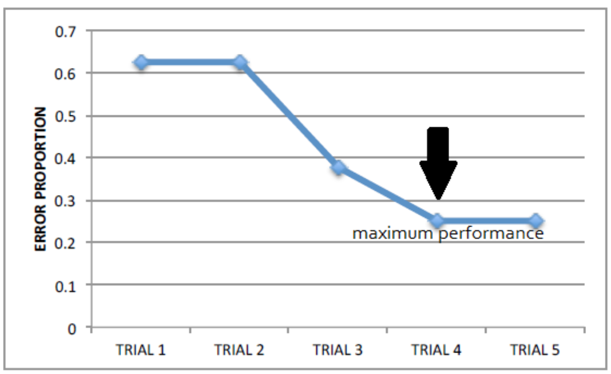
- where $\bar{x}$ is the sample mean
- n is the sample size
- s is the sample standard deviation
- t is the critical value from the t-distribution for n-1 degrees of freedom (df) for the considered confidence level

The following is a t-distribution

6. discuss results
confidence interval is large. I am 95% confident that the mean will lie between the interval 4.1 and 4.6. Since sample size is > 20 and is large there is a small margin of error. The standard deviation is low too. So, confidence interval is small.

Exercise 1.3

Learning takes time, as well as storing data in long-term memory. We have no information how the session between trials was conducted. Whether there were breaks (usually with distractions), without beaks and with gaps of at least a day. Trail 1 had an error proportion of approx. 0.61. Trail 2 had no change on the results. Trail 3 shows a steep decline in the error proportion from 0.61 to 0.39. It further went down to 0.25 in trial 4. The curve becomes flatter. Until in trial 5 we see no change. The gradient is 0.



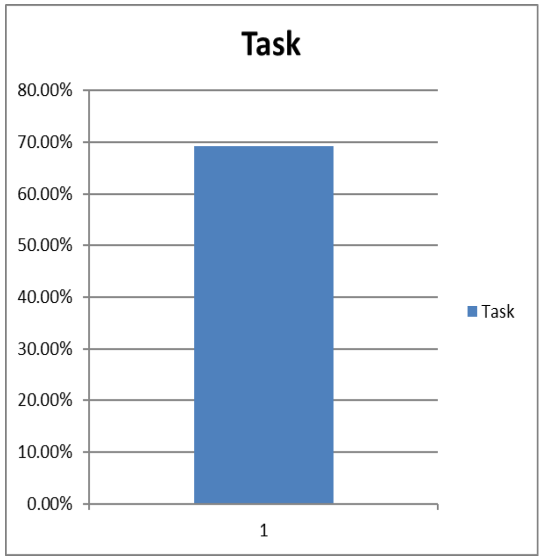
2.The difference between the highest and the lowest y-values is (0.61-0.25) = 0.36
The minimum error the user needs to perform the task is 0.25. A maximum of 4 trails are needed to reach the asymptote point where the curve becomes flat. The gap from what we infer from the graph is quite large. So, more time was taken to learn the task.

Lab 6: Exercise 2.1

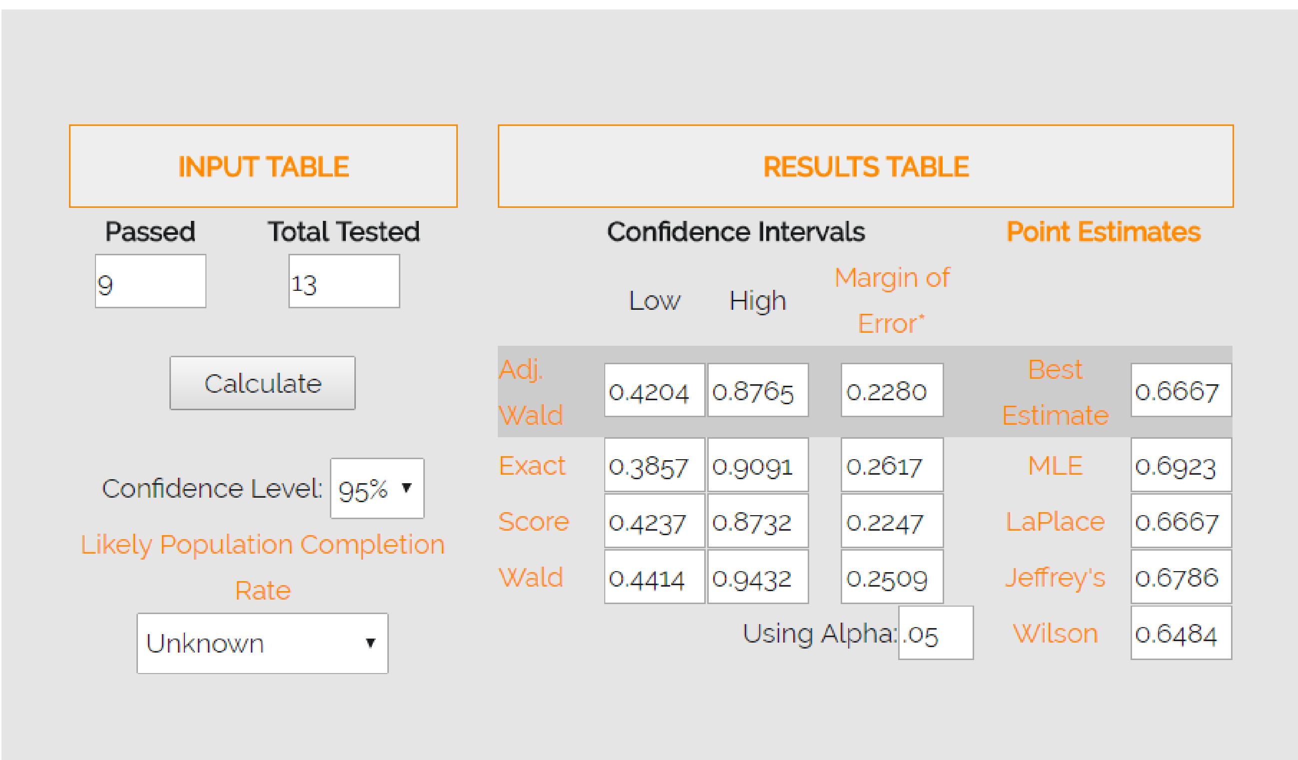
Usability Metrics and Analysis
Exercise 2.1
assign to success a value, usually, 1 and to failure another, usually, 0

Participant	Task
P1	1
P2	0
P3	1
P4	1
P5	0
P6	1
P7	0
P8	1
P9	0
P10	1
P11	1
P12	1
P13	1

Participant	Task
p1	1
p2	0
p3	1
p4	1
p5	0
p6	1
p7	0
p8	1
p9	0
p10	1
p11	1
p12	1
p13	1



Proportion of success: 9/13 = 0.6923



INPUT TABLE

Passed	Total Tested
9	13

Calculate

Confidence Level: 95%

Likely Population Completion Rate

Unknown

RESULTS TABLE

	Confidence Intervals			Point Estimates	
	Low	High	Margin of Error*		
Adj. Wald	0.4204	0.8765	0.2280	Best Estimate	0.6667
Exact	0.3857	0.9091	0.2617	MLE	0.6923
Score	0.4237	0.8732	0.2247	LaPlace	0.6667
Wald	0.4414	0.9432	0.2509	Jeffrey's	0.6786
		Using Alpha:	.05	Wilson	0.6484

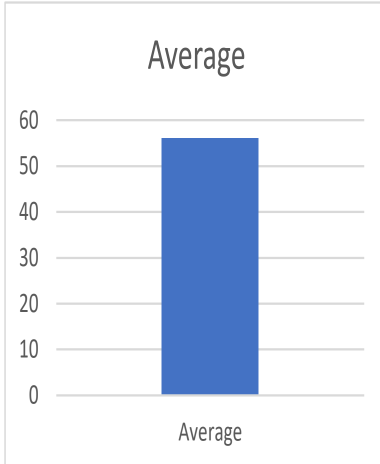
It is a small sample (13) therefore I used the Adjusted Wald Method.
I enter the total number of participants for each task and how many of them successfully completed it
I chose to calculate 95% confidence interval then read the output confidence interval

I have one task with 13 participants for each participant there is failure and success, I assigned 1 to success and zero to the failure then I used Excel to compute the average of success.
I used the Adjusted Wald Method to find Confidence intervals for binary success. I find that the model has 0.6923 Maximum Likelihood with 0.05 Alpha.

0.2280 is the margin error for Adjusted Wald Method while 0.6667 is The best point estimate is calculated using the following logic: Since I selected "Unknown" from the Likely Population Completion Rate drop-down, the LaPlace method is used. The smaller my sample size and the farther my initial estimate of p is from .5, the greater the benefit over the maximum likelihood.

Lab 7: Exercises 2.2 and 2.3
Usability Metrics and Analysis

Users	Tasks	Ln (Tasks)
1	45	3.806662
2	22	3.091042
3	40	3.688879
4	23	3.135494
5	60	4.094345
6	90	4.49981
7	80	4.382027
8	48	3.871201
9	90	4.49981
10	45	3.806662
11	74	4.304065

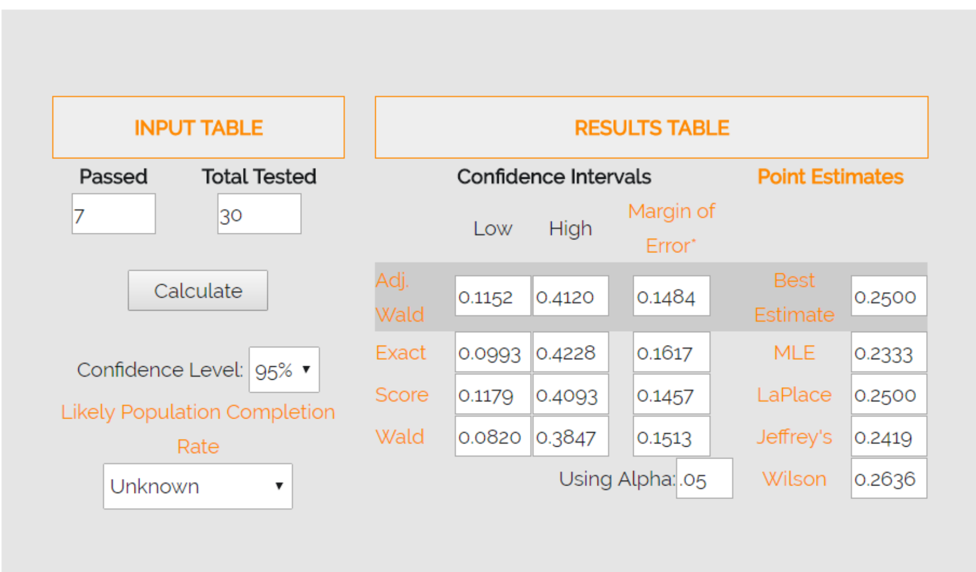


Mean Ln	3.925454
geometric mean	50.6761
Standard Dev	23.42281
Average (mean)	56.09091
T confidence value	15.73566
Ln Standard Dev	0.494723

Exercise 2.3

standard deviation	0.727247
T confidence value	0.27156
No of Best	7
Average of Best	0.2333

I used T distribution to compute the confidence value , I used Excel to compute it and to plot the statistics



INPUT TABLE

Passed	Total Tested
7	30

Calculate

Confidence Level: 95%

Likely Population Completion Rate

Unknown

RESULTS TABLE

	Confidence Intervals			Point Estimates	
	Low	High	Margin of Error*		
Adj. Wald	0.1152	0.4120	0.1484	Best Estimate	0.2500
Exact	0.0993	0.4228	0.1617	MLE	0.2333
Score	0.1179	0.4093	0.1457	LaPlace	0.2500
Wald	0.0820	0.3847	0.1513	Jeffrey's	0.2419
		Using Alpha:	.05	Wilson	0.2636

Exercise 3

The percentage time of participant 5 is high, the percentage success
is high. They make the percentage rating to be high. So participant 5 is the best.

The percentage time of participant 8 is low. The percentage success is lowest. It has the lowest rating and so it is the worst.

The percentage rate of participant 4 is also very low. He has low success percentage. He also has low rating. He is there in the second-last position.