Research Track 2

statistical analysis

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Chapter 1

Introduction

I want to know which algorithm is faster between professor's one and mine. For doing this I have chosen to measure the time needed for executing an entire lap of the arena by the robot. I measured a sample of 30 observations for each algorithm every time with a different arena disposition. I have chosen to measure 30 observations because for the Central limit theorem I am sure that my sample has a normal distribution.

Chapter 2

Development

The null hypothesis is: "Professor's algorithm is as fast as mine".
I want to reject the null hypothesis and for doing this I used the so called paired T-test. I can use this test because of normal distribution.

2.1 Observations

	prof time(s)	my time(s)	difference(s)
observation 1	184,85	235,06	50,21
observation 2	177,57	226,46	48,89
observation 3	185,24	222,04	36,8
observation 4	176,04	218,43	42,39
observation 5	193,32	231,13	37,81
observation 6	172,84	227,01	54,17
observation 7	185,99	214,89	28,9
observation 8	182,17	222,06	39,89
observation 9	172,07	230,48	58,41
observation 10	181,67	232,72	51,05
observation 11	182,93	223,94	41,01
observation 12	179,98	220,57	40,59
observation 13	175,9	219,1	43,2
observation 14	171,62	214,81	43,19
observation 15	169,62	217,77	48,15
observation 16	208,7	186,89	-21,81
observation 17	174,45	203,64	29,19
observation 18	183,55	206,97	23,42
observation 19	175,69	208,46	32,77
observation 20	213,42	225,18	11,76
observation 21	199,81	220,76	20,95
observation 22	216,24	226,11	9,87
observation 23	205,37	232,24	26,87
observation 24	203,36	223,12	19,76
observation 25	213,06	224,44	11,38
observation 26	210,6	235,46	24,86
observation 27	200,54	230,95	30,41
observation 28	176,85	218,18	41,33
observation 29	183,4	205,18	21,78
observation 30	190,44	215,18	24,74

2.2   data

- $DoF = 29$

- Set confidence level to 95%

Calculating the mean and standard deviation of the differences:

$$\overline{d} = 32,398$$

$$S_d = 16,572$$

Therefore:

$$SE(\overline{d}) = \frac{S_d}{\sqrt{30}} = 3,02.$$

Finally:

$$t = \frac{\overline{d}}{SE(\overline{d})} = 10,7.$$

Chapter 3

Conclusions

Checking in the table provided I can conclude that I can reject the null hypothesis with a confidence of 99% because:

$$t = 10,7 > 3.659$$

So I can conclude that professor's algorithm is not as fast as mine.

We can say also that professor's algorithm is faster than mine, because the mean of the differences of the times:

$$\bar{d} = 32,398 > 0.$$