Analysis:

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Introduction:

For this report, I am going to explore if Carmine's code costs the same amount of time as mine to finish a circuit.

Null hypothesis:

The time costs for robot finishing a circuit have no difference between Carmine's code and Zhouyang's code.

Methodology:

In this analysis, first I will apply two tailed test with 0.05 rejection area to reject some of the acquired data. Then I will apply 2-sample T-Test with the quantity of 10 for each sample.

First of all, due to the placement of silver crates, the probability of not being able to successfully complete a circuit for robot is high, so I used the code of Zhou Yang and Carmine to collect only 10 samples with units of seconds respectively, and then apply analysis.

Specifically, in the experiment, each time the program was run, 10 silver boxes were randomly placed in the map under the premise that the silver crates would not overlap with the wall. When the robot successfully completes a loop, I will record the time it took, and if it collides with a wall, turns around, or program crashes before finishing the sample from current circuit will be abandoned. Finally, I will end up with a total of 20 samples and 10 for each.

Data:

Mine /s	Carmine /s
352	225
357	198
333	194
285	218
320	210
379	201
304	189
372	215
314	233
336	231

Analysis:

operation	Mine	Carmine
	352	225
	357	198
	333	194
	285	218
	320	210
	379	201
	304	189
	372	215
	314	233
	336	231
Mean	335.2	211.4
Dev	30.202281	15.5863188
Variance	912.177778	242.933333
2-tailed area	0.05	0.05
Tail-left	276.003529	180.850815
Tail-right	394.396471	241.949185
number of rejected	0	0
Sigma_pooled^2	577.5555556	
Sigma_x1-x2	10.74760955	
2t-test	11.51884048	

Conclusion:

Finally, from the diagram above we can see that the t-value of this 2-sample T-test is 11.51884048, which is far bigger than 4.781. Set confidence level as 95%, thus H_0 can be rejected and my code costs more time than Carmine's code with more than 99.99% confidence.