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.