
ISyE 2028 – Basic Statistical Methods - Fall 2015
Bonus Project: “Big” Data Analytics
Final Report

I collected 10 samples for my experiment. Ten students in the age group 18-24 participated in the experiment. I collected data on the vertical jump for wearing shoes and not wearing shoes. After the initial proposal I had to slightly modify the method I was conducting the experiment and the number of subjects I tested. Instead of using a colorful powder on fingertips I used pieces of tape attached to fingertips that stuck to the place on wall that the subject was able to reach when they performed the vertical jump.

These are the results I obtained for the jumps with and without shoes:

	Vertical Distance With Shoes in inches	Vertical Distance Without Shoes in inches
Katie	14	13.5
Lara	12.25	12
Adeline	11.75	13.75
Ludwika	15.5	16.3
Rodolfo	17.5	18
Hannah	10.75	10.5
Vedant	10.5	10.6
Michael	13.5	13.5
Kai	14.5	14.5
David	17.5	18.3

I'm going to be using hypothesis testing and looking at the difference between the two means. My hypothesis will be that wearing a sports shoe does change the vertical distance a person can jump. I will be using Inference Difference in Means of Two Normal Distributions.

Data:

\bar{x} - mean of distance with shoes on

\bar{y} - mean of distance without shoes on

α - 0.05

$$\bar{x} = 13.775 \quad S^2 = 2.532$$

$$\bar{y} = 14.095 \quad S^2 = 2.755$$

Hypothesis:

$$H_0: \mu_1 - \mu_2 = 0$$

$$H_1: \mu_1 - \mu_2 \neq 0$$

Test Statistic:

$$t_0 = \frac{(\bar{X} - \bar{Y}) - \Delta_0}{S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$\text{Reject if: } |t_0| > t_{\alpha/2, n_1+n_2-2}$$

Calculations:

$$S_p^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{(n_1 + n_2 - 2)}$$

$$S_p^2 = 2.6435$$

$$T_0 = -0.271$$

$$T_{\alpha/2, n_1+n_2-2} = t_{0.025, 18} = 2.1$$

Conclusion:

As we can see $|t_0|$ is not greater than $T_{\alpha/2, n_1+n_2-2}$! So we do not reject the null hypothesis. This means that our data on average doesn't really show significant difference in the means between jumping with our without shoes.

I expected that my calculations would have given more proof that there is a more significant difference in jumping with or without shoes. But I believe that my results might have been slightly biased because of the way I was measuring the distances and because of human error. I could have improved this experiment by making my measurements more precise. And by having a room with a slightly higher ceiling, as some of the subjects were able to jump and touch the ceiling which definitely resulted in some outliers in my study. I also believe that my sample size should have been bigger that would make this a more statistically significant experiment.

