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Application of "independent t-test" by using SPSS for conducting physical education researches

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Abstract
Different types of researches are conducted in the field of physical education, such as case studies, philosophical researches, historical researches, survey studies and experimental studies. As per the trend and interest of today's researchers, survey studies are the most preferred studies. There are different types of surveys; most commonly used surveys are relationship studies, descriptive studies, prediction studies and comparative studies. Out of all types of surveys, comparative studies are preferred. The easiest and smallest comparison can be between two groups. T-test is used to compare two groups, but both groups should have independence.
Along with independence, normality and homogeneity of variance is required. If normality and homogeneity of variance is not fulfilled, there are alternate options.

Keywords: Independent t-test, normality, homogeneity of variance

Introduction
Prologue
T-test is a parametric statistics used to conduct comparative studies. It may be a comparative survey or an experiment, since different verities of t-tests are available to analyze data. Different assumptions are applicable to different t-tests. In precise form, it can be said that "t-test is a statistical techniques used it find out the significant difference among the means of two samples or two observations". A Common assumption should be fulfilled before applying t-test i.e. normality of data. There are different ways to test the normality of data i.e. descriptive statistics, QQ Plot, and formal tests. So, first steps should be "testing of normality". If the assumption of normality is not fulfilled, parallel non parametric technique should be applied.

Types of t-tests

S. No.	Name	Parallel non parametric statistics
1.	Independent t-test	Mann Whitney U test
2.	Dependent t-test	Wilcoxon Signed rank test
3.	One sample t-test	Sign test

T-test: type- I (Independent t-test)
Independent t-test in used to find out the significance difference between the means of two independent samples. There is one more assumption of independent t-test i.e. homogeneity of variance and this required assumption is tested by "levene statistics".

Example
A researcher wants to find out the significant difference between the blood glucose level of two samples (Males and females). Researcher used "Static Group Comparison Design".

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Table 1: Scores of two independent groups (Male and Female) in blood glucose level.

S. No.	Blood Glucose Level	
	Group – I (Male)	Groups – II (Female)
1.	80	91
2.	81	96
3.	86	92
4.	84	86
5.	85	86
6.	82	84
7.	89	85
8.	90	86
9.	99	84
10.	89	85
11.	86	86
12.	87	85
13.	82	86
14.	85	89
15.	86	91
16.	89	96
17.	90	93
18.	91	94
19.	96	96
20.	92	99

Hypothesis

It is hypothesize that there is no significant difference between the blood glucose level of males and females.

$$Ho: \mu^1 = \mu^2$$

Objective

The objective is to find out significant difference between the blood glucose level of males and females.

Subjects

Total 40 subjects are selected i.e. 20 males and 20 females.

Analysis

1. Type all data is first column of "Data View" (forty scores). In second column, give label for both groups i.e. male and female. In our example one (1) is for male and two (2) is for female.
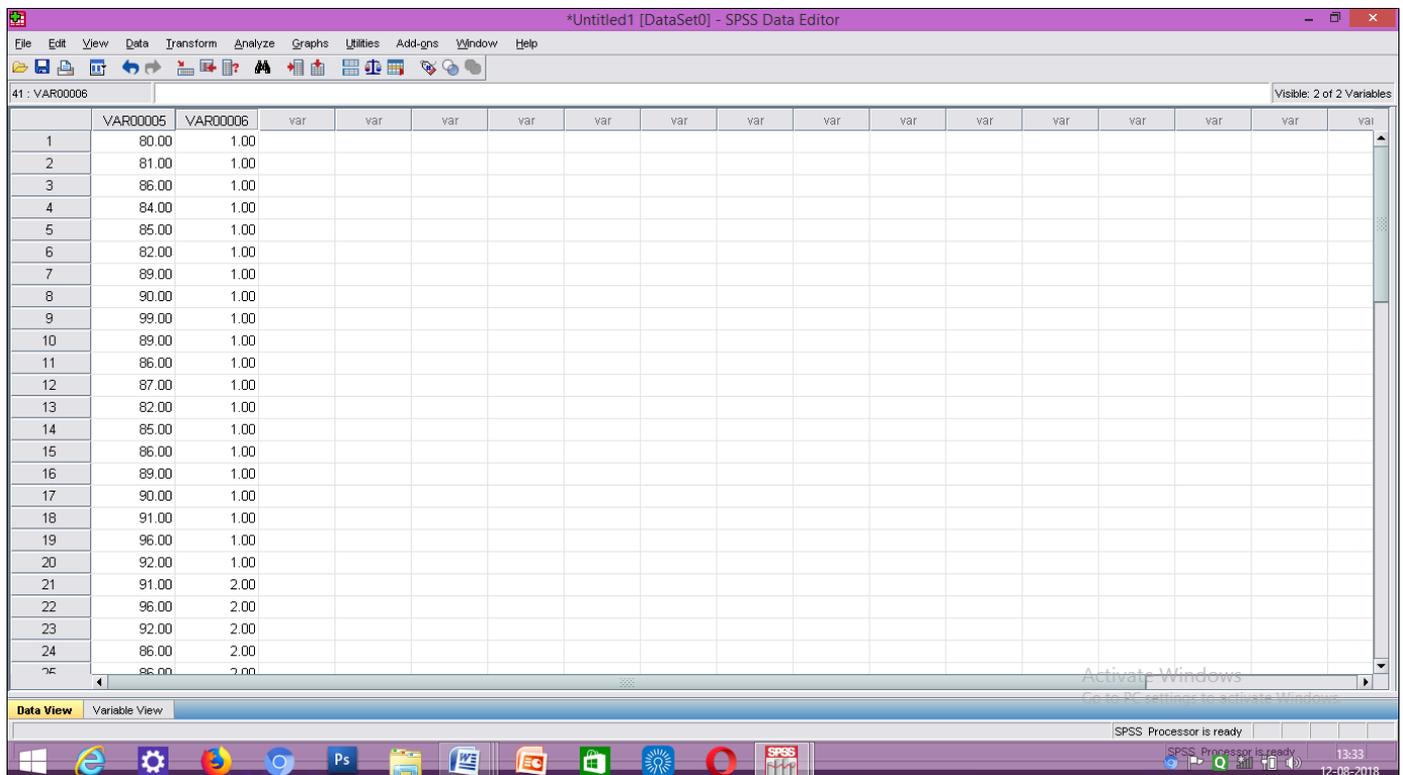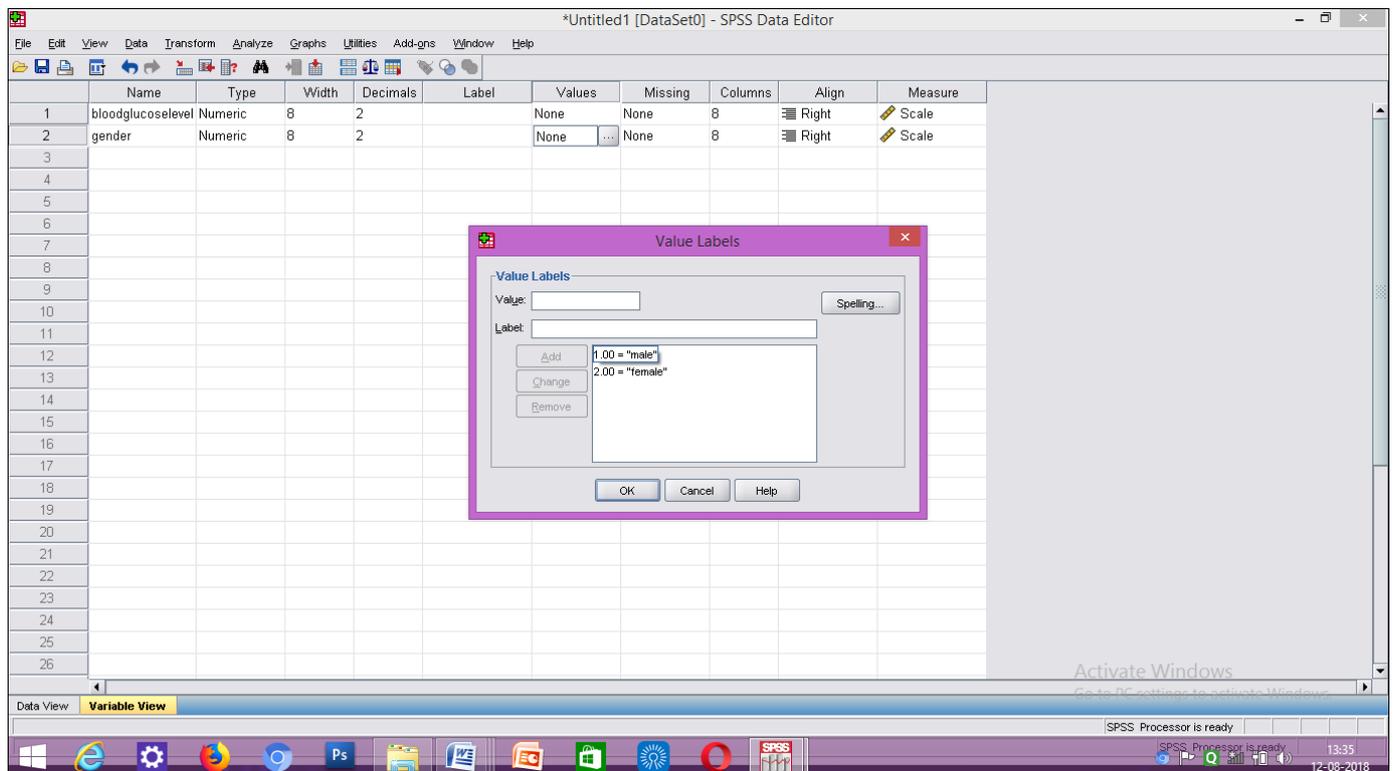

Template I: Data entry.

2. In variable view, give name to both columns, i.e. column one for blood glucose level and column two for gender.
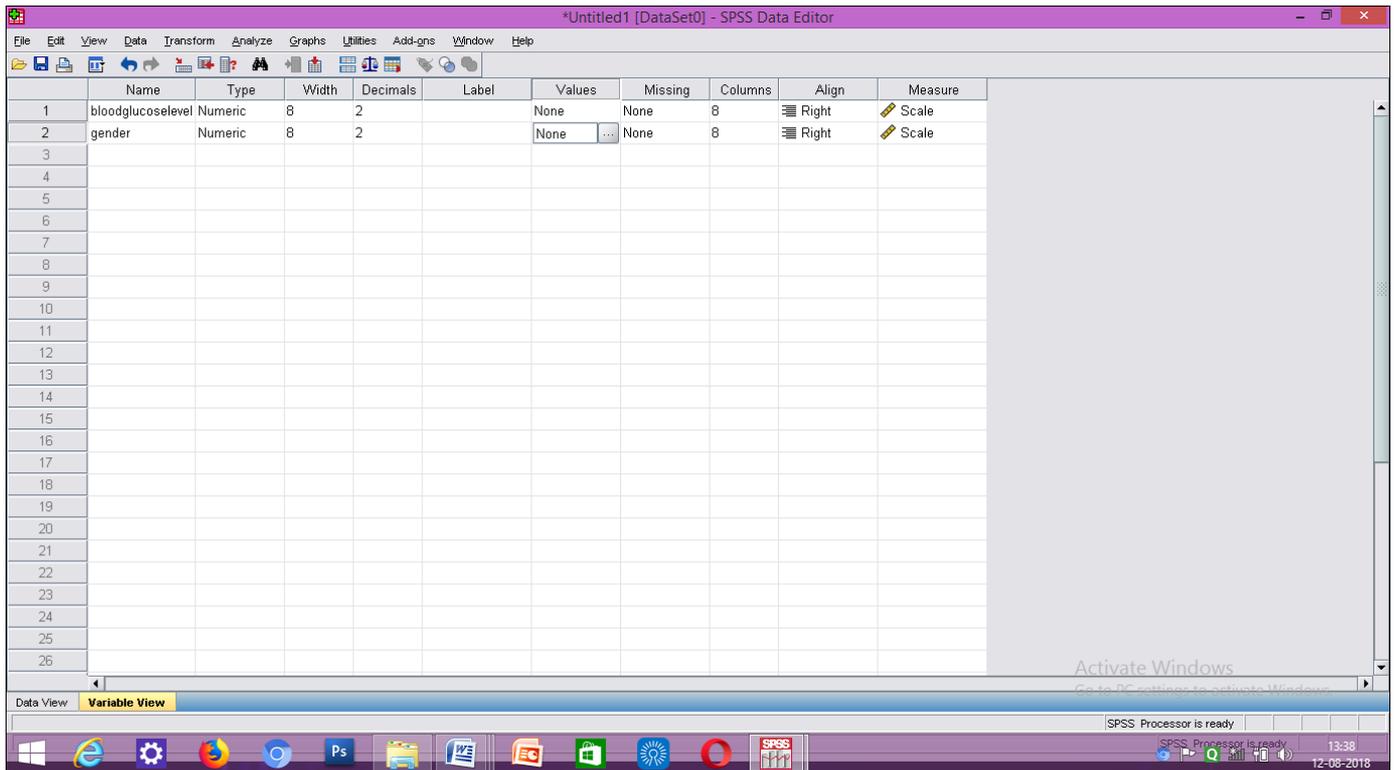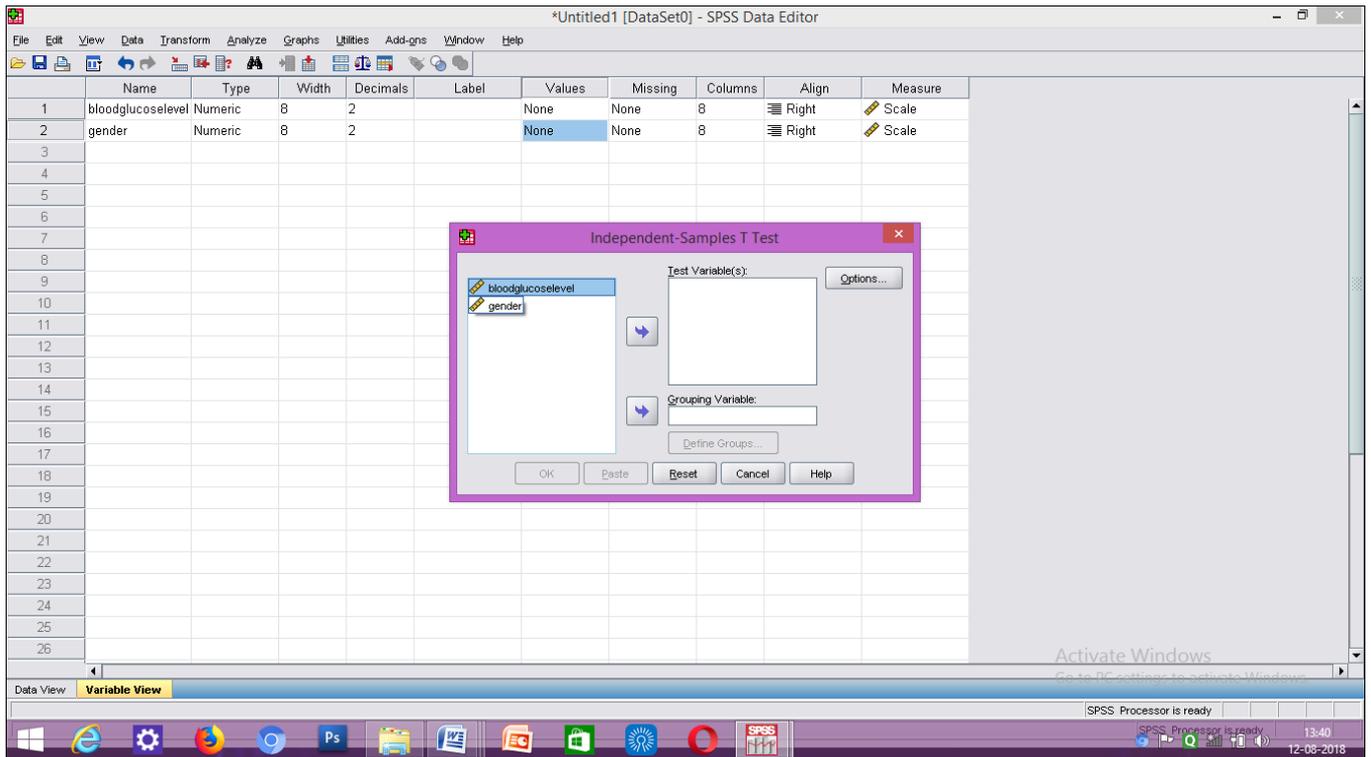

Template 2: Naming columns in variable view.

3. In same variable view, in "value label" give label for male and female i.e. 1 stands for male and 2 stands for female.
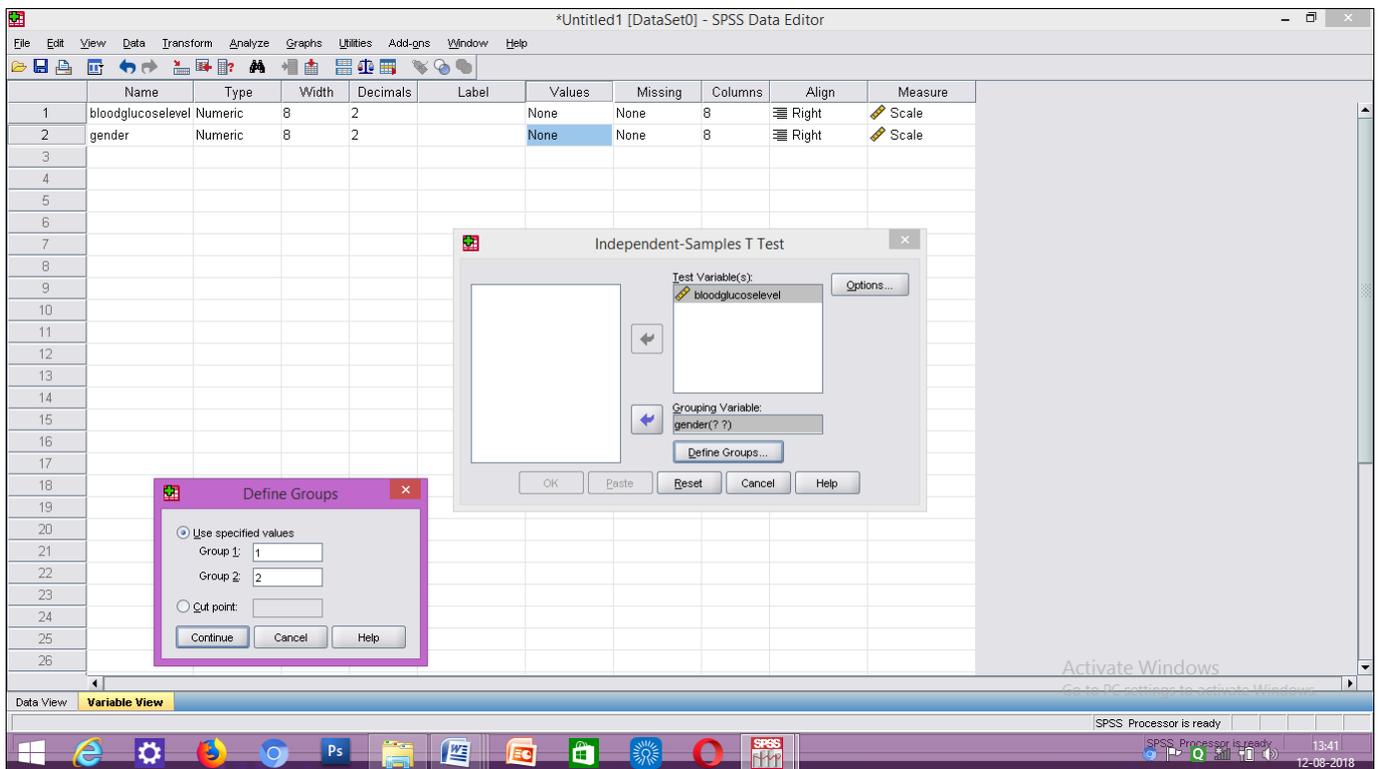

Template 3: Giving value to labels.

4. Click on Analyze ➜ Compare means ➜ Independent Sample T-test ➜ Click
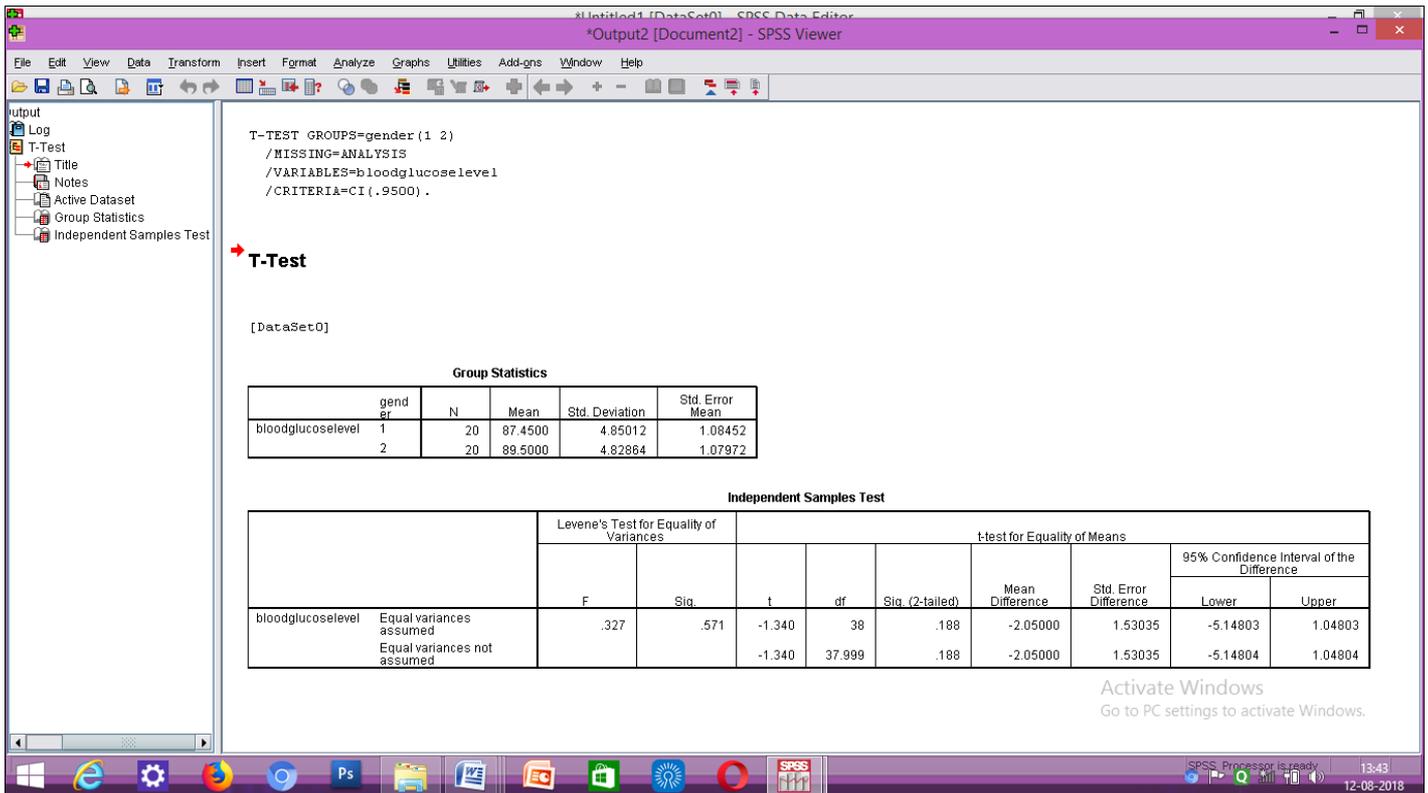(A Template will appear showing Independent Sample T-test).

Template 4: Independent Sample T-test

5. Insert blood glucose level in "test variable (s)" and gender in "grouping variable" also define 1 and 2.

Template 5: Selection of "test variable (s)", "grouping variable" and defining groups.

6. Click on "Ok", the output will appear.

Template 6: Output of independent t-test i.e. "Independent Samples T-Test".

Interpretation of results

If the t- value is significant at 0.05 level of significance, significant difference occurs otherwise no significant difference occurs.

In our hypothetical example, insignificant difference occurred, since t- value (1.34) is found insignificant at 0.05 level of significance (p >.05), hence formulated hypothesis is accepted.

If normality of data is not found parallel non parametric technique i.e. "Mann Whitney U test" should be used.

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