THREE DIMENSION DECISION FOR STATISTICAL TESTING. THE SIGNIFICANCE OF TRADITIONAL MEDICINE HOLISTIC APPROACH (A PRELIMINARY IDEA)

Haryadi Suparto, Mochamad Setyo Pramono

ABSTRACT

An idea of multidimensional decision for testing the significance of traditional medicine holistic approach was born. Using purely deduction approach from mathematical theory, a multidimensional function was proposed by joining more than one set of hypothesis. There are 3 alternatives: (1) by making average of the value (2) by comparing the probability of error (3) by developing 3-dimension curve. It is only a preliminary thinking and still need to be developed further.

Keywords*: holistic, traditional medicine, joint hypothesis testing*

INTRODUCTION

At present there is only one single hypothesis in medical research because the approach usually is not holistic. If there are several hypotheses, there will be several single hypotheses, not a single several hypothesis. The problem is if the conclusion of several single hypotheses is not the same, it is very difficult to make a single conclusion except by using a peer review, which is not by calculation. In traditional medicine holistic approach, the variable is more than one and the analysis can be done by using multivariate one but not the hypothesis which is still using two dimension normal curve (single hypothesis). To solve the problem a multivariable approach is used with several alternatives to be discussed. There are no comprehensive references available yet, it needs to discover a formula to have a single several hypothesis.

METHODS

It is a purely deductive approach using the probability theory of statistic and no field trial because it needs to be discovered thoroughly with the other statistician/mathematician.

RESULT

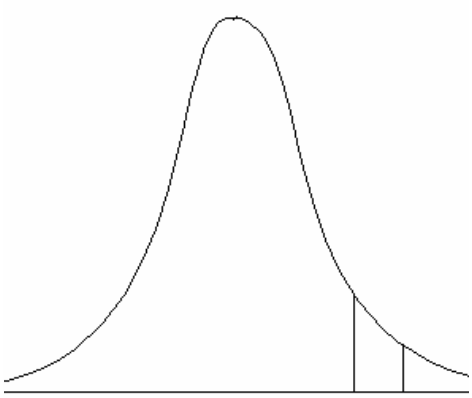
For example: testing two hypotheses

A. Immunoglobulin
   H_{Ao} : There is no difference of the immunoglobulin between the two groups
   H_{Ai} : There is difference of the immunoglobulin between the two groups
B. Attitude
   H_{Bo} : There is no difference of the attitude between the two groups
   H_{Bi} : There is difference of the attitude between the two groups

By using deduction in developing the formula, there are several alternative solutions

1. By making average of the value (to unite two values into one)

Health Services and Technology
Research and Development
Department of Health



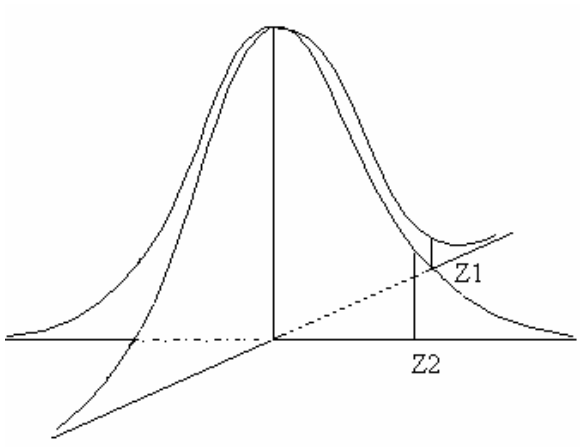
Picture 1 Z_1 Z_2

$$Z_1 = \frac{\bar{x}_1}{SE_1} \qquad Z_2 = \frac{\bar{x}_2}{SE_2} \qquad \bar{Z} = \frac{Z_1 + Z_2}{2}$$

(equal size)

$$\bar{Z} = \frac{\frac{\bar{x}_1 + \bar{x}_2}{2}}{\sqrt{\frac{SE_1^2 + SE_2^2}{2}}} \quad \text{.....(1)}$$

2. By comparing the probability of error (to choose two values into one)



Picture 2

For example :

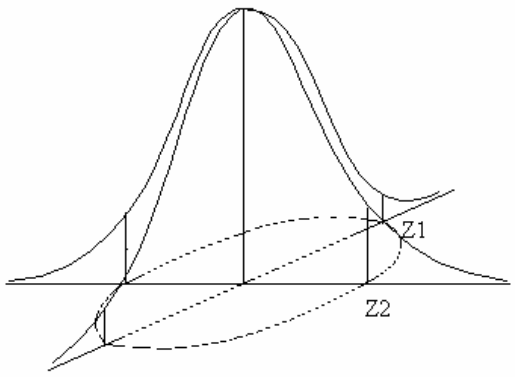
Z_1 ⟶ p= 0.04

Z_2 ⟶ p= 0.06

By comparing the two probability of error, the selection for conclusion is the larger probability of error (p=0.06)

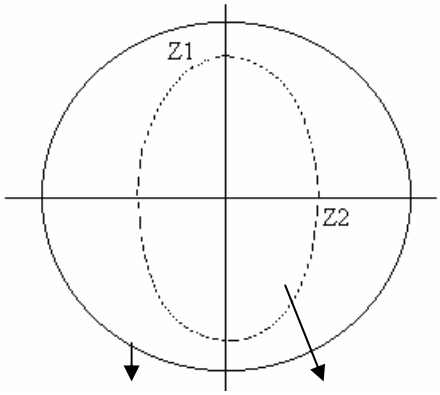
3. By developing 3 dimension curve
(to join two values into 3 dimension function)

Volume



Picture 3

Square of the base



circle normal ellipse

Let the normal (standard) function:

$$f(Z) = y = \frac{1}{\sqrt{2\pi}} e^{\frac{1}{2}(Z)^2} \quad \text{..... (2)}$$

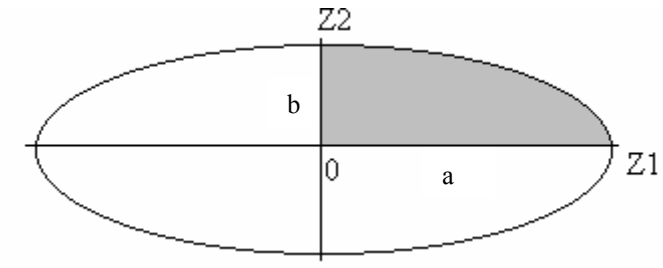
Formula of volume curve

$$\pi \int g(y)^2 dy$$

- Volume of Normal Curve:

$$\pi \int_0^{0.4} \sqrt{(-\ln(2\pi y^2))^2}\, dy \quad \text{or} \quad \pi \int_0^{0.4} -\ln(2\pi y^2) dy \quad \text{.....(3)}$$

- Square of Normal Base: $\pi\ r^2$
- Equation of Ellipse :
  $x^2/a^2 + y^2/b^2 = 1,\ a > b$ or $x^2/Z_1^2 + y^2/Z_2^2 = 1,\ Z_1 > Z_2$ ..... (4)



Picture 4

- Square of Ellipse calculation
  If y = f(x), the equation of the ellipse :

  $y^2/Z_2^2 = 1 - x^2/Z_1^2$

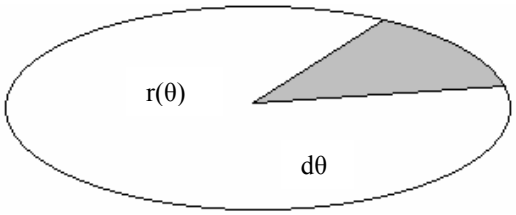
  $y^2 = Z_2^2 (1 - x^2/Z_1^2)$

$$f(x) = y = \pm\sqrt{Z_2^2(1-\frac{x^2}{Z_1^2})} \quad \text{……..…….. (5)}$$

Square of the ellipse is integral of x function with point 0 and Z_1 multiplied by 4

$$4\int_0^{Z_1}\sqrt{Z_2^2(1-\frac{x^2}{Z_1^2})}dx \quad \text{……. (6)}$$

We can find square of the ellipse by polar coordinate



Picture 5

Square of shadow = ½ $r^2(\theta)\, d\theta$

the equation of the ellipse in the polar coordinate :

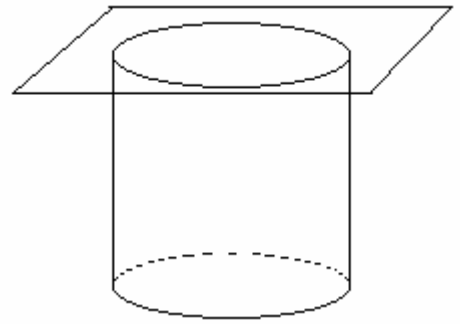
$$r^2(\theta) = \frac{a^2b^2}{b^2\cos^2\theta + a^2\sin^2\theta} \quad \text{…….. (7)}$$

Square of the ellipse = $\int_0^{2\pi}\frac{1}{2}r^2(\theta)d\theta$

$$= \frac{1}{2}\int_0^{2\pi}\frac{a^2b^2}{b^2\cos^2\theta + a^2\sin^2\theta}d\theta \quad \text{……(8)}$$

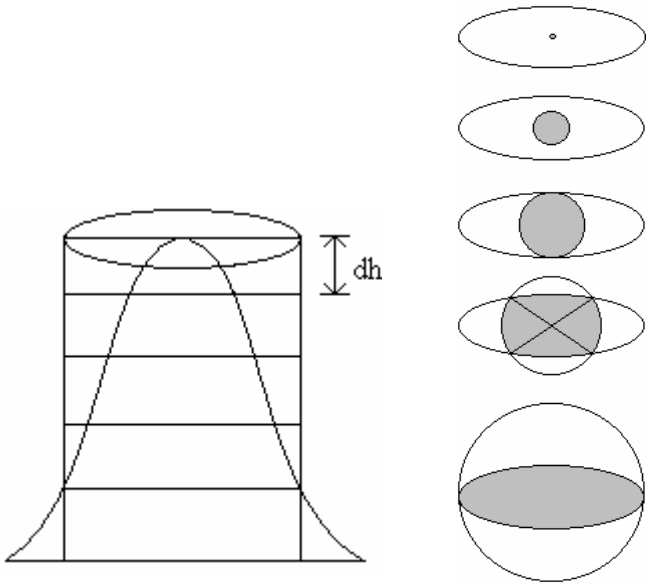
- Volume of a cylinder :

  Volume of an ellipse cylinder crossed by a plate is square of the ellipse base multiplied by the height of the cylinder



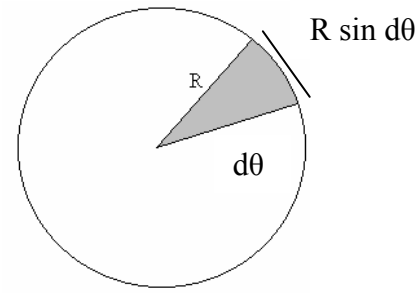
Picture 6

- Volume of an ellipse cylinder crossed by a curve:



side view top view

Picture 7



Picture 8

if $d\theta \approx 0$ then $\sin d\theta \approx d\theta$
so :
Square of the shadow = ½ $.R.R\, d\theta$
the equation of the circle $x^2 + y^2 = R^2$ …… (9)

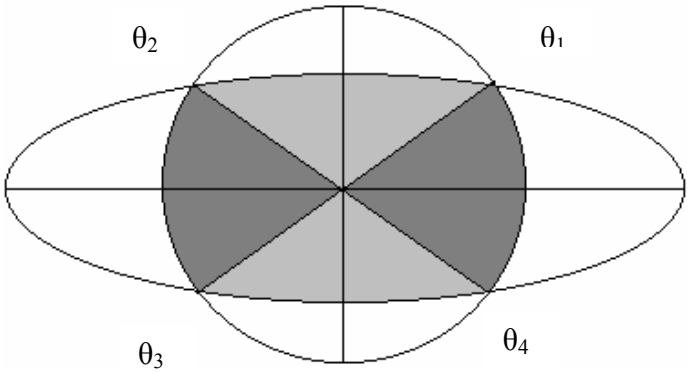
the equation of the circle in the polar coordinate :

$R^2 \sin^2(\theta) + R^2 \cos^2(\theta) = R^2$

$R^2(\theta) = R^2$……..….. (10)

Square of the circle $= \int_0^{2\pi} \frac{1}{2} R^2 d\theta$ …….. (11)

$= ½ R^2 (2\pi - 0) = \pi R^2$



Picture 9

- Find $\theta_1, \theta_2, \theta_3, \theta_4$, $0 < \theta_1 < \frac{1}{2}\pi$ taken from equation (6) and (9), then

$$\frac{a^2b^2}{b^2\cos^2\theta + a^2\sin^2\theta} = R^2 \quad \text{..... (12)}$$

We have find square of an ellipse crossed by a circle like picture 9

$$A_i = 2\int_{\theta_1}^{\theta_2} ellipse + 2\int_{\theta_2}^{\theta_3} circle \text{ , i = 1, 2, 3, ... , n}$$

- Find volume of an ellipse cylinder crossed by a curve using Simpson Factor[3]:
Simpson Factor (F_s)

	A	F_s	$A.F_s$
1	A_1	1	$A_1.1$
2	A_2	4	$A_2.4$
3	A_3	2	$A_3.2$
4	A_4	4	$A_4.4$
....	....	....	.....
n	A_n	1	$A_n.1$
		Volume:	$\sum A_i . F_s$

Volume of the ellipse cylinder crossed by the normal curve.
$V = \frac{1}{3} (\sum A_i . F_S).\ dh$ ..... (13)

dh is distance height (see picture 7)

Next, compare volume of the normal curve with volume of the ellipse cylinder crossed by the normal curve.
Suppose volume of normal curve = x = 100%
Volume of ellipse curve = y
Probability of error = p = (x - y) 100%
If $p > \alpha$ accept the H_0
If $p \leq \alpha$ refuse the H_0

DISCUSSION

There is no ideal technique for testing the significance of holistic approach because each technique has benefit and disbenefit. Alternative one is simple but not accurate, alternative two is not so simple but also not too accurate, alternative three is not simple, still in development but more accurate. This deduction approach should be followed by testing the technique in daily live (inductive approach). Scientifically it is sound but socially it is to be confirmed because it is difficult to change some one's behavior to a new one. It needs time. The discussion is only involving 3 variables and how about if it is more than 3 variables (holistic)? The users should discuss the problem with the professionals/experts to get the better formula nationally or internationally or is it really needed to have a holistic approach? It is not only the problem of thinking, but also the problem of wisdom because human being is not machine nor a guinea pig. It is more than that. Anyway, it is a long journey, waiting time, energy and cost.

CONCLUSION

Traditional medicine holistic approach should be treated with multivariable hypothetical testing. One of the techniques is by using multidimensional normal curve (in this paper only 3 dimensions for an example) by comparing the proportion of volume between the ellipse and circle normal curve. This is a preliminary idea in discovering the multivariable hypothetical testing technique. A long way of hard work is needed to fulfill the dream.

REFERENCES

Multivariate Normal Distribution. Available at: http://Wikipedia Fuce /encyclopedia/multivariate/ multivariat8.htm

Stroud KA, 1996. *Matematika Untuk Teknik* (translated), 3hd ed., Erlangga, Jakarta

Taylor SJ, 1978. *Statistics I* (Lecture Book). Department of OR. Lancaster