A Novel Algorithm Measuring the Deviation of the Nose and its Effects on the Size of Pulmonary Capacitance

Shaker K Ali
Computer and Mathematic
Collage, Thi-Qar university
shalynar@hotmail.com

Suhad Abbas Yasir
Technical Institute, Shattra
suhadabbass@yahoo.com

Amir Yasseen Mahdi.
Computer and Mathematic
Collage, Thi_Qar.University
amiryasseen@yahoo.com

Abstract

In this paper we designed algorithm to measure the nose Deviation and its impact on the size of capacitance vision. A samples were taken from the football players in the Faculty of Education at the Thi-Qar University, and the algorithm is a use Euclidean distance to measure the distance between two points by calculated midpoint between the eyebrows and midpoint between the lips then a straight line from lips to eyebrow to calculate the amount of deviation of the nose automatically. The aim of the research is to measure some of the variables and linked in the field of physiology sports as a modern measuring mean methods to measure deviations in the nose and different degrees may be at the top of the nose or in the middle or in the bottom or may be to right or left party. The results from using the algorithm shows the deviation percentage in nose reduces the amount of air.

Key words: Deviation of the Nose, image processing, Euclidean Distance, Pulmonary Capacitance, image processing.

ملخص

في هذا البحث تم تصميم خوارزميه لقياس انحراف الانف وتأثيره على حجم السعه الرؤية حيث تم اخذ عينه من لاعبي كرة القدم في كلية التربية في جامعة ذي قار , والخوارزمية هي عباره عن استخدام نظرية اقليدس لقياس المسافة بين نقطتين حيت يتم احتساب منتصف المسافة بين الحاجبين ومنتصف المسافة بين الشفتين ومن ثم يتم التوصيل بينهما بشكل مستقيم وبعد ذلك يتم حساب مقدار انحراف الانف حيث يقوم البرنامج بحساب كل هذه بدون الرجوع للطرق اليدوية. الهدف من البحث هو لقياس بعض المتغيرات وربطه في المجال الفسيولوجي الرياضي كوسيلة من وسائل القياس الحديثة واستخلاص نتائجها تعتبر من الحقائق العلمية الدقيقة لقياس الانحرافات في استقامة الأنف وبدرجات مختلفة وقد تكون في أعلى الأنف أو في وسطه او في مقدمته او قد يكون إلى احد الجهات اليمين او اليسار وهذا يعد خلل كبير في عملية دخول الهواء إلى الرئتين بشكل .اثبتت النتائج بعد استخدام الخوارزمية والتي ظهرت فيها نسبة انحراف عن الانف الطبيعي ان مقدار الانحراف يقلل من كمية الهواء وخاصه لدى الرياضيين اي عندما يحتاج الى شهيق وزفير سريع.

كلمات مرشدة : قياسات الانف, نظرية اقليدس, معالجة صور.

1. Introduction

The sciences' progressives open the gate for researchers to interlink these various sciences to get new scientific facts this is by measurements and tests. Since, computer science is the one of the most developed and multi-field science, therefore, to measure the physiological variables to get these scientific results, is an accurate scientific fact.

Furthermore, respiratory is one of the main parts of the human body, in this process air goes to lungs through nose and mouth cavity, any imbalance of these two cavities causes a respiratory imbalance. Therefore, the quantity of needed air cannot go normally to lungs. In this case, we discovered many people have a deviation of nose integrity; these deviations are above, middy, forewords, right or left, and in varying degrees. These deviations cause an imbalance of air qualities and air quantities, that should go to the lungs normally, in a way, they should commensurate with the normal practices of normal individuals. Therefore, this problem increases breath numbers to provide the required air [1].

Essentially, the normal person's respiratory has special recommendations. For instances, lungs air amounts should be (5-6 liters), these amounts should commensurate the normal actions of human being. Moreover, the number of times breathings of normal human ranges (15-25) times per minute. Normally, a person breathes through nose cavity to get the clear air that the nose provides, this be for candidates in the nose as hair or fluid. The candidates purify air that goes to the lungs. Thereupon, at any respiratory imbalance, breathing will be more complex, because human cannot get the amount of air required, on the other hand, the number of inhalation and exhalation will be higher than the normal case, this is to fill the air shortfall [2] .

There many type of nose which effect of the capacity of air. Nose is one of the main parts of respiratory. This system has primary and secondary functions, it moistens the air, prevents the strange impurities into the lungs and the most important function is the speech process. The outside parts of this system are group of bones and cartilage. Whereas, the inside parts are pair of cavities separated by a barrier disc to right and left room, and there is an open vacuum at the top of the nose called a click nose. The click consists of three parts: the upper, lower and the middle. These parts composed of a set of capillaries mucous supported by bones, and there are scrolls, under each cavity of which there are corridor antenna narrow called "Glues" it is useful to carry on the air to the lungs [3]. The enter air is examined by the existing hair which cleaning, pushing, and wetting the going on air. The secondary role of nose is very important. Mucus plays a defensive role of microorganisms, and foreign objects, as well as for additional protection against bacteria that carried out by lymphocytes- these are settle in the thin meat part- this protection is carried through the discharge plasma cells and that these platelets have a big role to push the air too.[4]

There are five type of nose as shown in figure1

1. Straight tilted bony pyramid with tilted cartilaginous vault in the opposite direction.
2. Straight tilted bony pyramid with concavely or convexly bent cartilaginous vault.
3. Straight bony pyramid with tilted cartilaginous vault.
4. Straight bony pyramid with bent cartilaginous vault.
5. Straight tilted bony pyramid and tilted cartilaginous.
6. dorsum in the same direction.

2. Procedure of research

To reach the specific and precise results of a research depends upon the right approach in which we rely. Because, it mainly depends on the nature of the problem, and it is the right gat to discover the scientific fact… this is to reach the specific result [5].

In this research the researchers depend the descriptive approach to solve the research problem.

Moreover, there are various of research sample collection ways. In this sense the sample should give a real representation to community, in order to disseminate the research results on the society[6]. "Jaber Abdel-Hamid Khairi and Ahmed Kazim mentioned that' the researcher should chose a real representative social sample. So, we chose 20 track and field players from western area, specifically, we use 14 marathon games players as a specific sample of nose deviation, there is one player exclusion to his injury and irregular exercises. We chose this kind of sample because they supposed to have big lungs, because they need big amounts of air to breath and oxygen on their sport [7]. The sample was divided into two regular groups. So the researchers use the statistical tools to get a hom ogenous sample and to get the results as the following table:

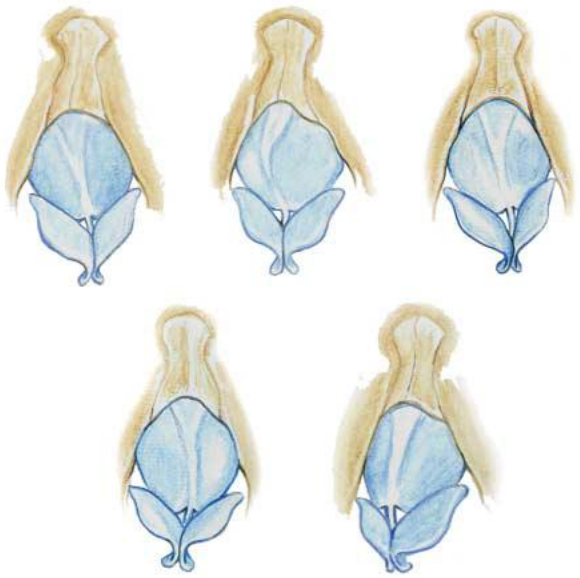

Figure (1) Classification of the deviated nose. For explanation of the 5 types,see the "Classification" subsection of the "Methods" section.

3.1. Calculating the nose Deviation

Calculate the midpoint of the tow distance by using the Euclidean distance between two points that lie on two corresponding lines if we need to derivate the final equation, we need to know the slope of each of two lines, assuming that, the first line have two points (x_1, y_1), (x_2, y_2), then the slope will be:

$$slope_1 = \frac{y2 - y1}{x2 - x1} \qquad (1)$$

And the slope for second line is $slope_2$, by using equation 1 it is easy to calculate the value of slope for each of the two lines. Let's consider the case where we have straight lines in an image. We first note that, for every point (xi ,yi) in that image, all the straight lines passing through that point satisfy Equation 6 for varying values of line slope and intercept (k,b).

(2)

$$k = -1/\text{slope}_1$$

$$y_i = kx_i + b \quad (3)$$

Now if we reverse our variables and look instead at the values of (k,b) as a function of the image point coordinates (xi ,yi), then Equation 2 becomes:

$$b = y_i - kx_i \quad (4)$$

As shown in figure 2.

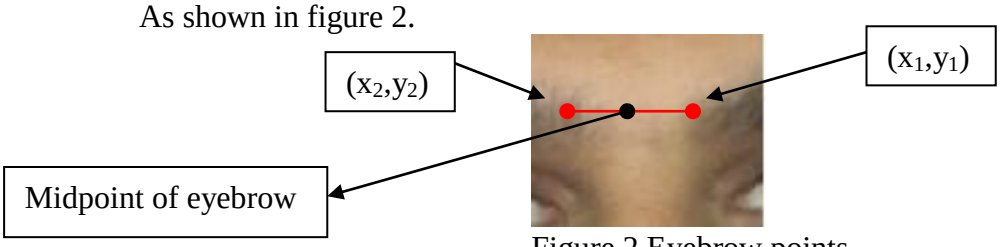

Figure 2.Eyebrow points

Equation 3 describes a straight line on a graph of k against b. At this point, it is easy to see that each different line through the point (xi,yi) corresponds to one of the points on the line in the (k,b) space. Now, consider two points P1 and P2, which lie on the line in the (x,y) space. For each pixel, we can represent all the possible lines through it by a single line in the (k,b) space. Thus, a line in the (x,y) space that passes through both pixels must lie on the intersection of the two lines in the (k,b) space, which represent the two pixels. This means that all pixels which lie on the same line in the (x,y) space are represented by lines which all pass through a single point in the (k,b) space.

There is need to know the two points lie on two lines in the same membrane but in corresponding position, so we assume that an orthogonal line intersection the two lines in points (x1,y1), (x2,y2) as shown in figure 2. We need to know how to calculate the intersection points between the two lines and orthogonal line, by using the Cramer's rule for the first and second line with the orthogonal as following [8]:

$$b_{line1} = -k_{line1}x_{line1} + y_{line1}$$
$$b_{orgline} = -k_{orgline}x_{orgline} + y_{orgline} \quad (5)$$

$$A_1 = \begin{bmatrix} -k_{line1} & 1 \\ -k_{orgline} & 1 \end{bmatrix}, \quad D_{x1} = \begin{bmatrix} b_{line1} & 1 \\ b_{orgline} & 1 \end{bmatrix}, \quad (6)$$

$$D_{y1} = \begin{bmatrix} -k_{line1} & b_{line1} \\ -k_{orgline} & b_{orgline} \end{bmatrix}$$

$$x_1 = \frac{D_{x1}}{A}, \quad y_1 = \frac{D_{y1}}{A} \quad (7)$$

where x1, y1 are the intersection point between the first and the orthogonal line, and we can also calculate the intersection point between second line and orthogonal line by using the same equations (5-7). Then, it is easy to calculate the distance between two line dependence on the two intersection points between the two lines and orthogonal line. By using Euclidean method we can calculate the distance between two points in two lines, assume the orthogonal line intersect the first line at point (x1, y1) and cross the second line at point (x2, y2), the Euclidean distance between them is [9]:

$$dis = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \quad (8)$$

There are 2 point must be calculate one for will midpoint of eyebrow as shown in figure 2, and the second for midpoint of lips as shown in figure 3.

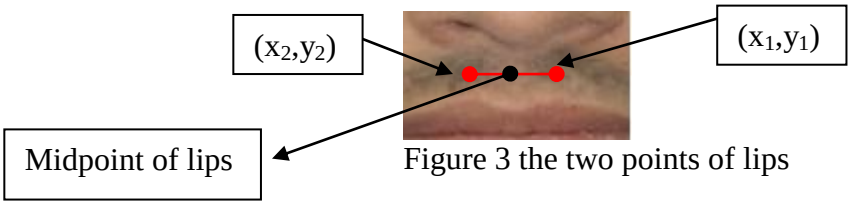

Figure 3 the two points of lips

Then use two new points(midpoint of eyebrow and midpoint of lips) slop1 and slop2 to find the straight line that will used for calculate the deviation. As shown in figure 4.

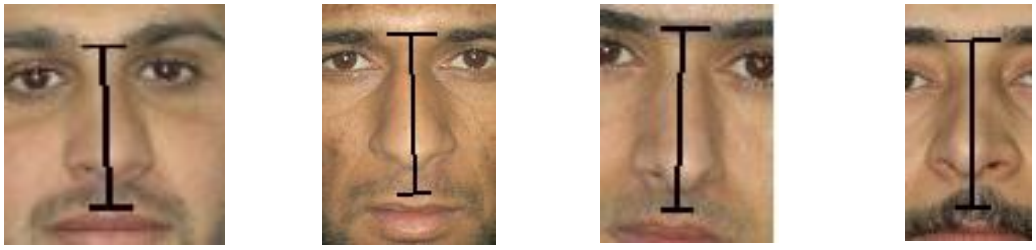

Figure 4. show the line between the slop1 and slop2

3.2 The algorithm

There five steps for our algorithm as shown in figure 5

1.**Input picture** : capture the picture from the source direct to the computer then .

2. **pre-processing**: in this step we enhance the picture that taken from different times and to have the same features by resize all the pictures with size 512*512 and JPG format.

3. **Rotate the picture in one direction**: some pictures have different positions , so it must have the same direction to calculate the distance this part is to re-position of all picture in same direction.

4**. Calculate the Euclidean distance**: calculate the distance as we shown in the section (Calculating the nose deviation).

5. **Find the degree of Deviation of the Nose:** by known the last result from our program that show in there is deviation or not and how many the degree of the deviation.

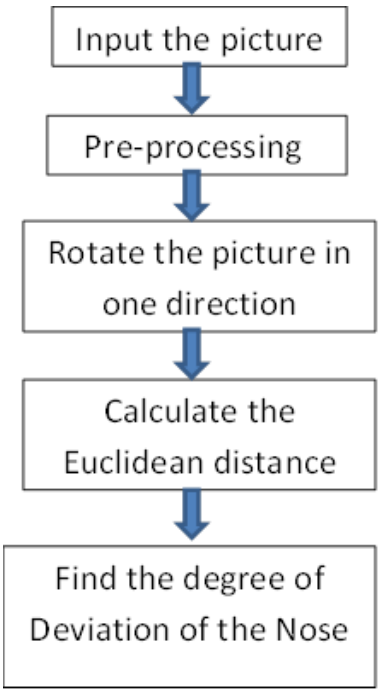

Figure 5 the algorithm

4. The result

Our algorithm show that our algorithm can easy find if there is an nose deviation. In our algorithm we find the measure is came by two ways first from our proposed way and the second by the size of affection , first we collect 20 samples, and the result shown that our proposed way has more accuracy depending on physical exam that used for measuring the amount of air (pulmonary capacity) to know if it is normal or not , we conclusion that all the persons have even little degree of deviation nose ,them measuring in physical exam is abnormal. As shown in the table1 and figure 6.

Our research show that the left deviation affect for pulmonary capacity, when the degree of deviation is left then the affect is more comparing with right deviation, as shown in table 2 and figures 7.

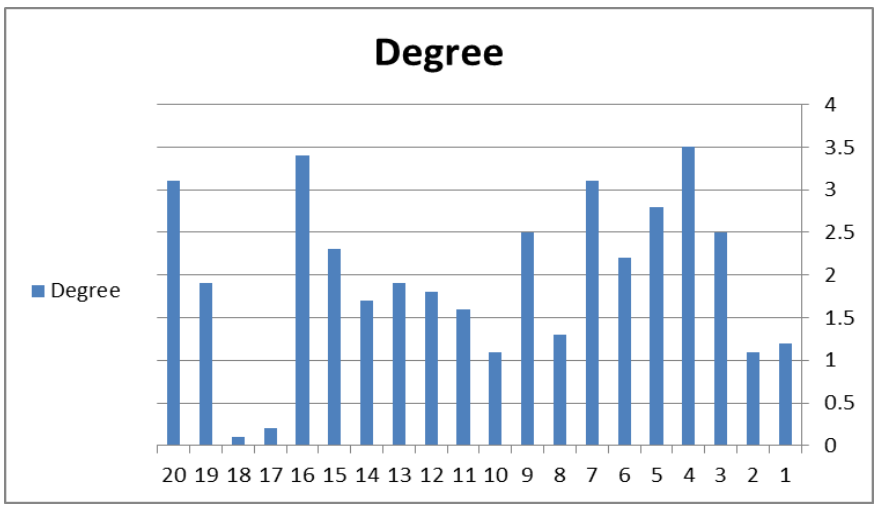

Figure 6. show the deference degree of samples.

Table .1 measuring of Pulmonary capacity with nose deviation .

Case number	Pulmonary capacity	Degree	Direction
Case1	Abnormal	1.2	Left
Case2	Abnormal	1.1	left
Case3	Abnormal	2.5	right
Case4	Abnormal	3.5	left
Case5	Abnormal	2.8	left
Case6	Abnormal	2.2	right
Case7	Abnormal	3.1	left
Case8	Abnormal	1.3	right
Case9	Abnormal	2.5	left
Case10	Abnormal	1.1	right
Case11	Abnormal	1.6	right
Case12	Abnormal	1.8	left
Case13	Abnormal	1.9	right
Case14	Abnormal	1.7	left
Case15	Abnormal	2.3	right
Case16	Abnormal	3.4	right
Case17	Normal	0.2	left
Case18	Normal	0.1	left
Case19	Abnormal	1.9	right
Case20	Abnormal	3.1	left

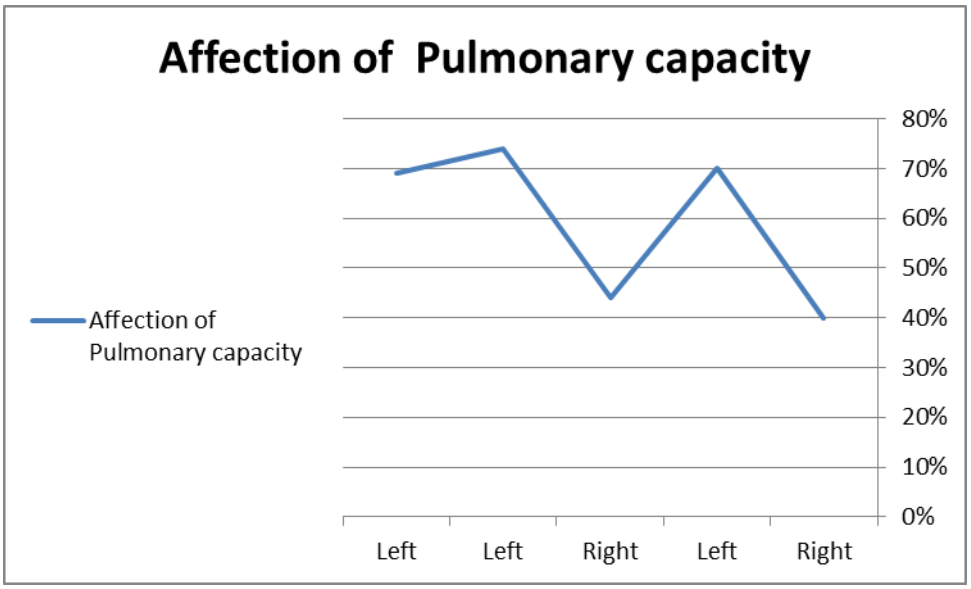

Figure 6 illustrated the deviation and its affecting of Pulmonary capacity

5. Conclusion

Mixed between computer science and other science has benefit for all science , so we found that some computer ways give the correct decision we found from this paper that we can know the amount of air (pulmonary capacity) wither it is normal or abnormal depend on if there is nose deviation or not, the result proved that if there is nose deviation then the pulmonary capacity will be abnormal.

In other side our algorithm has benefit for medicine and Faculty side also in computer fields. In medicine, it is easy to know the degree of deviation of the nose that is necessary for surgery or facelift. In Faculty field, it is easy to know the athletes and select them.
Our algorithm gives good result and no need to use the other device that is expensive, and complex compare with our algorithm.

Table 2. illustrated the sample of deviation and its affecting of Pulmonary capacity

Sample	Degree of deviation	deviation	Affection of Pulmonary capacity
1	1.2	Right	40%
2	2.1	Left	70%
3	1.5	Right	44%
4	2.3	Left	74%
5	1.9	Left	69%

References

[1] Michael J G, Susan A. L., Aedin C. Hester H. V. "Introduction to Human Nutrition" Second Edition, A John Wiley & Sons, Ltd., Publication,2009.
[2] Marriott,H.J.L:Practical Electrccadiography,7th Ed,Willians &, Baltimore, pp 95 1983.
[3] Steven hyperertrophy: in response to dynamic conditionin female athletes ,Auerican Physiological Society, pp-45,2010.
[4] Yong Ju Jang, MD; Jong Hwan Wang, MD; Bong-Jae Lee, MD "Classification of the Deviated Noseand Its Treatment" Arch Otolaryngol Head Neck Surg; vol. 134 no. 3, pp311-315, 2008.
[5] Cleary packham:Aspets of Educational England pitman Bath pp- 89,2000.
[6] Amany mousa:Statitstical Data Analysis. center for Advancement of Postgraduate Studies and Research, Faculty of Engineering, Cairo university ,2008,P98.
[7] Flipper: Biophysics and physiology of carbon Dioxide, New York, Springer-verlag.2009,p74.
[8] Jon Dattorro, Dattorro, Jon Dattorro Dattorro “Convex Optimization & Euclidean Distance Geometry” Meboo Publishing USA, 2005.
[9] K. S. Thyagarajan, “Digital Image Processing with Application to Digital Cinema”, Elsevier Press, 2006.