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A Methodological Review on stage based detection of ovarian cancer via neural network

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Abstract: Today, the fifth most common cancer in women is ovarian cancer .It begins in the ovaries which produce eggs (ova). In this paper, we shall be detecting the ovarian cancer and also its stage from the cancer image produced after detection. SIFT algorithm is proposed for this purpose. An image has lots of features which can be extracted and enhanced to get the full picture of the object and its properties in an image. A Fitness function is used to extract the features. This Fitness function has three parameters namely each feature, total feature and classification error rate.CNN and SVM classifiers are used to get the accuracy, Sensitivity, Specificity and Accuracy are used to get the performance measurement.

Keywords — algorithm SIFT, convolution Neural Network, Fitness Function (Fvalue), ovarian cancer.

I. INTRODUCTION

Cancer or tumor is a form of a harmful disease that affects the entire body in a short while. There are enormous kinds of diseases, but the major disease is cancer disease and the hundred diseases that came under this disease such as heart disease, liver, brain, ovaries and so on [1].The ovarian cancer is a form of disease that produced in the ovaries. The ovaries are the organ in the female body and oval shaped and positioned in the left or right side of the uterus. The size of a normal ovary is between 3cm to 5cm in length and the thickness is between 0.5 and 1.5 cm. There are various kinds ofovarian diseases such as the osteoporosis, ovarian cysts, ovary syndrome, and the major disease is the ovarian cancer.

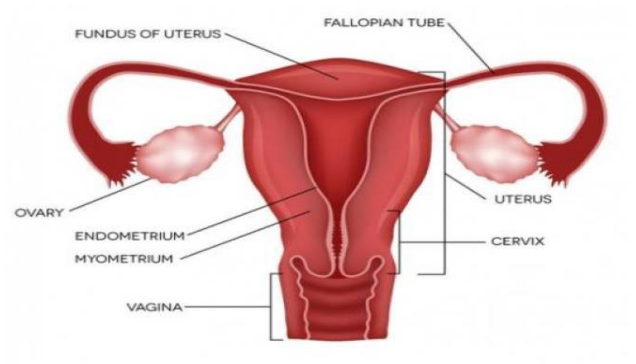

Figure 1. Structure of ovary

STAGES OF OVARIAN CANCER

The ovarian cancer is categorized in the four basic stages. The detection of disease is easy in the early stages as I and II whereas the detection process of disease becomes difficult in the stages III and IV. Stage I just limited effect. The Stage II disease effect the nearest area to the ovary. Stage III affects the abdomen and the last stage IV affects the liver and lungs also [2]. The ovarian cancer is considered as a silent disease that affect and majority of women all around the world.

CAUSES OF OVARIAN CANCER

The general causes of ovarian cancer are described as below:

- Due to the gene mutation
- Damage and changes in DNA (Deoxyribonucleic Acid)
- Malnutrition
- The excessive use of smoking and alcohol.
- Extreme is bleeding while menstrual cycle.

SIGNS AND SYMPTOMS OF OVARIAN CANCER

The common signs of ovarian cancer diseases are noticed in the early stages also. Some of the common symptoms are mentioned below-

- Abdominal pain in the body is a common sign of disease.
- Changes in the menstrual cycle.
- Sudden changes in weight it may be gained or loss.
- Abdominal pain in the back.
- Digestion problem and upset stomach.
- Problems while eating [3].

The ovarian cancer disease raised the effects on the other parts of body in basic three ways as an attack, magnify and the spread. An attack is about a common tumor that damaged the healthy organs in the body and travel to reach

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at the abdomen. Magnify is another way in which cancer cells are segmented and creates the new cancer cells in the organs. The last spread was a central form of cancer that easily distributed through the lymphatic system to the pelvis.

II. CLASSIFICATION OF OVARIAN CANCER

The ovarian cancer is simply classified in the three other techniques:

DETECTION TECHNIQUES;

The diagnosis and detection of ovarian cancer is essential in the early stages to reduce the survival of patients. The technology emerged and invented various methods for the detection of diseases in the medical field. The description of some techniques is described in the following section.

Noises:

The noises are the unrequired piece of information shows its presence on the digital images. It has its own effective affects such as the artifacts, unreal edges, unwanted lines, unshaped edges, blurring, low contrast and mashed background of images. The occurrences of these noises are varied from one to another. There are So many types of noises as gaussian noise, white noise, brown noise or fractal noise and the most important impulse noise.

Salt and Pepper Noise: The second name of the salt and pepper noise is impulse noise. It is the noise related to the data dropping from its own original values of data. The image is not fully changed but there may be occurrences of some kinds of noises that hide the original values. The original pixels of image are shuffled by other pixels which are corrupted It is shown in figure 3, the central pixel 212 is exchange with the pepper noise and it becomes 0 [5].

Figure 2. Salt and Pepper Noise

Edge Detection: Edge detection is a fascinating approach which used to detect the presence and the position of different edges in the highly intense image. Generally, edges are the corners of a particular region that accessed for the segmentation and the recognition of features of the image. The main aim is to filter the unnecessary information form the image. SOBEL is one of the most used approaches of edge detection

- **Sobel:** The purpose of sobel is to capture all the essential edges of an image and the directions of the edges in an image. Sobel is capable to perform both differencing and smoothing effects and basically it is executed as the total of two directional edges with the enhanced operators. The process is composed of a pair 3x3 convolutional kernels. Therefore, the gradient components of orientation are as

$$|O_g| = \sqrt{Oi^2 + Oj^2}$$

Where Oi and Oj are the gradient components and the approximately magnitude is as below-

$$|O| = |Oi| + |Oj|$$

Hence the processing speed is enhanced and it becomes quicker as compared to the previous results [6].

Median Filter

The basic function of a filter in image processing is to expel the noises form the image and make it better. The median filter is an order static and a non-linear formed filter which based on the ranks of the pixels values. The central value is converted with the median of the pixel values and the task is performed under the specific area. The processing is easy and simple executable for smoothening images. Further, it also utilized for the reduction of intensity variations of the pixels. The determination is completed by considering all the pixel values in an ascending order and them they altered with pixel which evaluated through the middle pixel's value. It is classified in various categories as standard, switched, progressive and adaptive median filters [7].

SIFT Algorithm

In this approach, for picture highlight era, takes a picture & changes it into an "expansive gathering of neighborhood highlight vectors" (From "Article Recognition from Local Scale-Invariant Features", David G. Lowe). In each of these highlight vectors is invariant to any scaling, revolution or interpretation of the picture [8].

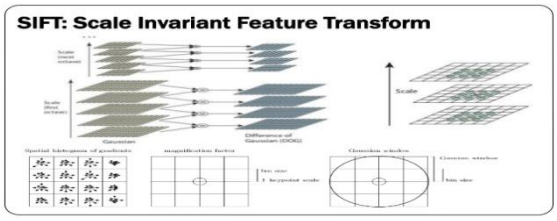

Figure 3. Scale Invariance Feature Transformations [9]

This methodology offers numerous highlights with neuron reactions in primate vision. To help the extraction of these highlights the SIFT calculation applies a 4 stage separating methodology:

a) Scale-Space Extreme Detection: This phase of the separating endeavours to recognize those areas & scales that are identifiable from diverse perspectives of

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the same item. This can be proficiently accomplished utilizing a "scale space" capacity.

b) Key point Localization: This stage endeavours to take out more focuses from the rundown of key points by discovering those that have low difference or are inadequately restricted on an edge [10].

c) Introduction Assignment: This step intends to relegate a predictable introduction to the key points taking into account nearby picture properties. The key point descriptor, depicted underneath, can then be spoken to with respect to this introduction, attaining to invariance to pivot.

d) Key point Descriptor: The nearby inclination information, utilized above, is additionally used to make key point descriptors. The slope data are pivoted to line up with the introduction of the key point & after that weighted by a Gaussian with a change of 1.5 * key point scale. This information is then used to make an arrangement of histograms over a window focused on the key point.

CNN (Convolutional Neural Networks)

CNNs are designed to method information that are available in the shape of multiple arrays, maybe color an image composed of 3 second arrays containing constituent intensities within the 3 color channels. Several information modalities within the type of multiple arrays: 1D for signals and sequences, together with language; second for pictures or audio spectrograms; and 3D for video or meter pictures. There are four key ideas behind ConvNets that make the most of the properties of natural signals: native connections, shared weights, pooling and also the use of the many layers. The design of a typical ConvNet in figure 5 is structured as a series of stages [11].

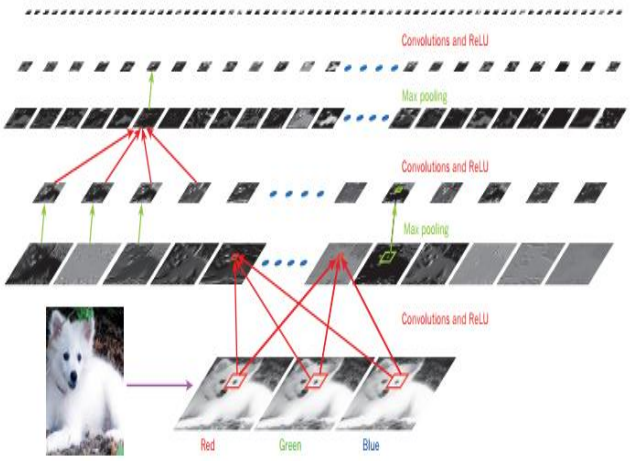

Figure 4. Convolutional Network

III. LITERATURE REVIEW

Kaur, B., et al., (2017) [4]proffered the classification approach for the brief introduction on ovarian cancer via the cytological images with the utilization of DCNN (Deep Convolutional Neural Networks). The ovarian cancer was one of the most dangerous forms of cancer formed in the ovaries of women. The basic cells of ovarian cancer were serous, mucinous and clear cells. Therefore, the detection systems were required. The recent research, CAD (Computer Aided Diagnosis) systems were utilized for pathologists to evaluate the correct diagnosis of ovarian cancer. The primitive approach was DCNN which relied on the Alexnet particularly to classify the various types of the cancers related to the ovary disease via cytological pictures. Basically, a deep convolutional network was a form of neural networks which proceeds in the layered structured. The results were acquired through this approach of ten folders of cross-validation which being capable to enhance the accuracy from previous accuracy at 72.76% to the current accuracy which recorded at 78.20%. It was proven that, it was being a good way to classify the ovarian cancers.

Osmanović, A., et al., (2017) [12]proposed a deep work on the detection of ovarian cancer with the user of classifiers that relied on the decision tree and on the data collected from the history of the patient. Generally, an ovarian cancer was a kind of a disease that produced in the ovaries and harms the other body parts of women. The disease was flourished rapidly, and the detection of ovarian cancer was required as soon as possible. For the detection of ovarian cancer, several methods were utilized. The planned methods were decision tree classifier and ANN (Artificial Neural Network) and MLP (Multilayer Perceptron). The data set was gathered from Danish cancer register. There was a current need to enhance the accuracy. There were three fundamental features of a dataset were demonstrated as the mobility, surface and the consistency. The experiment depicts that the patients who were cystic were died by cancer. On contrast, the patients with uneven had long survival of disease. The validation accuracy was recorded at 93% in round 1 and 95% in round 10.

Bhattacharjee, S., et al., (2017) [13] described the comparison performance of machine learning classifiers specifically for the detection of ovarian cancer. In simple terms, an ovarian cancer was a harmful disease and affects the majority of females. The signs of disease at the early stage were difficult to found. Therefore, for the detection of ovarian cancer, several machine learning methods were trained. The common need of machine learning method was to search out the regular patterns in the given information specifically obtained the better prediction approaches. In the current research work, the planned machine learning techniques were SVM (Support Vector Machine), NN (Neural Network), MLP (Multilayer Perceptron), decision trees and the KNN (K-Nearest Neighbor). The comparison of performances of different machine learning methods were demonstrated that the neural networks were above all the other methods in terms of accuracy at 99.1%, sensitivity at 100% and the specificity recorded at 97.9%.

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Yasodha, P., et al., (2017) [14]explained the stages of ovarian cancer and proposed the new approaches based on the convolutional neural networks (CNN). In this era, the ovarian cancers were the most dangerous forms of cancer diseases in the females. The current research work was all about the detailed description of ovarian cancer and its stages. The techniques were accessed to detect the cancer. The utilized approach for the detection of ovarian cancer was relied on the feature extraction and performed through SIFTS (Scale Invariance Feature Transformations). In this work, the information was collected from each feature and which later described the object. The genetic algorithm was also accomplished to find the solution through obtaining a fitness value. Hence, the CNN (Convolutional Neural Networks) was also trained for obtaining better results, and it was proven to be a good suggestion and enhanced the accuracy at 98.8% whereas it was 875.1% obtained by support vector machine.

Wu, M., et al., (2018) [15] utilized the big data analysis as in the form of an effective model for the detection of cancer diseases mainly to detect ovarian cancer. These days, the medical data was easy to access and utilized for the treatment of the major diseases such as ovarian cancer by just adopting the data mining approaches. All the description related to the ovarian cancer was represented in this paper. The purpose of research was to access an effective data mining technique specifically on the extreme amount of the datasets which used for the identification of disease.The proposed method was a powerful approach known as SOMICS that stands for the self-organized maps immune clonal selection. The aim of this approach was to access the better selection process of feature extraction particularly for the classification procedure along with the grammatical evolution neural networks (GENN).The obtained results give accuracy 98.23% and the mean square error was 0.0021%.

Li, L., et al., (2018) [16] demonstrated the ovarian cancer cells and the tissues obtained from the Fourier transform. The ovarian cancer was the gynecological malignancies. There were several methods were considered for the detection and diagnosis of the ovarian cancer. The proposed technique was Fourier transform infrared spectroscopy (FTIR) which operated on the normal and cancer tissues and the samples were taken from the 12 ovarian patients. It was used to reveal the pivotal role of the molecular characteristics. The searching and results described the common process of treatment of ovarian cancer. First of all, it was performed on the normal ovarian surface. Then, it accessed for the patients who had ovary cancers. The features were evaluated for accurately through this process which was better rather than other approaches of detection ovarian cancer.

IV. CONCLUSION

After reviewing various techniques we have found that the primary goal of this work was to upgrade the ovarian disease pictures with specific end goal to enhance the quality and distinguish the growth as per organize by proposing a relevant calculation.

REFERENCES

[1] Shandilya, S., & Chandankhede, C. (2017, March). Survey on recent cancer classification systems for cancer diagnosis. In Wireless Communications, Signal Processing and Networking (WiSPNET), 2017 International Conference on (pp. 2590-2594). IEEE.

[2] Kore, M.R., Phulpagar and Phulpagar, B.D. (2016). A survey on segmentation of ultrasound ovarian cancer image. International journal of innovative research in computer and communication engineering. Vol.4, issue 10. ISSN: 2320-9801. 1

[3] Sharma, A., Singh, S., & Kumar, S. Ovarian Cancer Detection: Cause, Symptoms and Techniques. 2

[4] Kaur, B., Mann, K. S., and Grewal, M. K. (2017, October). Ovarian cancer stage based detection on convolutional neural network. In Communication and Electronics Systems (ICCES), 2017 2nd International Conference on (pp. 855-859). IEEE.

[5] Boyat, A. K., & Joshi, B. K. (2015). A review paper: noise models in digital image processing. arXiv preprint arXiv:1505.03489.

[6] Sharma, P., Singh, G., & Kaur, A. (2013). Different techniques of edge detection in digital image processing. International Journal of Engineering Research and Applications (IJERA), 3(3), 458-461.

[7] Sontakke, M. D., & Kulkarni, M. S. (2015). Different Types of Noises in Images and Noise Removing Technique. IJATES, 3(1).

[8] Slideshare.net. (2017). Visual Object Detection, Recognition & Tracking (without Deep Learnin…. [online] Available at: https://www.slideshare.net/yuhuang/visual-object-detection-recognition-tracking-without-deep-learning [Accessed 14 Jun. 2017].

[9] Kim, A., Ueda, Y., Naka, T., & Enomoto, T. (2012). Therapeutic strategies in epithelial ovarian cancer. Journal of experimental & clinical cancer research, 31(1), 14.

[10] Slideshare.net. (2017). Visual Object Detection, Recognition & Tracking (without Deep Learning…[online] Available at: shttps://www.slideshare.net/yuhuang/visual-object-detection-recognition-tracking-without-deep-learning [Accessed 14 Jun. 2017

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