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BREAST CANCER DETECTION USING DEEP LEARNING

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ABSTRACT

Deep learning (DL) technologies are becoming a buzzword these days, especially for breast histopathology image tasks, such as diagnosing, due to the high performance obtained in image classification. Among deep learning types, Convolutional Neural Networks (CNN) are the most common types of DL models utilized for medical image diagnosis and analysis.

However, CNN suffers from high computation cost to be implemented and may require to adapt huge number of parameters. Thus, and in order to address this issue; several pre-trained models have been established with the predefined network architecture. In this study, a transfer learning model based on Visual Geometry Group with 16-layer deep model architecture (VGG16) is utilized to extract high-level features from the Break His benchmark histopathological images dataset.

Then, multiple machine learning models (classifiers) are used to handle different Breast Cancer (BC) histopathological image classification tasks mainly: binary and multiclass with eight-class classifications. The experimental results on the public BreakHis benchmark dataset demonstrate that the proposed models are better than the previous works on the same dataset. Besides, the results show that the proposed models are able to outperform recent classical machine learning algorithms.

I. INTRODUCTION

Breast cancer remains one of the most severe public health concerns, and it is the leading cause of cancer-related deaths in women around the world. For example, in Jordan, breast cancer constitutes 19.7% of all diagnosed chance. Therefore, the early diagnosis of this disease is vital to avoid its progression consequences and reduce its morbidity rates in women.

Breast cancer cells include numerous entities with distinctive clinical and histological attributes, this indicates that this disease is a heterogeneous one. Figure 1 shows two rows of images; the top row shows benign cells images while the bottom row show malignant cells ones. Unfortunately, this malignancy happens from the development of unusual breast cells and might conquer the close healthy tissues. Clinical diagnosis of breast cancer is composed of numerous techniques. The first technique is clinical screening, which is performed by employing radiology images, e.g.Magnetic Resonance Imaging (MRI), Mammography and others. However, these non-invasive imaging may not be able to determine the cancerous area efficiently.

Thus, to analyze the malignancy professionally, biopsy images are used with different stained to produce histopathology images. However, manual investigation of the histopathology images is tedious, time-consuming, and based on physician skills. Thus, manual diagnosing is subjective. To this end, Computer-Aided Diagnosis (CAD) plays a significant role in assisting pathologists in examining the histopathology images and finding the suspected area. Typically, it increases the diagnostic performance of BC by reducing the inter-and intrapathologist variation in making a final decision

II. AIM & OBJECTIVES

- The main aim of this module is to provide earlier warning to the users and it is also cost and time saving.
- In this system image pre-processing and image segmentation are implemented to obtain the diagnosis result.
- The extracted features can be used for classification of disease stages. this technique helps the radiologists and the doctors by providing more information and taking correcting decision for breast cancer patient in short time with accuracy.
- Therefore, this method is less costly, less time consuming and easy to implement.

III. LITERATURE SURVEY

[International Conference on Advances in Computing, Communication Control and Networking (ICACCCN2018)]

Topic: Breast Cancer Diagnosis Using Deep Learning Algorithm.

System Used: In this paper we proposed the deep learning method convolutional neural network that mostly used for classification of images dataset. After the implementation this method we have achieved 99.67% accuracy. In this paper we used only 12 features for diagnosis of cancer. In future we will try on images datasetwith Convolution Neural Network and will try toachieve best accuracy. Our work proved that Deep

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Learning neural network algorithm also effective for human vital data analyzation and we can do pre-diagnosis without any special medical knowledge.

[3rd International Conference and Workshops on Recent Advances and Innovations in Engineering, 22-25 November 2018 (IEEE Conference Record # 43534)]
Topic: Breast Cancer Detection From Histopathological Images Using Deep Learning.
System Used: As we know that deep learning method convolutional neural network mostly used for image dataset classification that why we used convolutional neural network in this paper. After the implementation this paper we have achieved 98% accuracy. As we mention this paper worked on only 12 features only. In future we will try with new features and also try with the real images dataset so that we can achieved best result and accuracy for diagnosis the cancer. In feature we will also try this method on different type in cancer not only for breast cancer.

[2018 International Conference on Computational Techniques, Electronics and Mechanical Systems (CTEMS)]
Topic: Breast Cancer Detection Using Machine Learning Algorithms.
System Used: The most frequently occurring type of across cancer is breast cancer. There is a chance of twelve percent for a women picked randomly to be diagnosed with the disease[10]. Thus, early detection of breast cancer can save a lot of valuable life. The proposed model in this paper presents a comparative study of different machine learning algorithms, for the detection of breast cancer. Performance comparison of the machine learning algorithms techniques has been carried out using the Wisconsin Diagnosis Breast Cancer data set. It has been observed that each of the algorithm had an accuracy of more than 94%, to determine benign tumor or malignant tumor. From Table 6, it is found that kNN is the most effective in detection of the breast cancer as it had the best accuracy, precision and F1 score over the other algorithms. Thus supervised machine learning techniques will be very supportive in early diagnosis and prognosis of a cancer type in cancer research.

[Proceedings of the International Conference on Smart Electronics and Communication (ICOSEC 2020) IEEE Xplore Part Number: CFP20V90-ART; ISBN: 978-1-7281-5461-9]
Topic: Breast Malignant Detection using Deep Learning Model
System Used: This paper projected a deep learning technique convolutional neural system that diagnosis breast cancer data. This experiment has resolved the dataset imbalance, skewness, and insufficient data of the dataset. And also, the hyperparameters to train the model to achieve the optimal accuracy is discussed. In addition to that, the proposed model is compared with existing machine learning models by including Logistic regression, K- Nearest Neighbors, and decision tree algorithms in terms of performance metrics including accuracy score, precision score, recall score, and f1-score. The proposed model provides better performance in terms of accuracy score (97.94), recall score (98.6) and F1-score(97.94) compared to other machine learning models.

[International Conference and Workshops on Recent Advances and Innovations in Engineering (IEEE) March-2019]
Topic: Breast Cancer Detection Based on Deep Learning Technique.
System Used: In this paper, deep learning technique using VGG16 and ResNet50 network have been implemented for normal and abnormal breast cancer detection. The classification methods were evaluated using three performance evaluations which are precision, recall, and accuracy rate. The best result of classification accuracy was VGG16 with 94%. For future work, the abnormal images can be classified to malignant and benign tumor. That help a lot in term of conducting the next procedure for the patients.

IV. EXISTING SYSTEM

First the quality of the CADs depends on the extracted features, while acquiring representative features from the image is very complex issue.
Second using acquiring features may not be suitable for inter and intra-class variation in the histopathological images.
Third most of the extracted features are based on class label information they can be lying to biased results.
The conventional CADs that was based on the extracted handcrafted features, DL plays a significant in multiple classification tasks and can achieve high performance and extract high-level features from histopathology images automatically.

V. PROPOSED SYSTEM

The experimental results on the public BreakHis benchmark dataset demonstrate that the proposed models are better than the previous works on the same dataset. Besides, the results show that the proposed models are able to outperform recent classical machine learning algorithms.

The nature of breast histopathological images carry many textures, shape, and histological structure such as nuclei, cytoplasm. Thus, the proposed method utilizes VGG16 to extract deep representative features of the input histopathological images.

The experiments means the number of negative samples that were correctly classified divided by all negative samples. The high specificity in this study implies that the proposed method able to predict the true negative cases accurately.

VI. CONCLUSION

Extracting high-level features from breast histopathological images assists in improving the effectiveness of the diagnostic process. Thus, the main objective of this study is to utilize VGG16, a pre-trained model from CCN deep learning, to extract the high-level features from breast images. To do that, we removed the last fully connected layers in VGG16. Then, the obtained features were classified using a set of heterogeneity classifiers. Extensive experiments on Breaches dataset (public dataset) were carried out, and a set of performance metrics was calculated for performance evaluation (on test data portion). The experimental results

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outperformed various techniques in the state-of-the-art. This is demonstrate the effectiveness of the extracted features using VGG16 with polynomial and RBF SVMs classifiers. In the future, further investigation for an ensemble of different classifiers and pre-trained models to deliver high performance for this complex domain will be addressed

VII. REFERENCES

1. *M. A. Rahman, R. chandrenMuniyandi, D. Albashish, M. M. Rahman, and O. L. Usman, "Artificial neural network with Taguchi method for robust classification model to improve classification accuracy of breast cancer," PeerJ Computer Science, vol. 7, p. e344, 2021.*
2. *M. Al-Masri, B. Aljalabneh, H. Al-Najjar, and T. Al-Shamaileh, "Effect of time to breast cancer surgery after neoadjuvant chemotherapy on survival outcomes," Breast Cancer Research and Treatment, pp. 1-7, 2021.*
3. *O. Dorgham, M. Ryalat, and M. A. Naser, "Automatic body segmentation for accelerated rendering of digitally reconstructed radiographimages," Informatics in Medicine Unlocked, vol. 20, p. 100375, 2020.*
4. *S. Sahran, D. Albashish, A. Abdullah, N. AbdShukor, and S. H. M. Pauzi, "Absolute cosine-based SVM-RFE feature selection method for prostate histopathological grading," Artificial intelligence in medicine, vol. 87, pp. 78-90, 2018.*
5. *M. Aubreville, C. A. Bertram, C. Marzahl, C. Gurtner, M. Dettwiler, A. Schmidt, et al., "Deep learning algorithms out-perform veterinary pathologists in detecting the mitotically most active tumor region," Scientific RepoRtS, vol. 10, pp. 1-11, 2020.*
6. *D. Albashish, A. I. Hammouri, M. Braik, J. Atwan, and S. Sahran, "Binary biogeography-based optimization based SVM-RFE for feature selection," Applied Soft Computing, vol. 101, p. 107026, 2021.*
7. *A. Adam, A. A. I. Mudjahidin, B. Hasan, and D. Albashish, "Injecting Tissue Texture and Morphology Comprehension into Algorithm for Cancer Grading," 2020.*
8. *O. Dorgham, M. Alweshah, M. Ryalat, J. Alshaer, M. Khader, and S. Alkhalaileh, "Monarch butterfly optimization algorithm for computed tomography image segmentation," Multimedia Tools and Applications, pp. 1-34, 2021.*
9. *F. A. Spanhol, L. S. Oliveira, C. Petitjean, and L. Heutte, "A dataset for breast cancer histopathological image classification," Ieee transactions on biomedical engineering, vol. 63, pp. 1455-1462, 2015.*
10. *A. A. Samah, M. F. A. Fauzi, and S. Mansor, "Classification of benign and malignant tumors in histopathology images," in 2017 IEEE International Conference on Signal and Image Processing Applications (ICSIPA), 2017, pp. 102-106.*