
CHAPTER 8

CONCLUSION AND FUTURE WORK

8.1 Conclusion

In recent years, people have been exposed to several diseases as a consequence of changing ecological variations and their lively manners. However, physicians diagnose the patient's health condition to understand their problems and prescribe the recommended treatment with respect to heal constraint, and the procedure is always iterative.

In general, uterine cancer is an irregular, multiplying development of tissues and malignant cells may arise in adjacent tissues with further parts of the body. However, cervical cancer occurs in the tissue of cervical area remains at the lowest portion of the uterus. Hence, diseased uterine tissues cultivate and then proliferate through irregular cell sets. Subsequently, it was slow-increasing cancer; females with early-stage cervical cancer won't take several indications until a development and spread of intrusive cancer occurs to further tissues of the body. As the syndrome has an extensive pre-malignant stage, the analysis of the syndrome in its first phase is entirely treatable and avoidable.

Moreover, cervical cancer is one of the most common malignancies among females globally. At present, several studies have accompanied cervical cancer with diverse methods to provide extrapolation at the primary phase. By means of ML, the prediction was contributed towards the initial forecast. Consequently, the most significant sources of the syndrome among female populaces had inadequate cognizance in accessing resources through therapeutic centers, and the expenditure of enduring consistent investigation at specific nations. Moreover, ML has enhanced the efficiency by investigation the exact patient information. Existing studies have incorporated text mining, ML, and econometric implements to regulate fundamental and enriched feature characteristics, and sentiments were further applicable in predicting users' gratification in various service circumstances.

Further, the study recognized procedures appropriated for the classification of destructive and optimistic cervical cancer aimed at the theoretical procedure. Cervical cancer could be analyzed with the assistance of such systems. DL has revealed a substantial effect on healthiness and therapeutic imaging that has supported the calculation of the analytical accurateness of DL procedures in classifying pathologies in therapeutic imaging.

In the First model, an automatic identification of cervical cancer through TWBS with RVDLNN in Pap smear images was proposed. The method included numerous processes, such as pre-processing, fragment removal, trapped cytoplasm separation, the partition of the nucleus, extraction and selection of features, and classification. Subsequently, the investigation exploration was achieved wherein the efficiency exploration with the absolute examination of the projected methods were completed regards with certain performance measures so as to authenticate the efficacy of the projected procedure. The advanced method could control several indecisions with condensed further promising outcomes. The openly available datasets, named Herlev dataset and SIPaKMeD dataset, were utilized in this study, wherein the projected technique achieved an accuracy of 92.73%, precision of 71.15%, recall of 88.10% and F-measure of 78.72% for single cell and accuracy of 93.08%, precision of 82.61%, recall of 97.69%, and F-measure of 85.07% for multi-cell classification. Generally, the proposed cervical cancer recognition outperformed the prevailing advanced approaches and also remained further dependable and forceful.

Correspondingly, in the second model, DL-based RBM classification was incorporated for identification of cervical cancer through the Pap Smear Test. Besides, an Anisotropic Diffusion Filter by means of Histogram Equalization utilized for reduction of the disorder by reducing the boundaries that influences the improvement of dissimilar images which aimed at improved segmentation. Hence, an i-WFCM was implemented to define the optimum cluster center of an image in the segmentation that has led towards the extraction of the features proficiently. In addition, the RBM classifier was employed for classification. While associated with additional classifiers such as DenseNet201, ResNet50V2, AlexNet, RVDLNN, and DBN, the outcome for proposed RBM-DBN attained 95.27% accuracy for single cell and 95.5% accuracy for multi-cell.

In the third model, the proposed work essentially concentrated on the finding of cervical cancer in the former phase. The noise in the cervical image was pre-processed by an Anisotropic Diffusion filter. Where, the filter weights were enhanced using Dragonfly optimization (DA). Consequently, the edges were conserved, and correspondingly, the noise became compact. Besides, depending on the pre-processed image, improved - Weighted FCM with Grasshopper optimization algorithm was employed for segmentation. The desired portions of the segmented image of cervical cancer were taken out also selected the features for further classification. Through the support of Deep CNN with ReLU as an activation

function, the features were classified and the classification label of cervical cancer was identified efficiently. Here, the projected Deep CNN with ReLU accomplished 96.73% accuracy for single cell and 97.23% accuracy for multi-cell and compared with further prevailing classifiers aimed at cervical cancer classification.

8.2 Future Work

In the field of bioinformatics, deep learning has the potential to generate results more efficiently than conventional machine learning algorithms. Nevertheless, further research is needed to improve the capabilities, versatility, and computational speed of DL methods. The examination introduced cutting-edge, established deep-learning structures used for cervical cancer with regard to input data and research goals.

- The study will conduct tests on multiple datasets, evaluate different DL techniques and their computational difficulty, and present a process that will expose findings over various datasets in future studies.
- Future work will involve enhancing advanced neural networks and focusing on various forms of cancer.
- In the future, proposing a novel algorithm on the Pap smear image to exploit the detection of cervical cancer.
- One of approach is to enhance the performance of DL models using optimization algorithms such as particle swarm optimization, Ant colony optimization, Firefly optimization etc.
- Smart procedures will be created using ensemble techniques to enhance the accuracy of the proposed model. The cervical cancer prediction method requires the creation of work with a variety of cancer datasets, including various parts of the body.
- Internet of Things (IoT) will integrate the system to allow patients to utilize personal health devices at home to alert healthcare staff immediately in case of emergencies.
- Since, pathologists find it challenging to detect and categorize diseases, especially during large screenings. This leads to a growing need for automated systems to expedite the diagnostic process in real-time.

- Investigate the combination of different imaging techniques to enhance the precision with the dependability of cervical cancer segmentation. Moreover, emerging synthesis approaches, which combine data against various modalities, can help improve the identification of tumor boundaries.
- Explore various interactive segmentation methods and provide instant feedback to clinicians in real-time. This can make decision-making more effective and allow clinicians to take action or offer advice as needed, thus enhances the segmentation system's accuracy and usability overall.
- Broaden graph-based techniques to address intricate situations that include various objects, such as segmenting various tumors or otherwise differentiating among various kinds of cervical irregularities. It may incorporate sophisticated graph modeling methods or proposed innovative algorithms tailored for multi-object segmentation.