Towards Tumor Stage Classification and Treatment quality

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Abstract

Exact Stage tumor classification and treatment quality is a necessary feature of computer aided tumor diagnosis system for breast and lung cancer. This could achieve after accurate tumor identification because if the system is unable to detect accurate tumor then it is impossible to find exact stage of tumor and vice versa. For accurate identification a CAD is demonstrated in (Waqas Haider 2011). In this article the exact tumor stage classification and treatment quality phase is demonstrated. The proposed phase requires an accurate detected tumor area, the biological tumor stage information and treatment plan according to the stage of tumor and Neural Network based decision making ability. The proposed phase for achieving treatment quality make use of neural network utility of artificial intelligence and data mining , for automatic decision making upon detected area of tumor and stored information at CAD e.g tumor stage biological information and treatment plan. The demonstration shows that it helps in efficiency of computer aided tumor diagnosis system as it comprises on accurate early stage tumor detection, exact stage classification and automated treatment plan generation.

So far with the help of image processing applications and artificial neural networks different CAD system are proposed which detect and classify lung and breast cancer, but still required a lot of improvements for exact tumor stage classification and treatment quality. The term treatment quality is highly dependent on accuracy and efficiency of CAD.

Keywords: Computer Aided Tumor Diagnosis, Tumor stage classification, Neural network, Data mining

1. Introduction

The main challenge of the modern health care organizations is the increment of treatment quality combined with the decrement of health care provision costs. In order to achieve the specific goal, they need to utilize standardized clinical protocols used in the various domains of medical practice. The specific kind of protocol contains detailed medical plans and corresponding actions for diagnosis, therapy scheme, and follow-up (Dimitrios A. et al 2011). An early detection of lung/breast cancer and treatment quality can greatly improve the survival rate of the tumor infected patient. Treatment quality means efficient treatment must be ensure according to disease. The efficient treatment is based on efficient diagnosis of disease, once the disease is diagnosed accurately then system could make reliable treatment plan.

The current research community is presenting several CAD for automation and speedy diagnosis of tumor. As a part of such CADs a system is proposed in (Waqas Haider 2011) for accurate early stage tumor detection. In this article the focus is on classification and treatment quality. The proposed phase make use of neural network and data mining computing utilities. Neural network is a mechanism which is built artificially with the help of computing languages to act as human brain (Fatma T. et al 2010, V.P. Gladis P. et al 2011 and Younis M. 2011). Its working is similar to human brain as first it requires training then analysis and then makes decision. Data mining, another computing utility is a mechanism to retrieve stored data. The purpose of neural network and data mining is to generate treatment plan according to tumor stage efficiently. The realization of proposed phase is given in section three. The rest of the paper is organized as follows, in section two the existing work in the domain of tumor stage classification is expressed. Section three expresses proposed tumor stage classification and treatment quality phase. Concluded remarks are given in

section four.

2. Existing Work

So far with the help of image processing applications and artificial neural networks different CAD system are proposed which detect and classify lung and breast cancer, but still required a lot of improvements for exact tumor stage classification and treatment quality. The term treatment quality is highly dependent on accuracy and efficiency of CAD. The research community in medical imaging focusing on treatment quality with different computing applications. Using image processing applications and artificial neural networks a system is proposed in (S.Aravind K. et al 2011) which detect and classify lung cancer, but still required a lot of improvements for exact tumor stage classification and treatment quality module. The article (W. Wang et al 2006) shows the identification of lung cancer with image processing in it frequency domain image enhancement's (e.g wavelet transformation) and segmentation algorithm is applied for lung tumor identification. The author of (Christopher Koehler et al 2010) utilized 3D imaging and artificial neural network based method for lung cancer detection and localization. In (V.P. Gladis P. et al 2011) the image processing and artificial neural network is applied for brain tumor identification. The author targeted to motivate research community to work in brain tumor segmentation and identification. In (Fatma T. et al 2008) the image segmentation is applied for lung cancer tumor identification. The method focuses on sensitivity, accuracy and specificity of CAD system. The article (S.Aravind Kumar et al 2011) presented a CAD system based on image processing and artificial intelligence for early stage lung tumor automated detection.

3. Tumor stage Classification and Treatment Quality

Many contributors developed systems and algorithms with different technologies and methodologies for early stage tumor identification for lung and   breast cancer, but they are lacking in tumor detection accuracy and exact stage classification, which ultimately results no quality treatment. For accurate early stage breast/lung tumor identification the accuracy module is demonstrated in (Waqas Haider 2011). In figure 1 the abstract view of proposed classification and treatment quality module is shown.
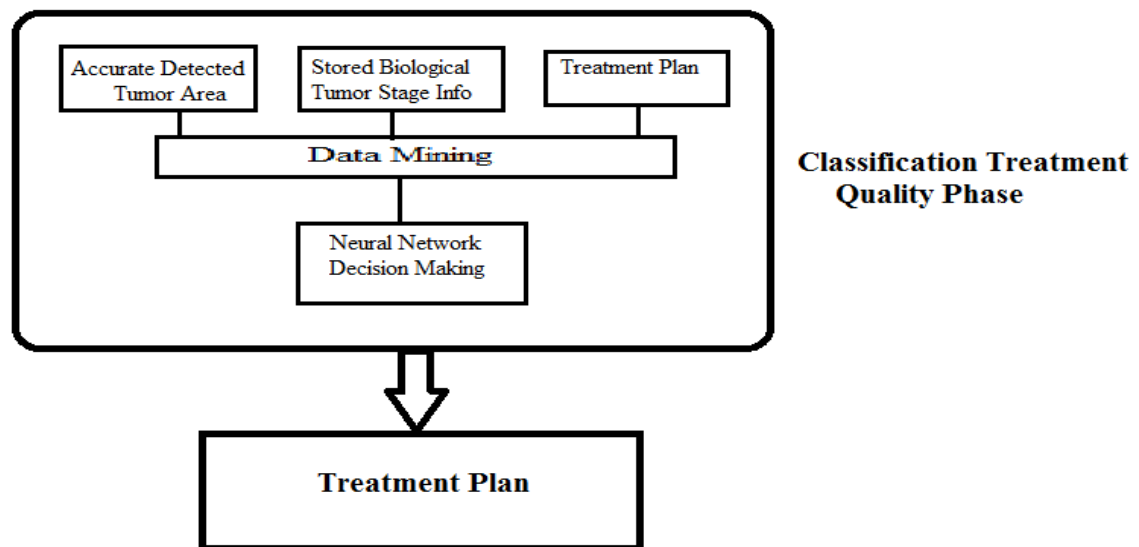
Figure 1. Early stage tumor Classification and treatment quality abstract view

In figure one the input for accurate area detection of tumor is taken from accuracy phase given in (Waqas Haider 2011). It holds the exact area of the tumor whether in breast or lung. The biological information about tumor stages is organized and stored. Similarly treatment plan is also organized and stored.

The demonstrated CAD in (Waqas Haider 2011) after detected accurate tumor area then neural network decision making is applied. The NN utilize three type of information for training and generating treatment plan with the help of data mining. Before taking upcoming accurate area information form area detection phase , the NN required to train first. The NN is trained with the relation of two set of stored information e.g Stored tumor stage biological information and treatment plan. It should be trained as which treatment plan related   to which stage of the tumor. Once it got trained then it takes detected area information at real time and will generate treatment plan using data mining utility.

6. Conclusion

In this article the classification and treatment quality module of (Waqas Haider 2011) computer aided tumor diagnosis is expressed. The phase makes use of neural network and data mining to achieve efficient and reliable treatment quality for early stage breast/lung cancer diagnosis. The CAD with such classification and treatment quality ability could helps in several cancer hospitals for accurate early stage breast/lung cancer diagnosis.

7. References

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