



# Detection of Prostate cancer in Computer Aided Methodology Using Deep Convolutional Neural Networks

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## Abstract:

Abstract— In India one of the leading causes of death from cancer among men, determined by this study, is prostate cancer. prostate cancer is one of the main reasons why men die from cancer in India. In this study, methods involving deep learning are used to analyze prostate cancer utilizing computer-aided detection on multi-parametric MR images. Computer aided systems can be used to determine patient statuses and cancer stages to improve a patient's likelihood of survival. We propose a deep learning-based computer-aided strategy for the classification of prostate cancer. Our model combines manually crafted features with those produced by convolutional neural networks. Two subnets are involved; one will extract the high-dimensional features, while the other will extract the three manually created features and process them using a straightforward CNN. The output properties of the two subnets after two subnets. the output features of the two subnets are concatenated and sent them into classifier for classification of cancer stages to find weather it is in initial stage, Advanced stage or healthy. The accuracy of our model is of 96-98% accuracy. This project helps in determining the cancer at early stage by usage of CNN algorithm.

Keywords—Biomedical image processing, Computational pathology, Deep convolutional neural networks, Prostate Cancer

## I. INTRODUCTION

As we know now a days the diseases has been increased in that cancer has been rapidly increasing the reason behind this is excessive usage of cigarette and also not taking much care on the health which leads them in this deadly cancers. As the cure for the cancer has been increasing and doctors are working on this problems like how they can eradicate in the early stages. This cancers are of different types but in our project we take the problem which occurs mainly in mens as this is the second leading problem after the lung cancer. So in order to eradicate this we have have come up with the solution which helps to identify the tumors in the region and can be reduced by the system on which we are using. Cancer monitoring is another use for it. The variety of oncological imaging is

constantly expanding, and For pathologists and other medical professionals, cancer detection has always been a significant problem when it comes to remedies the tumor cells can be identified by using the microscope where the images have brnn sent through the computer vision and it helps us to find the places where thr amount of cells present along with that it helps in explaining about such as the absence of precise quantitative measurements to distinguish between normal and malignant biopsy images.

## II Digital Image Processing

As a result, digital image processing can provide both more sophisticated performance on straightforward jobs and the execution of techniques that would be impractical with analogue technology.

Digital image processing, in particular, is a real-world application of and a useful technology based on: Classification; Feature extraction; Multi-scale signal analysis; Pattern recognition; and Projection.

Software called digital picture processing is used to process images. Computer graphics, communications, photography, camera mechanisms, pixels, etc. are a few examples.

### III. DIGITAL IMAGE PROCESSING APPLICATIONS

Now a days digital image processing used in various aspects which helps in identification of various problems and closely examining them. They are used widely in different sectors like hospitals ,factories, along with this it helps us to give us the correct values about the problems. This can be used in agricultural sector which will help for the farmers for the identifications of thr diseases associated with the plants.

- Business applications
- Medical field
- Used in radio detection waves.
- Used in identification of sound waves through navigation
- Used in geographical features of the map.
- Detection of diseases in plants
- Monitoring the weather conditions.

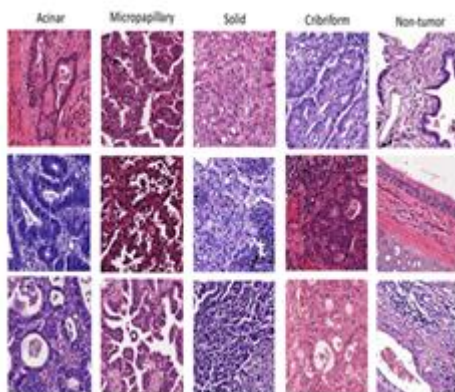


Fig.1.Different histopathological patterns

In this network helps in maintaining the parameters associated with the images and again checks back the condition of each with the help of gradient. This will help us to find out the essential information associated with the images by focusing on the interest part on we

are examining. This prevents training on the complete image due to the memory constraints of existing accelerator cards. As a result, only a small portion of the entire slide image is used to train most networks. Typically, they are detected on indepth descriptions of the classes such as regiois of tumor by an expert. This is very difficult and hard to find the parts as it takes so much of time and also it cannot be done with all the parameters. The dataset size for training models is thus constrained. Additionally, we will have to make these annotations for each distinct task. In addition to time restrictions, the diagnosis is further plagued by significant and Pathologists report cancer using the gradient. Three levels of aggression are produced by categorizing prognostically intriguing growth patterns. In this it will idedtntify the score which combines to form the patterns associated with the images and will grade according to the trained dataset so that the different cells can be separated. The separated parts will be trained by the model so that the color along with the shapes of the tumor cells can be identified by the model and whenever the image is sent which contains the cancer it will explain the region where the cells of the tumor contains by this doctors can able to cure and helps them to perform the operations in that region only. The difficult part in this is to identify and classify the part where the tumor is associated because its hard to find in that millions of tumor cells so the model has been treained according to the system which we are implementing.

Figure 1: Shows Dataset of probes that contains left probes

It shows us the tissue that contains the dangerous tumor when it is closely examined



Fig 1.2 Dataset trained creating heat maps and predict the results



Early techniques to create computer-aided systems using medical images were gaining popularity. The extraction of numerous hand-crafted elements from photos is a necessary stage in the creation of those systems. With deep learning's recent breakthrough in the field of computer vision, this issue may now have a viable and efficient solution. This will help us to find the solutions and also the neural network will give us the perfect accuracy for the solution identification for the problem than methods based on manually extracted features. The architecture affects how well a deep learning method performs.

Constant studies have been in the field of computer methods that are useful in the medical field. As machine learning is new technology it gives advancement in the medical field. The researcher will gain insight into how a study of this nature has been conducted in the past by reading previous publications and research that are linked to the subject. This research may be able to reflect, compare itself to other studies, learn from failures, and develop a stronger and more effective study in this way. They developed a model which creates a big impact for the checking of features associated with the cancer in this the images are sent to the computer where it will identify the outlines of the cells of the cancer so that the model will be trained according to the project so whenever after training we pass an image which contains the cancer cells to the system it will check for the features which has been already trained by the given datasets so that based on the trained model it will check for the cancer and tells the stage of the cancer along with the remedies associated for the eradication.

In early times this computer detected systems used for this cancer detection and can be used widely by many doctors. Now a days the technology has been improved and it gives the region where the cancer cells are associated and the regions has been checked thoroughly which helps us for the closely examining of the cells of tumors. Early techniques to create computer-aided systems using medical images were gaining popularity. The extraction of numerous hand-crafted elements from photos is a necessary stage in the creation of those systems. When it comes to some more specialized and difficult problems, like processing medical images, these approaches can't perform satisfactorily because of the empirical definition of such handcraft aspects. With deep

learning's recent breakthrough in the field of computer vision, this issue may now have a viable and efficient solution.

In this the processing of images digitally can be useful in the sectors like agriculture and in other fields but the same thing in this medical field is a challenging thing because the correct identification and observation in this tissue cells associated with the cancer may be a little bit difficult and doctors also face a lot of problems because it only checks and identifies the one side of the issue and it cannot find the other parts of the tissue which becomes difficult for the identification of cancer cells.

The image checking after the model for the cancer detection is done is difficult because during the training of the cells the whole parts cannot be checked clearly as the images are in different form compared to the original cells. So it becomes difficult for the doctors as well as for those who are checking and creating the models which detect them to find the cancer of the tissues.

## II Literature Survey

Research Paper – 1:

In this dataset utilized a Convolutional Neural Network to project the detection of prostate cancer. They did this by using for prostate biopsies, which lowers the GPU memory needs by and allows for the direct use of high-resolution biopsy pictures. They will soon need to directly predict survival from histopathological tissue.

Research Paper – 2:

It is an algorithm for extraction features from prostate photos that uses a 10-fold cross-validation test on both manually created and artificially created features. The features are also optimized by using an autoencoder to reduce the features. In this preprocessing of texture information. Using machine learning classifiers, we improved performance accuracy and for GLCM features. ResNet-101 and Deep Learning LSTM provided the best results.

Research Paper-3:

The results were evaluated using two standards: radiological segmentations of the PZ tumors and tumor segmentations obtained from histopathological assessed from all the sections of the prostate. These results show that, by using this method they achieved a higher diagnostic performance than a radiologist



against the gold standard histopathological labels. They also succeeded in performing single image features with respect to both reference standards.

#### Research Paper-4:

They suggested one of the first CAD systems for prostate cancer examination utilising all MP-MRI modalities. Additionally, MRSI has never been combined with the other modalities. They obtained results on a relatively complex dataset of 17 patients with an average of that obtains the latest version results, even though several CADs were tested on various datasets in order to get the best validation approach, choose the best features, and choose the best classifier.

#### Research Paper-5:

In this study, convolutional neural networks (CNNs) are used to identify prostate cancerous tumors. The malignancy is detected using epithelial nuclear seeds. CNN was used to extract features from a cancer cell. CNNs were trained using the data augmentation technique on CNNs attained for cancer detection. compared to methods that combine traditional machine learning techniques with innovative deep learning networks.

#### Research Paper-6:

In this paper it explains about the procersss where the images have been trained and categorized according the trained model of the project initially the dataset has been taken by them and so that if the user puts the image after the training of the model rhey eill get the result associated with the image in the same way in this paper it explained that the feature of the disease can be classified and checked the outlines of the tumor cells and pre process it by usage of the network model. So this will help us in diagnosis of the disease by identifying the important features and characteristic of the project and model can be checked through the identification and find out the diseases associated with the images which has been passed.

#### Research Paper-7:

In this it explains about the cancer in the tissue where it extract the features and classify them thorough the different resolutions. The main aim is to identify the tissue cells and can be prevented them from the nearby cells in order to spread the disease to other cells.

#### Research Paper – 8:

The paper explains about the different classifications of the disease associated with the cancesr as this the major issue in the present days and this can be treated faster in order to stop the spreading of the disease to

other parts of the body. The cells with the tumor can be passed to other parts in faster way which leads to affects the health of the person severely.

#### Architectural Diagram of our model

Transform through usage of the hough:

The model will gives u sthe idea about how we can overcome this cancer especially tgis will affects the men atthe older age which is the second largest problem after the lung cancer so in order to overcome this we come up with this solution. This model will explains about the major part where the disease has been spread and in order to stop and spreading of the cancer to other cells this model has been introduced where it diagnosis the cells of the tumor and decrease the affect in sprading to othet cells.

#### Convolutional Neural Network (CNN):

This plays a major role in various aspects and are used widely in different sectors to identify the objects along with the classification of the disease.

#### Convolutional Layer:

This layer will comes after the input layer where it is useful in finding the features in the images this is an important layer where it checks all the necessary parts of the images and calassifies the thoroughly.

#### Pooling Layer:

This is the layer which comes after te convolutional where the image has taken form the previous layer in this the image has been resoluted and takes the essential parts and in this there are sub layers which identifies closely.

#### Fully Connected Layer:

This layer is the last layer where previous layers are kept in single manner and can be associated with output layer. In this nodes can be kept to all so that disease can be predicted.

#### Softmax layer:

This is the function which is used to find out the values associated with the problems and gives us the solution for the problem.

Steps in architectural diagram:

- The image can be sent to the model initially where it contains the tumor cells.
- As the next step the features of the images can be taken along with that algorithms are applied for the



training of the model.

- The extracted features may contains various things associated with images as it will give us the important characteristics of the images which helps in finding the region of the disease in cells.

In this different layers have different properties initially the image with the tumor can be sent in the input layer where the size of the image can be changed according to the trained model after that the next layer which is convolutional layer is used for the feature extraction and finding the important features and outlines of the images. The images may conatin various characteristics where all this can be acquired by the model because in order to find the diseases the model should be trained and tested. The next layer called as pooling where the values can be gathered this is the layer where the image can be closely examined for getting the important and interested part can be checked thoroughly. The next will be dropout layer where all the necessary layers are kept and unnecessary will be removed in order to avoid the decrease in the model accuracy. These all layers will work together and finally it kept in single slide and passed to fully connected layer which is connected to output layer in this layer the disease on which the model trained is present so that whenever the image is passed it will goes through these layers finally it gives the disease of the particular model trained.

### Binary Local Pattern:

This pattern will help us in finding the patterns associated with the images where it can be examined by the model. Based on the trained model the values of the images can be identified here it uses the threshold so that under this values the problems of the disease can be checked. The intensity of the images along with colors are checked this patterns will describe about the how the diseases are structured along with the shpes of them everything is monitored so that doctors can get an idea about the behaviore of the disease so that they can give us the ideas about the cure and diagnosis of the disease. Now a days the cancer can be cured at the early stages but these cancers are of different types especially on which we are training because it is hard to find out through these images because the part where the tumors are present is highly difficult to find out because as this is well suited in computer but also difficult in classifying it.

This extraction can be divided into steps where it thoroughly checks the features of the disease and gives us an idea about the problem. In this we used the algorithm which helps us to find out the cells of the tumor and predict them with the good accuracy.

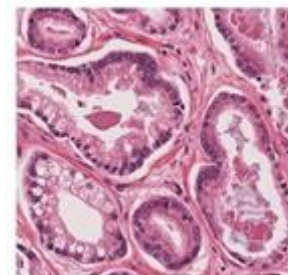
Generally this model can be trained in such a way that some filters are used in order to get the layers of the images associated with it. The time taken for the processing will be more as it checks all the cells of tumor because it is hard to find the particular spot where the disease is present. Therefore we have come up with the model which can be trained and tested thoroughly.

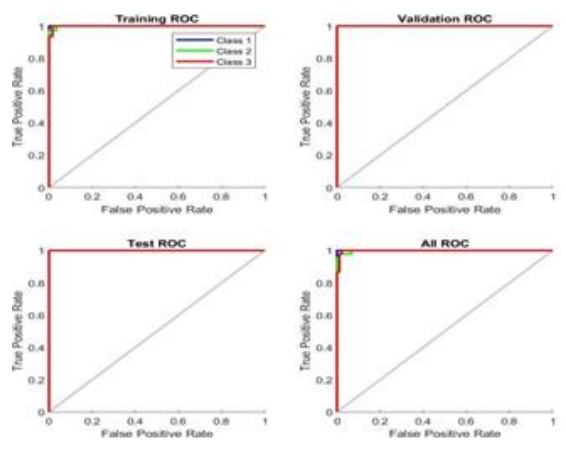
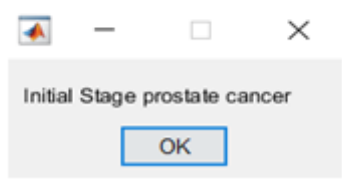
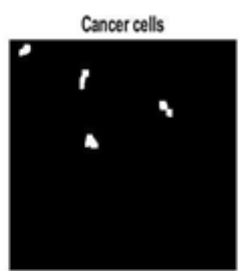
It identifies the part where the cells are affected by the cancer and find out the disease at the early stage which helps us to take the remedies associated with that disease. The final layer will give us the result as the model trained diseases will be kept in this layer only so it will check all the node and find out the moist similar features associated with that and gives us the result in this way we can find the cancer cells present in the images.

### Results and Discussion

This is the input image where it is passed in to the trained model and it will acquire all the necessary parts and regions of the images. Then it uses the filters for the classification in the region and sent it to the other layer.

In below we shown the image from the dataset trained and it contains the cells of tumor that has cancer and the surrounding regions are scanned and outlines of the cancer cells are checked and forms a structure and passed into another layer.





Curves with true positive and negative values. In this we used analysis of ROC Using where it gives us the characteristics for drawing the graphs of the model. The strategies can be explained with in the graph drawn. Thus focussing on the ROC curve area under the curve.

### Conclusion

In this we studied about how to extract the featus from the images and also acquired all the necessary parts which are useful for the implementation of the project. This described the method where the characteristics of the cancer of prostate can be identified. Along with this an algorithm is used for the optimization of the model and can be preprocessed for getting the results from the images. This gives us the intensity values of the images and the outlines associated with it. In this it helps for the persons who are suffering with this cancer to overcome from it this model has been prepared. So that they can get the remedies also about how to overcome those diseases.

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